San Benito County Water District GSA

Valley Water

# North San Benito

# Groundwater Sustainability Plan

November 2021

# APPENDICES

TODD GROUNDWATER

# APPENDIX A
# SBCWD Notices of Decision to become a Groundwater Sustainability Agency

# BOARD OF DIRECTORS
# SAN BENITO COUNTY WATER DISTRICT
**Agenda for**
**February 8, 2017**
**Special Meeting – 5:00 p.m.**
**30 Mansfield Road, Hollister, CA  95023**

*Speakers will be limited to 5 minutes to address the Board*

**Assistance for those with disabilities:** If you have a disability and need accommodation to participate in the meeting, please call Barbara Mauro, Board Clerk, at (831) 637-8218 for assistance so the necessary arrangements can be made.

## CALL TO ORDER

a. Pledge of Allegiance

b. Speakers will be limited to 5 minutes to address the Board

## AGENDA ITEMS:

1. Public Hearing regarding the District's Decision to become the Groundwater Sustainability Agency for the Bolsa, Hollister and San Juan Subbasins within San Benito County

   a. Proof of Publication submitted for Notice of Public Hearing

   b. Presentation of Groundwater Sustainability Agency

   c. Open Public Hearing

   d. Close Public Hearing

   e. Consider Resolution for San Benito County Water District's Decision to become the Groundwater Sustainability Agency for the Bolsa, Hollister and San Juan Subbasins within San Benito County

## ADJOURNMENT

All public records relating to an agenda item on this agenda are available for public inspection at the time the record is distributed to all, or a majority of all, members of the Board. Such records shall be available at the District office located at 30 Mansfield Road, Hollister, California.

**BOARD OF DIRECTORS**
**SAN BENITO COUNTY WATER DISTRICT**

## RESOLUTION NO. 2017-03

## A RESOLUTION OF THE BOARD OF DIRECTORS SAN BENITO COUNTY WATER DISTRICT'S DECISION TO BECOME THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE BOLSA, HOLLISTER, AND SAN JUAN SUBBASINS WITHIN SAN BENITO COUNTY

**WHEREAS**, on September 16, 2014, the Sustainable Groundwater Management Act (SGMA) was signed into law and adopted into the California Water Code, commencing with Section 10720; and

**WHEREAS**, the legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management; and to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; and

**WHEREAS,** Water Code Sections 10725 et al. and 10726 et al. detail additional new powers and authorities granted to Groundwater Sustainability Agencies to implement sustainable groundwater management in the basins under their jurisdictions; and

**WHEREAS**, the San Benito County Water District Act (California Water Code Appendix, Chapter 70) provides the District with broad groundwater management authority, including the authority to conserve water for beneficial and useful purposes by spreading, storing, retaining, and causing such waters to percolate into the soil within or without the District; and

**WHEREAS**, the District's statutory boundary overlies the Bolsa, Hollister, and San Juan Subbasins within San Benito County; and

**WHEREAS**, the Bolsa, Hollister, and San Juan Subbasins are deemed by the California Department of Water Resources (DWR) to be medium-priority basins and therefore require the development of a Groundwater Sustainability Plan; and

**WHEREAS**, establishing the District as the Groundwater Sustainability Agency will enable the District to prepare and implement a Groundwater Sustainability Plan (GSP) for the Bolsa, Hollister, and San Juan Subbasins within San Benito County, and to best work with DWR and the State Water Resources Control Board to resolve groundwater and surface water issues related to the Bolsa, Hollister, and San Juan Subbasins within San Benito County; and

**WHEREAS**, the District is committed to its legislatively created mandate to manage the surface water and groundwater resources within its jurisdiction; and

**WHEREAS**, prior to adopting a resolution of intent to establish the District as a Groundwater Sustainability Agency, Water Code Section 10723 requires the local agency to hold a public hearing, after publication of notice pursuant to California Government Code Section 6066, on whether or not to adopt a resolution to establish a Groundwater Sustainability Agency; and

**WHEREAS**, pursuant to Government Code 6066, notices of a public hearing on whether or not to adopt a resolution to establish a Groundwater Sustainability Agency were published on January 27, 2017 and February 3, 2017; and

**WHEREAS**, on February 8, 2017, this District held a public hearing regarding the adoption of a resolution to establish the District as the Groundwater Sustainability Agency for the Bolsa, Hollister, and San Juan Subbasins within San Benito County;

NOW, THEREFORE BE IT RESOLVED that the Board of Directors of the San Benito County Water District:

1. Hereby establishes the District as the Groundwater Sustainability Agency for the Bolsa, Hollister, and San Juan Subbasins within San Benito County; and
2. Hereby authorizes the District Manager or his designee to provide a copy of this resolution and a Notice of Intent to the California Department of Water Resources within 30 days and to otherwise comply with the requirements of Water Code Section 10723.B(a); and
3. All the recitals in this Resolution are true and correct and the District so finds, determines, and represents.

**PASSED AND ADOPTED** at a Special Meeting of the Board of Directors of San Benito County Water District by the following vote on February 8, 2017:

AYES: Tobias, Tonascia, Bettencourt, Flores & Huenemann
NOES: None
ABSENT: None
ABSTAIN: None

John Tobias
President

ATTEST:

Sara Singleton
Assistant Manager

# APPENDIX B

# Memorandum of Understanding

DOCUMENT #

MOU 00150

# MEMORANDUM OF UNDERSTANDING
# BETWEEN SANTA CLARA VALLEY WATER DISTRICT
# AND SAN BENITO COUNTY WATER DISTRICT
# FOR
# SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE

THIS MEMORANDUM OF UNDERSTANDING ("MOU"), made in the State of California on July 5, 2017, is by and between the Santa Clara Valley Water District ("SCVWD"), and the San Benito County Water District ("SBCWD"), each a "Party" and collectively the "Parties."

This MOU sets forth the respective roles and responsibilities of the Parties regarding coordination to sustainably manage groundwater in the Hollister Area Subbasin and San Juan Bautista Area Subbasin.

## RECITALS

WHEREAS, the SCVWD, an independent special district created by the Legislature of the State of California, manages groundwater and is the primary water resource agency for Santa Clara County, supplying wholesale water, providing flood protection and serving as environmental steward for clean, safe creeks and healthy ecosystems; and

WHEREAS, the SBCWD, a water conservation and flood control district, preserves the economic and environmental health and well-being of San Benito County through the control, management and conservation of waters and the provision of water services in a practical, cost-effective and responsible manner; and

WHEREAS, the Sustainable Groundwater Management Act ("Act"), enacted by the State of California, provides that local agencies may become a Groundwater Sustainability Agency ("GSA") and adopt a Groundwater Sustainability Plan ("GSP") to manage groundwater basins within the local agency's statutory jurisdiction; and

WHEREAS, the Act and this MOU define "basin" as a basin or subbasin identified and defined in California Department of Water Resources (DWR) Bulletin 118; and

WHEREAS, the Act requires that the entirety of each medium- and high-priority basin, as defined by DWR, be covered by a GSA by June 30, 2017 to avoid potential state intervention; and

WHEREAS, the service area of each Party overlies two common groundwater basins as defined by the Act and DWR: the Hollister Area Subbasin (DWR Basin 3-3.03) and the San Juan Bautista Area Subbasin (DWR Basin 3-3.04), collectively the "Common Basins"; and

WHEREAS, the SBCWD manages groundwater within San Benito County, including the majority of the Common Basins and the entirety of the Bolsa Area Subbasin (DWR Basin 3-3.02); and

WHEREAS, small portions of the Common Basins are located within Santa Clara County; and

WHEREAS, in terms of surface area, Santa Clara County contains less than ten percent of the Hollister Area Subbasin and less than one percent of the San Juan Bautista Area Subbasin; and

WHEREAS, the SCVWD has not previously conducted groundwater management activities in the Santa Clara County portions of the Common Basins other than permitting the construction, modification, and destruction of wells; and

WHEREAS, following a public hearing on February 8, 2017, the SBCWD Board of Directors adopted Resolution 2017-03 establishing the SBCWD as the GSA for the portions of the Common Basins located within San Benito County; and

WHEREAS, following a public hearing on June 13, 2017, the SCVWD Board of Directors adopted Resolution 17-38 establishing the SCVWD as the GSA for the portion of the Common Basins in Santa Clara County; and

WHEREAS, the action of each Party to adopt a resolution to become the GSA and submit related notification to DWR ensures the entirety of the Common Basins is covered by a GSA with no areas of overlap; and

WHEREAS, each Party is a local agency qualified to prepare and adopt a GSP under the Act; and

WHEREAS, the entirety of each basin subject to the Act that is not in a condition of critical overdraft must be addressed by a GSP by January 31, 2022; and

WHEREAS, if there are multiple GSAs within a basin, the GSAs can develop a single GSP for the entire basin or separate GSPs, provided there is a related coordination agreement; and

WHEREAS, for the purposes of this MOU, "GSP" is defined as one or more GSPs developed by the Parties for the entirety of the Common Basins; and

WHEREAS, GSAs are responsible for ensuring long-term groundwater sustainability through implementation of a GSP; and

WHEREAS, the Parties wish to provide a framework for cooperative groundwater management efforts in the Common Basins to ensure the Act is implemented effectively, efficiently, fairly, and at the lowest reasonable cost.

NOW, THEREFORE, in consideration of the recitals and mutual obligations of the Parties expressed herein, the Parties agree as follows:

**1. Purpose**

The purpose of this MOU is to establish an understanding between the Parties with regard to preparing a GSP for the Common Basins, including responsibilities and funding obligations.

**2. Term**

a) This MOU shall become effective upon its execution by both Parties.

b) This MOU will terminate when the Parties agree, in writing, that the GSP is complete to the satisfaction of DWR.

c) Payment obligations under Article 6, Cost Sharing and Payment, and Article 11, Cancellation, shall survive discharge or termination of this MOU until obligations are satisfied.

**3. Responsibilities of the Parties**

General responsibilities of the Parties regarding the Common Basins are as follows:

a) Ensure all required GSA filings are complete and submitted to DWR by the June 30, 2017 statutory deadline.

b) Develop a schedule to prepare a GSP for the Common Basins for consideration by the Board of Directors of both Parties.

c) Share relevant data on geology, hydrogeology, operations, or other information that may be needed to develop or implement a GSP.

d) Coordinate to conduct stakeholder outreach related to GSP development and adoption.

e) Submit the GSP to DWR by the January 31, 2022 statutory deadline.

f) Ensure all work related to this MOU is performed in accordance with the California Environmental Quality Act and other applicable laws.

g) Coordinate to respond to public comments on the GSP for the Common Basins, as applicable.

h) Address any issues or deficiencies raised by DWR during their review of the GSP within the required time.

i) Explore the role of each Party in implementing the GSP to ensure long-term sustainability and compliance with the Act. The role of each Party will be documented in a future MOU or other agreement. This MOU does not obligate either Party to implement specific groundwater management actions in the Common Basins.

**4. Responsibilities of SBCWD**

a) SBCWD will act as the contracting entity under this MOU. Subject to approval by SBCWD's authorized representative, SBCWD shall be responsible for executing any Consultant Contract(s) to undertake development of the GSP. SBCWD shall conduct a consultant procurement process that satisfies its own internal consultant procurement policies/criteria.

b) Share relevant data and information with SCVWD as requested.

c) Notify SCVWD of the Consultant(s) selected to develop the GSP.

d) Solicit SCVWD comments on any Consultant Contract(s) related to GSP development prior to execution.

e) Review Consultant invoices for approval and report disputes, if any, to SCVWD within five (5) working days of receipt of invoice. Pay approved invoices and provide copies of invoices to SCVWD with requests for reimbursement as described in Article 6.

f) Solicit SCVWD comments on Consultant deliverables prior to acceptance.

**5. Responsibilities of SCVWD**

a) Share relevant data and information with SBCWD as requested.

b) Provide comments on proposed Consultant Contract(s) within five (5) working days of receipt.

c) Provide comments on Consultant deliverables within five (5) working days, or other schedule as mutually agreed upon. The SCVWD technical review period for the draft GSP will be a minimum of ten (10) working days.

d) Reimburse SBCWD in accordance with Article 6.

**6. Cost Sharing and Payment**

The estimated Consultant cost to develop a GSP for the Common Basins is expected to be less than $250,000. Additional Consultant work may be needed to respond to issues raised during DWR review of the GSP. SCVWD agrees to reimburse SBCWD for 10% of the total Consultant cost, with a maximum contribution of $35,000, unless additional funding is authorized in writing through an amendment pursuant to Article 13 of this MOU.

a) SBCWD shall request reimbursement from SCVWD by submitting invoice(s) for incurred Consultant contract costs no more than once a calendar quarter. The invoice(s) shall clearly indicate the SCVWD cost share and shall be accompanied by adequate supporting documentation of related Consultant contract costs, including the hourly rates, hours spent, and information on activities performed in support of the scope of services specified in the Consultant contract(s).

b) Following review and approval of an invoice by SCVWD, SCVWD shall disburse to SBCWD the approved amount within thirty (30) days of receipt of the invoice.

c) An invoice may be rejected by SCVWD only if the invoice contains a material error or paying the invoice would result in SCVWD exceeding its maximum contribution described in this Article. SCVWD shall notify SBCWD of any invoice so rejected, and the reasons therefore.

d) Costs incurred by SBCWD for "in-kind" services including staff time and overhead costs, as well as costs for Consultant oversight, meetings, travel, and incidental expenses shall not be reimbursable by SCVWD.

## 7. Hold Harmless, Indemnification, Remedies, and Insurance

To the extent permitted by California State law and in proportion to fault, each Party will indemnify, defend, and hold all other Parties and their directors, officers, agents, and employees safe and harmless from any and all claims, suits, judgments, damages, penalties, costs, expenses, liabilities and losses (including without limitation, sums paid in settlement of claims, actual attorneys' fees, paralegal fees, consultant fees, engineering fees, expert fees, and any other professional fees) that arise from or are related in any way to each Party, its employees, officers, or other agents in the operation and/or performance of this MOU; provided, however, that no Party shall indemnify or hold harmless another Party for that Party's own negligent acts, errors, or omissions, or willful misconduct, in the operation and/or performance of this MOU or the performance of the Consultant(s).

Notwithstanding the preceding paragraph, where more than one Party is named in a suit challenging the GSP regarding the Common Basins, or made subject to a claim or penalty regarding the same, the Parties shall coordinate and undertake a joint defense, utilizing a joint defense agreement to the extent possible, subject to the approval of the Parties. Each Party agrees that, to the greatest extent practicable, it shall cooperate in such defense and execute any waivers and/or tolling agreements that may be necessary in order to provide for a single joint defense of such a suit, claim, or imposition of penalty. Any communications between the Parties and any of their respective consultants and attorneys engaged in the joint defense shall be privileged as joint defense communications. Work performed during the joint defense by Consultants or attorneys, to the extent allowed by law, shall be considered attorney work product. Nothing in this paragraph is intended to require a joint defense under circumstances where it would be legally impermissible or under circumstances where it is wholly impractical.

This indemnity provision shall survive the termination of this MOU and the termination of any Party's participation in this MOU. Further, each Party will be liable to the other Party for attorneys' fees, costs, and expenses, and all other costs and expenses whatsoever, which are incurred by the other Party in enforcing this indemnity provision.

In all Consultant contracts funded in whole or part by the Parties, SBCWD shall name the SCVWD and its respective officers, agents, and employees as additional insureds and additional indemnitees in the insurance coverage and indemnity provisions customarily used in the SBCWD professional service contracts.

## 8. Disputes

Any claim that a Party may have against the other Party regarding the performance of this MOU including, but not limited to, claims for compensation will be submitted to such other Party. The Parties will attempt to negotiate a resolution of such claim and if necessary process an amendment to this MOU or a settlement agreement to implement the terms of any such resolution.

## 9. Cancellation

If a Party elects to terminate its participation in this MOU, it may do so by delivering to the other Party a written notice of intention to terminate. Termination shall take effect thirty days following the receipt of notice by the other Party. No portion of the terminating Party's financial contribution provided under this MOU shall be refunded to the terminating Party.

## 10. Maintenance and Inspection of Books, Records, and Reports

The Parties will, upon reasonable advance written notice, make available for inspection by the other Party all records, books, and other documents directly relating to the GSP or groundwater management for the Common Basins. Prior to release of such documents (other than in response to a request under the California Public Records Act, a subpoena, or court order), all draft information shall be approved by both Parties for finalization and release.

## 11. MOU Not a Precedent

The Parties intend that the provisions of this MOU will not bind the Parties as to the provisions of any future agreement between them. This MOU was developed specifically for the specified MOU term and purpose.

## 12. Notices

Any notice, demand, or request made in connection with this MOU must be in writing and will be deemed properly served if delivered in person or sent by Unites States mail, postage prepaid, to the addresses specified herein.

Santa Clara Valley Water District
Attention: Garth Hall, Deputy Operating Officer, Water Supply
5750 Almaden Expressway
San Jose, CA 95118

San Benito County Water District
Attention: Jeff Cattaneo, District Manager
30 Mansfield Road, PO Box 899
Hollister, CA 95024

Any Party may change such contact or address by notice given to the other Party as provided herein.

## 13. Amendments

The MOU may be amended in the form of written amendment executed by both Parties.

## 14. Assignment

No Party shall assign, sublet, or transfer this MOU or any of the rights or interests in this MOU without the written consent of the other Party.

## 15. Severability

The partial or total invalidity of one or more parts of this MOU will not affect the intent or validity or remaining parts of this MOU.

**16. Governing Law**

This MOU will be deemed a contract under the laws of the State of California and for all purposes shall be interpreted in accordance with such laws.

**17. Interpretation**

This MOU shall be deemed to have been prepared equally by both Parties, and its individual provisions shall not be construed or interpreted more favorably for one Party on the basis that the other Party prepared it.

**18. Contractual Restriction on Consultant's Use of Study Materials**

Each Party shall ensure that reasonable contractual restrictions on the consultant's use of the study material and handling of confidential material are included in a written agreement with the consultant.

**19. No Third-Party Beneficiaries**

This MOU does not and is not intended to confer any rights or remedies upon any person or entity other than the Parties.

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In WITNESS WHEREOF, the parties have executed this MOU as of the effective date.

**San Benito County Water District**

Approved as to Form

NAME DAVID E. PIRAL
General Counsel

Jeff Cattaneo
General Manager

7/5/17
Date

**Santa Clara Valley Water District**

Approved as to Form

Erick Soderlund
Assistant District Counsel

Norma Camacho
Interim Chief Executive Officer

6/19/2017
Date

# APPENDIX C

# GSP Preparation Checklist

## Table 1-1. GSP Preparation Checklist

| GSP Regulations Section | Water Code Section | Requirement | Description | Section(s) or Page Number(s) in the GSP |
|---|---|---|---|---|
| **Article 3. Technical and Reporting Standards** | | | | |
| 352.2 | | Monitoring Protocols | - Monitoring protocols adopted by the GSA for data collection and management<br>- Monitoring protocols that are designed to detect changes in groundwater levels, groundwater quality, inelastic surface subsidence for basins for which subsidence has been identified as a potential problem, and flow and quality of surface water that directly affect groundwater levels or quality or are caused by groundwater extraction in the basin | Section 7.2 |
| **Article 5. Plan Contents, Subarticle 1. Administrative Information** | | | | |
| 354.4 | | General Information | - List of references and technical studies | Section 10 |
| 354.6 | | Agency Information | - GSA mailing address<br>- Organization and management structure<br>- Contact information of Plan Manager<br>- Legal authority of GSA<br>- Estimate of implementation costs | Section 1.3 |
| 354.8(a) | 10727.2(a)(4) | Map(s) | - Area covered by GSP (Figure 1-1)<br>- Adjudicated areas, other agencies within the basin, and areas covered by an Alternative (Figure 1-1)<br>- Jurisdictional boundaries of federal or State land (Figure 2-1)<br>- Existing land use designations (Figures 2-7, 2-8)<br>- Density of wells per square mile (Figures 2-3 through 2-6) | Section 2 |
| 354.8(b) | | Description of the Plan Area | - Summary of jurisdictional areas and other features | Section 2.1 |
| 354.8(c)<br>354.8(d)<br>354.8(e) | 10727.2(g) | Water Resource Monitoring and Management Programs | - Description of water resources monitoring and management programs<br>- Description of how the monitoring networks of those plans will be incorporated into the GSP<br>- Description of how those plans may limit operational flexibility in the basin<br>- Description of conjunctive use programs | Section 2.1.4<br>Section 2.1.4.1<br>Section 2.1.4.2<br>Section 2.1.6 |
| 354.8(f) | 10727.2(g) | Land Use Elements or Topic Categories of Applicable General Plans | - Summary of general plans and other land use plans<br>- Description of how implementation of the GSP may change water demands or affect achievement of sustainability and how the GSP addresses those effects<br>- Description of how implementation of the GSP may affect the water supply assumptions of relevant land use plans<br>- Summary of the process for permitting new or replacement wells in the basin<br>- Information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management | Section 2.1.5<br>Section 2.1.5.3<br><br>Section 2.1.5.4<br><br>Section 2.1.5.5<br>Section 2.1.6 |
| **Article 5. Plan Contents, Subarticle 1. Administrative Information (Continued)** | | | | |
| 354.8(g) | 10727.4 | Additional GSP Contents | **Description of Actions related to:**<br>- Control of saline water intrusion<br>- Wellhead protection<br>- Migration of contaminated groundwater<br>- Well abandonment and well destruction program<br>- Replenishment of groundwater extractions<br>- Conjunctive use and underground storage<br>- Well construction policies<br>- Addressing groundwater contamination cleanup, recharge, diversions to storage, conservation, water recycling, conveyance, and extraction projects<br>- Efficient water management practices<br>- Relationships with State and federal regulatory agencies<br>- Review of land use plans and efforts to coordinate with land use planning agencies to assess activities that potentially create risks to groundwater quality or quantity<br>- Impacts on groundwater dependent ecosystems | Section 2.1.6 |
| 354.10 | | Notice and Communication | - Description of beneficial uses and users<br>- List of public meetings<br>- GSP comments and responses<br>- Decision-making process<br>- Public engagement<br>- Encouraging active involvement<br>- Informing the public on GSP implementation progress | Section 2.1.7<br>Appendix I<br>Appendix I<br>Section 1.3.1<br>Appendix D<br>Section 2.1.7<br>Section 2.1.7 |

| GSP Regulations Section | Water Code Section | Requirement | Description | Section(s) or Page Number(s) in the GSP |
|---|---|---|---|---|
| **Article 5. Plan Contents, Subarticle 2. Basin Setting** | | | | |
| 354.14 | | Hydrogeologic Conceptual Model | - Description of the Hydrogeologic Conceptual Model<br>- Two scaled cross-sections<br>- Map(s) of physical characteristics: topographic information, surficial geology, soil characteristics, surface water bodies, source and point of delivery for imported water supplies | Section 3, Figure 3-7 and 3-10<br>Figure 3-1,Figure 3-5,Figure 3-4,Figure 3-2, Figure 2-7 |
| 9 | 10727.2(a)(5) | Map of Recharge Areas | - Map delineating existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas | Figure 3-11 |
| | 10727.2(d)(4) | Recharge Areas | - Description of how recharge areas identified in the plan substantially contribute to the replenishment of the basin | Section 3.10 |
| 354.16 | 10727.2(a)(1)<br>10727.2(a)(2) | Current and Historical Groundwater Conditions | - Groundwater elevation data<br>- Estimate of groundwater storage<br>- Seawater intrusion conditions<br>- Groundwater quality issues<br>- Land subsidence conditions<br>- Identification of interconnected surface water systems<br>- Identification of groundwater-dependent ecosystems | Section 4 |
| 354.18 | 10727.2(a)(3) | Water Budget Information | - Description of inflows, outflows, and change in storage<br>- Quantification of overdraft<br>- Estimate of sustainable yield<br>- Quantification of current, historical, and projected water budgets | Section 5.7, Section 5.8, and Section 5.9 |
| | 10727.2(d)(5) | Surface Water Supply | - Description of surface water supply used or available for use for groundwater recharge or in-lieu use | Section 2.1.2.1, Section 3.11, Section 5.6.2 |
| 354.20 | | Management Areas | - Reason for creation of each management area<br>- Minimum thresholds and measurable objectives for each management area<br>- Level of monitoring and analysis<br>- Explanation of how management of management areas will not cause undesirable results outside the management area<br>- Description of management areas | Section 5.4 |
| **Article 5. Plan Contents, Subarticle 3. Sustainable Management Criteria** | | | | |
| 354.24 | | Sustainability Goal | - Description of the sustainability goal | Section 6.1.1 |
| 354.26 | | Undesirable Results | - Description of undesirable results<br>- Cause of groundwater conditions that would lead to undesirable results<br>- Criteria used to define undesirable results for each sustainability indicator<br>- Potential effects of undesirable results on beneficial uses and users of groundwater | Section 6.2.1<br>Section 6.3.1<br>Section 6.4.1<br>Section 6.6.1<br>Section 6.7.1 |
| 354.28 | 10727.2(d)(1)<br>10727.2(d)(2) | Minimum Thresholds | - Description of each minimum threshold and how they were established for each sustainability indicator<br>- Relationship for each sustainability indicator<br>- Description of how selection of the minimum threshold may affect beneficial uses and users of groundwater<br>- Standards related to sustainability indicators<br>- How each minimum threshold will be quantitatively measured | Section 6.2.4<br>Section 6.3.4<br>Section 6.4.4<br>Section 6.6.4<br>Section 6.7.4 |
| 354.30 | 10727.2(b)(1)<br>10727.2(b)(2)<br>10727.2(d)(1)<br>10727.2(d)(2) | Measureable Objectives | - Description of establishment of the measureable objectives for each sustainability indicator<br>- Description of how a reasonable margin of safety was established for each measureable objective<br>- Description of a reasonable path to achieve and maintain the sustainability goal, including a description of interim milestones | Section 6.2.5<br>Section 6.3.5<br>Section 6.4.5<br>Section 6.6.5<br>Section 6.7.5 |

| GSP Regulations Section | Water Code Section | Requirement | Description | Section(s) or Page Number(s) in the GSP |
|---|---|---|---|---|
| **Article 5. Plan Contents, Subarticle 4. Monitoring Networks** | | | | |
| 354.34 | 10727.2(d)(1)<br>10727.2(d)(2)<br>10727.2(e)<br>10727.2(f) | Monitoring Networks | - Description of monitoring network<br>- Description of monitoring network objectives<br>- Description of how the monitoring network is designed to: demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features; estimate the change in annual groundwater in storage; monitor seawater intrusion; determine groundwater quality trends; identify the rate and extent of land subsidence; and calculate depletions of surface water caused by groundwater extractions<br>- Description of how the monitoring network provides adequate coverage of Sustainability Indicators<br>- Density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends<br>- Scientific rational (or reason) for site selection<br>- Consistency with data and reporting standards<br>- Corresponding sustainability indicator, minimum threshold, measureable objective, and interim milestone<br>- Location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used<br>- Description of technical standards, data collection methods, and other procedures or protocols to ensure comparable data and methodologies | Section 7.1<br>Section 7.2 |
| 354.36 | | Representative Monitoring | - Description of representative sites<br>- Demonstration of adequacy of using groundwater elevations as proxy for other sustainability indicators<br>- Adequate evidence demonstrating site reflects general conditions in the area | Section 7.3 |
| 354.38 | | Assessment and Improvement of Monitoring Network | - Review and evaluation of the monitoring network<br>- Identification and description of data gaps<br>- Description of steps to fill data gaps<br>- Description of monitoring frequency and density of sites | Section 7.5<br>Section 7.5.1<br>Section 7.5.2<br>Section 7.1.1 |
| **Article 5. Plan Contents, Subarticle 5. Projects and Management Actions** | | | | |
| 354.44 | | Projects and Management Actions | - Description of projects and management actions that will help achieve the basin's sustainability goal<br>- Measureable objective that is expected to benefit from each project and management action<br>- Circumstances for implementation<br>- Public noticing<br>- Permitting and regulatory process<br>- Time-table for initiation and completion, and the accrual of expected benefits<br>- Expected benefits and how they will be evaluated<br>- How the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included.<br>- Legal authority required<br>- Estimated costs and plans to meet those costs<br>- Management of groundwater extractions and recharge | Section 8.0 |
| 354.44(b)(2) | 10727.2(d)(3) | | - Overdraft mitigation projects and management actions | NA |
| **Article 8. Interagency Agreements** | | | | |
| 357.4 | 10727.6 | Coordination Agreements - Shall be submitted to the Department together with the GSPs for the basin and, if approved, shall become part of the GSP for each participating Agency. | **Coordination Agreements shall describe the following:**<br>- A point of contact<br>- Responsibilities of each Agency<br>- Procedures for the timely exchange of information between Agencies<br>- Procedures for resolving conflicts between Agencies<br>- How the Agencies have used the same data and methodologies to coordinate GSPs<br>- How the GSPs implemented together satisfy the requirements of SGMA<br>- Process for submitting all Plans, Plan amendments, supporting information, all monitoring data and other pertinent information, along with annual reports and periodic evaluations<br>- A coordinated data management system for the basin<br>- Coordination agreements shall identify adjudicated areas within the basin, and any local agencies that have adopted an Alternative that has been accepted by the Department | N/A |

| Article 5. | | | Plan Contents for North San Benito Basin | GSP Document References | | | | |
|---|---|---|---|---|---|---|---|---|
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| § 354. | | | **Introduction to Plan Contents** | | | | | |
| | | | This Article describes the required contents of Plans submitted to the Department for evaluation, including administrative information, a description of the basin setting, sustainable management criteria, description of the monitoring network, and projects and management actions. | | | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Section 10733.2, Water Code. | | | | | |
| **SubArticle 1.** | | | **Administrative Information** | | | | | |
| § 354.2. | | | **Introduction to Administrative Information** | | | | | |
| | | | This Subarticle describes information in the Plan relating to administrative and other general information about the Agency that has adopted the Plan and the area covered by the Plan. | | | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Section 10733.2, Water Code. | | | | | |
| § 354.4. | | | **General Information** | | | | | |
| | | | Each Plan shall include the following general information: | | | | | |
| (a) | | | An executive summary written in plain language that provides an overview of the Plan and description of groundwater conditions in the basin. | 17:27 | ES | | | |
| (b) | | | A list of references and technical studies relied upon by the Agency in developing the Plan. Each Agency shall provide to the Department electronic copies of reports and other documents and materials cited as references that are not generally available to the public. | 340:348 | 10 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10733.2 and 10733.4, Water Code. | | | | | |
| § 354.6. | | | **Agency Information** | | | | | |
| | | | When submitting an adopted Plan to the Department, the Agency shall include a copy of the information provided pursuant to Water Code Section 10723.8, with any updates, if necessary, along with the following information: | | | | | |
| (a) | | | The name and mailing address of the Agency. | 29:30 | 1.3 | | | |
| (b) | | | The organization and management structure of the Agency, identifying persons with management authority for implementation of the Plan. | 29:30 | 1.3 | | | |
| (c) | | | The name and contact information, including the phone number, mailing address and electronic mail address, of the plan manager. | 29:30 | 1.3 | | | |
| (d) | | | The legal authority of the Agency, with specific reference to citations setting forth the duties, powers, and responsibilities of the Agency, demonstrating that the Agency has the legal authority to implement the Plan. | 32 | 1.4.1 | | | |
| (e) | | | An estimate of the cost of implementing the Plan and a general description of how the Agency plans to meet those costs. | 32:33 | 1.4.2 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10723.8, 10727.2, and 10733.2, Water Code. | | | | | |
| § 354.8. | | | **Description of Plan Area** | | | | | |

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| | | | Each Plan shall include a description of the geographic areas covered, including the following information: | | | | | |
| (a) | | | One or more maps of the basin that depict the following, as applicable: | | | | | |
| | (1) | | The area covered by the Plan, delineating areas managed by the Agency as an exclusive Agency and any areas for which the Agency is not an exclusive Agency, and the name and location of any adjacent basins. | 34, 36:55 | 2.1 | Figure 1-1 | | |
| | (2) | | Adjudicated areas, other Agencies within the basin, and areas covered by an Alternative. | 36, 67 | 2.1.1 | Figure 2-1 | | |
| | (3) | | Jurisdictional boundaries of federal or state land (including the identity of the agency with jurisdiction over that land), tribal land, cities, counties, agencies with water management responsibilities, and areas covered by relevant general plans. | 36:40, 68 | 2.1.2 | Figure 2-1 | | |
| | (4) | | Existing land use designations and the identification of water use sector and water source type. | 40, 48:53, 79 | 2.1.3, 2.1.5 | Figure 2-8: Figure 2-13 | | |
| | (5) | | The density of wells per square mile, by dasymetric or similar mapping techniques, showing the general distribution of agricultural, industrial, and domestic water supply wells in the basin, including de minimis extractors, and the location and extent of communities dependent upon groundwater, utilizing data provided by the Department, as specified in Section 353.2, or the best available information. | 37:40, 68:71 | 2.1.2.1 | Figures 2-2: Figure 2-5 | | |
| (b) | | | A written description of the Plan area, including a summary of the jurisdictional areas and other features depicted on the map. | 36:55, 67 | 2.1 | Figure 2-1 | | |
| (c) | | | Identification of existing water resource monitoring and management programs, and description of any such programs the Agency plans to incorporate in its monitoring network or in development of its Plan. The Agency may coordinate with existing water resource monitoring and management programs to incorporate and adopt that program as part of the Plan. | 40:48 | 2.1.4 | | | |
| (d) | | | A description of how existing water resource monitoring or management programs may limit operational flexibility in the basin, and how the Plan has been developed to adapt to those limits. | 40:48 | 2.1.4 | | | |
| (e) | | | A description of conjunctive use programs in the basin. | 40:48 | 2.1.4 | | | |
| (f) | | | A plain language description of the land use elements or topic categories of applicable general plans that includes the following: | | | | | |
| | (1) | | A summary of general plans and other land use plans governing the basin. | 48:53, 76:79 | 2.1.5 | Figure 2-10: Figure 2-13 | | |
| | (2) | | A general description of how implementation of existing land use plans may change water demands within the basin or affect the ability of the Agency to achieve sustainable groundwater management over the planning and implementation horizon, and how the Plan addresses those potential effects | 48:53 | 2.1.5 | | | |
| | (3) | | A general description of how implementation of the Plan may affect the water supply assumptions of relevant land use plans over the planning and implementation horizon. | 48:53 | 2.1.5 | | | |

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| | (4) | | A summary of the process for permitting new or replacement wells in the basin, including adopted standards in local well ordinances, zoning codes, and policies contained in adopted land use plans. | 53 | 2.1.5.5 | | | |
| | (5) | | To the extent known, the Agency may include information regarding the implementation of land use plans outside the basin that could affect the ability of the Agency to achieve sustainable groundwater management. | 51:52 | 2.1.5.3 | | | |
| (g) | | | A description of any of the additional Plan elements included in Water Code Section 10727.4 that the Agency determines to be appropriate. | 53:54 | 2.1.6 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10720.3, 10727.2, 10727.4, 10733, and 10733.2, Water Code. | | | | | |
| **§ 354.10.** | | | **Notice and Communication** | | | | | |
| | | | Each Plan shall include a summary of information relating to notification and communication by the Agency with other agencies and interested parties including the following: | | | | | |
| (a) | | | A description of the beneficial uses and users of groundwater in the basin, including the land uses and property interests potentially affected by the use of groundwater in the basin, the types of parties representing those interests, and the nature of consultation with those parties. | 88:89, 193, 202, | 3.10, 6.2.4, 6.3.4, 6.5, 6.6.4, 6.6.7, Appendix D | | | |
| (b) | | | A list of public meetings at which the Plan was discussed or considered by the Agency. | 1211:1253 | Appendix I | | | |
| (c) | | | Comments regarding the Plan received by the Agency and a summary of any responses by the Agency. | 1211:1253 | Appendix I | | | |
| (d) | | | A communication section of the Plan that includes the following: | | | | | |
| | (1) | | An explanation of the Agency's decision-making process. | 357:366 | Appendix B | | | |
| | (2) | | Identification of opportunities for public engagement and a discussion of how public input and response will be used. | 393:404 | Appendix D | | | |
| | (3) | | A description of how the Agency encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin. | 393:404 | Appendix D | | | |
| | (4) | | The method the Agency shall follow to inform the public about progress implementing the Plan, including the status of projects and actions. | 393:404 | Appendix D | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10723.2, 10727.8, 10728.4, and 10733.2, Water Code | | | | | |
| **SubArticle 2.** | | | **Basin Setting** | | | | | |
| **§ 354.12.** | | | **Introduction to Basin Setting** | | | | | |

| Article 5. | | | Plan Contents for North San Benito Basin | GSP Document References | | | | |
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| | | | | Page Numbers of Plan | Or Section Numbers | Or Figure Numbers | Or Table Numbers | Notes |
| | | | This Subarticle describes the information about the physical setting and characteristics of the basin and current conditions of the basin that shall be part of each Plan, including the identification of data gaps and levels of uncertainty, which comprise the basin setting that serves as the basis for defining and assessing reasonable sustainable management criteria and projects and management actions. Information provided pursuant to this Subarticle shall be prepared by or under the direction of a professional geologist or professional engineer. | | | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Section 10733.2, Water Code. | | | | | |
| **§ 354.14.** | | | **Hydrogeologic Conceptual Model** | | | | | |
| (a) | | | Each Plan shall include a descriptive hydrogeologic conceptual model of the basin based on technical studies and qualified maps that characterizes the physical components and interaction of the surface water and groundwater systems in the basin. | 80:100 | 3 | Figures 3-1: Figure 3-11 | | |
| (b) | | | The hydrogeologic conceptual model shall be summarized in a written description that includes the following: | | | | | |
| | (1) | | The regional geologic and structural setting of the basin including the immediate surrounding area, as necessary for geologic consistency. | 81:83, 90:94 | 3.4:3.5 | Figures 3-1: Figure 3-5 | | |
| | (2) | | Lateral basin boundaries, including major geologic features that significantly affect groundwater flow. | 82:88, 94 | 3.5:3.7, 3.9 | Figure 3-5 | | |
| | (3) | | The definable bottom of the basin. | 85:86 | 3.8 | | | |
| | (4) | | Principal aquifers and aquitards, including the following information: | | | | | |
| | | (A) | Formation names, if defined. | 81:82, 94 | 3.4 | Figure 3-5 | | |
| | | (B) | Physical properties of aquifers and aquitards, including the vertical and lateral extent, hydraulic conductivity, and storativity, which may be based on existing technical studies or other best available information. | 81:88, 94 | 3.4:3.9 | Figure 3-5 | | |
| | | (C) | Structural properties of the basin that restrict groundwater flow within the principal aquifers, including information regarding stratigraphic changes, truncation of units, or other features. | 81:88, 94 | 3.4:3.9 | Figure 3-5 | | |
| | | (D) | General water quality of the principal aquifers, which may be based on information derived from existing technical studies or regulatory programs. | 109:111 | 4.4 :4.5 | | | |
| | | (E) | Identification of the primary use or uses of each aquifer, such as domestic, irrigation, or municipal water supply. | 89 | 3.11 | | | |
| | (5) | | Identification of data gaps and uncertainty within the hydrogeologic conceptual model | 89 | 3.12 | | | |
| (c) | | | The hydrogeologic conceptual model shall be represented graphically by at least two scaled cross-sections that display the information required by this section and are sufficient to depict major stratigraphic and structural features in the basin. | 85:86, 96:98 | 3.8 | Figure 3-7: Figure 3-9 | | |

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| (d) | | | Physical characteristics of the basin shall be represented on one or more maps that depict the following: | | | | | |
| | (1) | | Topographic information derived from the U.S. Geological Survey or another reliable source. | 90 | | Figure 3-1 | | |
| | (2) | | Surficial geology derived from a qualified map including the locations of cross-sections required by this Section. | 94 | | Figure 3-5 | | |
| | (3) | | Soil characteristics as described by the appropriate Natural Resources Conservation Service soil survey or other applicable studies. | 93 | | Figure 3-4 | | |
| | (4) | | Delineation of existing recharge areas that substantially contribute to the replenishment of the basin, potential recharge areas, and discharge areas, including significant active springs, seeps, and wetlands within or adjacent to the basin. | 100 | | Figure 3-11 | | |
| | (5) | | Surface water bodies that are significant to the management of the basin. | 91 | | Figure 3-2 | | |
| | (6) | | The source and point of delivery for imported water supplies. | 37:40, 73 | 2.1.2.1 | Figure 2-7 | | ADD IMPORTED WATER SYSTEM? |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10727.2, 10733, and 10733.2, Water Code. | | | | | |
| **§ 354.16.** | | | **Groundwater Conditions** | | | | | |
| | | | Each Plan shall provide a description of current and historical groundwater conditions in the basin, including data from January 1, 2015, to current conditions, based on the best available information that includes the following: | | | | | |
| (a) | | | Groundwater elevation data demonstrating flow directions, lateral and vertical gradients, and regional pumping patterns, including: | | | | | |
| | (1) | | Groundwater elevation contour maps depicting the groundwater table or potentiometric surface associated with the current seasonal high and seasonal low for each principal aquifer within the basin. | 132:133 | | Figure 4-8:Figure 4-9 | | |
| | (2) | | Hydrographs depicting long-term groundwater elevations, historical highs and lows, and hydraulic gradients between principal aquifers. | 127:131 | | Figure 4-3:Figure 4-7 | | |
| (b) | | | A graph depicting estimates of the change in groundwater in storage, based on data, demonstrating the annual and cumulative change in the volume of groundwater in storage between seasonal high groundwater conditions, including the annual groundwater use and water year type. | 179 | | Figure 5-6 | | |
| (c) | | | Seawater intrusion conditions in the basin, including maps and cross-sections of the seawater intrusion front for each principal aquifer. | 118 | 4.10 | | | |
| (d) | | | Groundwater quality issues that may affect the supply and beneficial uses of groundwater, including a description and map of the location of known groundwater contamination sites and plumes. | 109:117, 139:145 | 4.4: 4.9 | Figure 4-15: 4-21 | | |
| (e) | | | The extent, cumulative total, and annual rate of land subsidence, including maps depicting total subsidence, utilizing data available from the Department, as specified in Section 353.2, or the best available information. | 106:109, 135:138 | 4.3 | Figure 4-11:4-14 | | |

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| | | | | Page Numbers of Plan | Or Section Numbers | Or Figure Numbers | Or Table Numbers | Notes |
| (f) | | | Identification of interconnected surface water systems within the basin and an estimate of the quantity and timing of depletions of those systems, utilizing data available from the Department, as specified in Section 353.2, or the best available information. | 117:124, 146:148 | 4.11 | Figures 4-22:4-24 | | |
| (g) | | | Identification of groundwater dependent ecosystems within the basin, utilizing data available from the Department, as specified in Section 353.2, or the best available information. | 121, 146:148 | 4.11.6 | Figures 4-22:4-24 | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10723.2, 10727.2, 10727.4, and 10733.2, Water Code. | | | | | |
| **§ 354.18.** | | | **Water Budget** | | | | | |
| (a) | | | Each Plan shall include a water budget for the basin that provides an accounting and assessment of the total annual volume of groundwater and surface water entering and leaving the basin, including historical, current and projected water budget conditions, and the change in the volume of water stored. Water budget information shall be reported in tabular and graphical form. | 158:170, 179:186 | 5.6 | Figure 5-6: Figure 5-13 | Table 5-2:Table 5-9 | |
| (b) | | | The water budget shall quantify the following, either through direct measurements or estimates based on data: | | | | | |
| | (1) | | Total surface water entering and leaving a basin by water source type. | 155:161, 179:180 | 5.5 | Figure 5-6: Figure 5-7 | Table 5-2:Table 5-5 | |
| | (2) | | Inflow to the groundwater system by water source type, including subsurface groundwater inflow and infiltration of precipitation, applied water, and surface water systems, such as lakes, streams, rivers, canals, springs and conveyance systems. | 162:169, 181:184 | 5.6 | Figure 5-8:Figure 5-11 | Table 5-6:5-9 | |
| | (3) | | Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow. | 162:169, 181:184 | 5.6 | Figure 5-8:Figure 5-11 | Table 5-6:5-9 | |
| | (4) | | The change in the annual volume of groundwater in storage between seasonal high conditions. | 166:169, 171:172, 181:184, 1139:1198 | 5.8, Appendix G | Figure 5-8:Figure 5-11 | Table 5-6:5-9 | |
| | (5) | | If overdraft conditions occur, as defined in Bulletin 118, the water budget shall include a quantification of overdraft over a period of years during which water year and water supply conditions approximate average conditions. | | NA | | | |
| | (6) | | The water year type associated with the annual supply, demand, and change in groundwater stored. | 169:172, 174, 181:184 | 5.7:5.8 | Figure 5-1, Figure 5-8:Figure 5-11 | Table 5-10 | |
| | (7) | | An estimate of sustainable yield for the basin. | 172:173 | 5.9 | | Table 5-11 | |
| (c) | | | Each Plan shall quantify the current, historical, and projected water budget for the basin as follows: | | | | | |
| | (1) | | Current water budget information shall quantify current inflows and outflows for the basin using the most recent hydrology, water supply, water demand, and land use information. | 162:169, 181:184 | 5.6 | Figure 5-8:Figure 5-11 | Table 5-6:5-9 | |

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| | (2) | | Historical water budget information shall be used to evaluate availability or reliability of past surface water supply deliveries and aquifer response to water supply and demand trends relative to water year type. The historical water budget shall include the following: | | | | | |
| | | (A) | A quantitative evaluation of the availability or reliability of historical surface water supply deliveries as a function of the historical planned versus actual annual surface water deliveries, by surface water source and water year type, and based on the most recent ten years of surface water supply information. | 155:161, 179:180, 1139:1198 | 5.5, Appendix G | Figure 5-6:Figure 5-7 | Table 5-2:Table 5-5 | |
| | | (B) | A quantitative assessment of the historical water budget, starting with the most recently available information and extending back a minimum of 10 years, or as is sufficient to calibrate and reduce the uncertainty of the tools and methods used to estimate and project future water budget information and future aquifer response to proposed sustainable groundwater management practices over the planning and implementation horizon. | 162:169, 181:184, 1139:1198 | 5.6, Appendix G | Figure 5-8:Figure 5-11 | Table 5-6:5-9 | |
| | | (C) | A description of how historical conditions concerning hydrology, water demand, and surface water supply availability or reliability have impacted the ability of the Agency to operate the basin within sustainable yield. Basin hydrology may be characterized and evaluated using water year type. | 149, 162:169, 181:184, 1139:1198 | 5.1, 5.6: 5.8 Appendix G | Figure 5-8:Figure 5-11 | Table 5-6:5-9 | |
| | (3) | | Projected water budgets shall be used to estimate future baseline conditions of supply, demand, and aquifer response to Plan implementation, and to identify the uncertainties of these projected water budget components. The projected water budget shall utilize the following methodologies and assumptions to estimate future baseline conditions concerning hydrology, water demand and surface water supply availability or reliability over the planning and implementation horizon: | | | | | |
| | | (A) | Projected hydrology shall utilize 50 years of historical precipitation, evapotranspiration, and streamflow information as the baseline condition for estimating future hydrology. The projected hydrology information shall also be applied as the baseline condition used to evaluate future scenarios of hydrologic uncertainty associated with projections of climate change and sea level rise. | 154:155, 166:169, 186, 1139:1198 | 5.4.3, Appendix G | Figure 5-13 | Table 5-6:5-9 | |
| | | (B) | Projected water demand shall utilize the most recent land use, evapotranspiration, and crop coefficient information as the baseline condition for estimating future water demand. The projected water demand information shall also be applied as the baseline condition used to evaluate future scenarios of water demand uncertainty associated with projected changes in local land use planning, population growth, and climate. | 154:155, 166:169, 186, 1139:1198 | 5.4.3, Appendix G | Figure 5-13 | Table 5-6:5-9 | |

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| | | | | Page Numbers of Plan | Or Section Numbers | Or Figure Numbers | Or Table Numbers | Notes |
| | | (C) | Projected surface water supply shall utilize the most recent water supply information as the baseline condition for estimating future surface water supply. The projected surface water supply shall also be applied as the baseline condition used to evaluate future scenarios of surface water supply availability and reliability as a function of the historical surface water supply identified in Section 354.18(c)(2)(A), and the projected changes in local land use planning, population growth, and climate. | 154:155, 166:169, 186, 1139:1198 | 5.4.3, Appendix G | Figure 5-13 | Table 5-6:5-9 | |
| (d) | | | The Agency shall utilize the following information provided, as available, by the Department pursuant to Section 353.2, or other data of comparable quality, to develop the water budget: | | | | | |
| | (1) | | Historical water budget information for mean annual temperature, mean annual precipitation, water year type, and land use. | 149, 174, 177:178, 1139:1198 | 5.1, Appendix G | Figure 5-1, Figure 5-4:Figure 5-5 | | |
| | (2) | | Current water budget information for temperature, water year type, evapotranspiration, and land use. | 162:169, 181:184, 1139:1198 | 5.6, Appendix G | Figure 5-8:Figure 5-11 | Table 5-6:5-9 | |
| | (3) | | Projected water budget information for population, population growth, climate change, and sea level rise. | 286, 289, 329, 1139:1198 | 8.1, Appendix G | Figure 8-1 | Table 8-1,8-2 | |
| (e) | | | Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow. If a numerical groundwater and surface water model is not used to quantify and evaluate the projected water budget conditions and the potential impacts to beneficial uses and users of groundwater, the Plan shall identify and describe an equally effective method, tool, or analytical model to evaluate projected water budget conditions. | 155:169, 181:184, 1139:1198 | 5.5:5.7, Appendix G | Figure 5-8:Figure 5-11 | Table 5-6:5-9 | |
| (f) | | | The Department shall provide the California Central Valley Groundwater-Surface Water Simulation Model (C2VSIM) and the Integrated Water Flow Model (IWFM) for use by Agencies in developing the water budget. Each Agency may choose to use a different groundwater and surface water model, pursuant to Section 352.4. | 152:155, 1139:1198 | 5.4, Appendix G | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10721, 10723.2, 10727.2, 10727.6, 10729, and 10733.2, Water Code. | | | | | |
| **§ 354.20.** | | | **Management Areas** | | | | | |
| (a) | | | Each Agency may define one or more management areas within a basin if the Agency has determined that creation of management areas will facilitate implementation of the Plan. Management areas may define different minimum thresholds and be operated to different measurable objectives than the basin at large, provided that undesirable results are defined consistently throughout the basin. | 151:152, 175, 405:436 | 5.3, Appendix E | Figure 5-2 | | |

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| (b) | | | A basin that includes one or more management areas shall describe the following in the Plan: | | | | | |
| | (1) | | The reason for the creation of each management area. | 151:152, 405:436 | 5.3, Appendix E | | | |
| | (2) | | The minimum thresholds and measurable objectives established for each management area, and an explanation of the rationale for selecting those values, if different from the basin at large. | 188:238 | 6.1: 6.7 | | | |
| | (3) | | The level of monitoring and analysis appropriate for each management area. | 259:274 | 7 | | | |
| | (4) | | An explanation of how the management area can operate under different minimum thresholds and measurable objectives without causing undesirable results outside the management area, if applicable. | 187:238 | 6 | | | |
| (c) | | | If a Plan includes one or more management areas, the Plan shall include descriptions, maps, and other information required by this Subarticle sufficient to describe conditions in those areas. | 151:152, 175, 405:436 | 5.3, Appendix E | Figure 5-2 | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10733.2 and 10733.4, Water Code. | | | | | |
| **SubArticle 3.** | | | **Sustainable Management Criteria** | | | | | |
| **§ 354.22.** | | | **Introduction to Sustainable Management Criteria** | | | | | |
| | | | This Subarticle describes criteria by which an Agency defines conditions in its Plan that constitute sustainable groundwater management for the basin, including the process by which the Agency shall characterize undesirable results, and establish minimum thresholds and measurable objectives for each applicable sustainability indicator. | | | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Section 10733.2, Water Code. | | | | | |
| **§ 354.24.** | | | **Sustainability Goal** | | | | | |
| | | | Each Agency shall establish in its Plan a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The Plan shall include a description of the sustainability goal, including information from the basin setting used to establish the sustainability goal, a discussion of the measures that will be implemented to ensure that the basin will be operated within its sustainable yield, and an explanation of how the sustainability goal is likely to be achieved within 20 years of Plan implementation and is likely to be maintained through the planning and implementation horizon. | 188 | 6.1.1 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10721, 10727, 10727.2, 10733.2, and 10733.8, Water Code. | | | | | |
| **§ 354.26.** | | | **Undesirable Results** | | | | | |

| Article 5. | | | Plan Contents for North San Benito Basin | GSP Document References | | | | |
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| | | | | Page Numbers of Plan | Or Section Numbers | Or Figure Numbers | Or Table Numbers | Notes |
| (a) | | | Each Agency shall describe in its Plan the processes and criteria relied upon to define undesirable results applicable to the basin. Undesirable results occur when significant and unreasonable effects for any of the sustainability indicators are caused by groundwater conditions occurring throughout the basin. | 191:192, 201, 208:209, 213:214, 223 | 6.2.1, 6.3.1, 6.4.1, 6.6.1, 6.7.1 | | | |
| (b) | | | The description of undesirable results shall include the following: | | | | | |
| | (1) | | The cause of groundwater conditions occurring throughout the basin that would lead to or has led to undesirable results based on information described in the basin setting, and other data or models as appropriate. | 192, 201:202, 209, | 6.2.2, 6.3.2, 6.4.2, 6.6.2, 6.7.2 | | | |
| | (2) | | The criteria used to define when and where the effects of the groundwater conditions cause undesirable results for each applicable sustainability indicator. The criteria shall be based on a quantitative description of the combination of minimum threshold exceedances that cause significant and unreasonable effects in the basin. | 192:193, 202, 209, 215, 231 | 6.2.3, 6.3.3, 6.4.3, 6.6.3, 6.7.3 | | | |
| | (3) | | Potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results. | 193, 202, 210:212, 215:217, 231 | 6.2.4, 6.3.4, 6.4.4, 6.6.4, 6.7.4 | | | |
| (c) | | | The Agency may need to evaluate multiple minimum thresholds to determine whether an undesirable result is occurring in the basin. The determination that undesirable results are occurring may depend upon measurements from multiple monitoring sites, rather than a single monitoring site. | 193:195, 202:204, 212, 217:221, 232 | 6.2.5, 6.3.5, 6.4.5, 6.6.5, 6.7.5 | | | |
| (d) | | | An Agency that is able to demonstrate that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin shall not be required to establish criteria for undesirable results related to those sustainability indicators. | 212 | 6.5 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10721, 10723.2, 10727.2, 10733.2, and 10733.8, Water Code. | | | | | |
| **§ 354.28.** | | | **Minimum Thresholds** | | | | | |
| (a) | | | Each Agency in its Plan shall establish minimum thresholds that quantify groundwater conditions for each applicable sustainability indicator at each monitoring site or representative monitoring site established pursuant to Section 354.36. The numeric value used to define minimum thresholds shall represent a point in the basin that, if exceeded, may cause undesirable results as described in Section 354.26. | 195:200, 204:207, 210:212 221:223, 232:236 | 6.2.6, 6.3.6, 6.4.4, 6.6.6, 6.7.6 | | | |
| (b) | | | The description of minimum thresholds shall include the following: | | | | | |
| | (1) | | The information and criteria relied upon to establish and justify the minimum thresholds for each sustainability indicator. The justification for the minimum threshold shall be supported by information provided in the basin setting, and other data or models as appropriate, and qualified by uncertainty in the understanding of the basin setting. | 193:195, 202:204, 212, 217:221, 232 | 6.2.5, 6.3.5, 6.4.5, 6.6.5, 6.7.5 | | | |

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| | | | | Page Numbers of Plan | Or Section Numbers | Or Figure Numbers | Or Table Numbers | Notes |
| | (2) | | The relationship between the minimum thresholds for each sustainability indicator, including an explanation of how the Agency has determined that basin conditions at each minimum threshold will avoid undesirable results for each of the sustainability indicators. | 195:200, 204:207, 210:212 217:221, 232:236 | 6.2.6, 6.3.6, 6.4.4, 6.6.5, 6.7.6 | | | |
| | (3) | | How minimum thresholds have been selected to avoid causing undesirable results in adjacent basins or affecting the ability of adjacent basins to achieve sustainability goals. | 195:200, 204:207, 210:212 217:221, 232:236 | 6.2.6, 6.3.6, 6.4.4, 6.6.5, 6.7.6 | | | |
| | (4) | | How minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests. | 195:200, 204:207, 210:212 217:221, 232:236 | 6.2.6, 6.3.6, 6.4.4, 6.6.5, 6.7.6 | | | |
| | (5) | | How state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the Agency shall explain the nature of and basis for the difference. | 199, 206:207, 210:212, 217:221, 234:235 | 6.2.6.5, 6.3.6.5, 6.4.4, 6.6.5, 6.7.6.5 | | | |
| | (6) | | How each minimum threshold will be quantitatively measured, consistent with the monitoring network requirements described in Subarticle 4. | 195:200, 204:207, 210:212 217:221, 232:236 | 6.2.6, 6.3.6, 6.4.4, 6.6.5, 6.7.6 | | | |
| (c) | | | Minimum thresholds for each sustainability indicator shall be defined as follows: | | | | | |
| | (1) | | Chronic Lowering of Groundwater Levels. The minimum threshold for chronic lowering of groundwater levels shall be the groundwater elevation indicating a depletion of supply at a given location that may lead to undesirable results. Minimum thresholds for chronic lowering of groundwater levels shall be supported by the following: | | | | | |
| | | (A) | The rate of groundwater elevation decline based on historical trends, water year type, and projected water use in the basin. | 102:104, 191:200, 127:131, 239 | 4.1.3, 6.2 | Figure 4-3: 4-7, 6-1 | | |
| | | (B) | Potential effects on other sustainability indicators. | 198:199 | 6.2.6.2 | | | |
| | (2) | | Reduction of Groundwater Storage. The minimum threshold for reduction of groundwater storage shall be a total volume of groundwater that can be withdrawn from the basin without causing conditions that may lead to undesirable results. Minimum thresholds for reduction of groundwater storage shall be supported by the sustainable yield of the basin, calculated based on historical trends, water year type, and projected water use in the basin. | 201:207, 240:241 | 6.3 | Figure 6-2. 6-3 | | |

| Article 5. | | | Plan Contents for North San Benito Basin | GSP Document References | | | | |
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| | (3) | | Seawater Intrusion. The minimum threshold for seawater intrusion shall be defined by a chloride concentration isocontour for each principal aquifer where seawater intrusion may lead to undesirable results. Minimum thresholds for seawater intrusion shall be supported by the following: | | | | | |
| | | (A) | Maps and cross-sections of the chloride concentration isocontour that defines the minimum threshold and measurable objective for each principal aquifer. | 212 | 6.5 | | | |
| | | (B) | A description of how the seawater intrusion minimum threshold considers the effects of current and projected sea levels. | 212 | 6.5 | | | |
| | (4) | | Degraded Water Quality. The minimum threshold for degraded water quality shall be the degradation of water quality, including the migration of contaminant plumes that impair water supplies or other indicator of water quality as determined by the Agency that may lead to undesirable results. The minimum threshold shall be based on the number of supply wells, a volume of water, or a location of an isocontour that exceeds concentrations of constituents determined by the Agency to be of concern for the basin. In setting minimum thresholds for degraded water quality, the Agency shall consider local, state, and federal water quality standards applicable to the basin. | 212:223 | 6.6 | | | |
| | (5) | | Land Subsidence. The minimum threshold for land subsidence shall be the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results. Minimum thresholds for land subsidence shall be supported by the following: | | | | | |
| | | (A) | Identification of land uses and property interests that have been affected or are likely to be affected by land subsidence in the basin, including an explanation of how the Agency has determined and considered those uses and interests, and the Agency's rationale for establishing minimum thresholds in light of those effects. | 207:212 | 6.4 | | | |
| | | (B) | Maps and graphs showing the extent and rate of land subsidence in the basin that defines the minimum threshold and measurable objectives. | 135:138, 207:212, 242 | 6.4 | Figure 4-11:4-14, Figure 6-4 | | |
| | (6) | | Depletions of Interconnected Surface Water. The minimum threshold for depletions of interconnected surface water shall be the rate or volume of surface water depletions caused by groundwater use that has adverse impacts on beneficial uses of the surface water and may lead to undesirable results. The minimum threshold established for depletions of interconnected surface water shall be supported by the following: | | | | | |
| | | (A) | The location, quantity, and timing of depletions of interconnected surface water. | 223:238, 243:258 | 6.7 | Figures 6-5:6-17 | | |
| | | (B) | A description of the groundwater and surface water model used to quantify surface water depletion. If a numerical groundwater and surface water model is not used to quantify surface water depletion, the Plan shall identify and describe an equally effective method, tool, or analytical model to accomplish the requirements of this Paragraph. | 232 | 6.7.5 | Figures 6-5:6-17 | | |

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| (d) | | | An Agency may establish a representative minimum threshold for groundwater elevation to serve as the value for multiple sustainability indicators, where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual minimum thresholds as supported by adequate evidence. | 201:207 | 6.3 | | | |
| (e) | | | An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish minimum thresholds related to those sustainability indicators. | 212 | 6.5 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10723.2, 10727.2, 10733, 10733.2, and 10733.8, Water Code. | | | | | |
| **§ 354.30.** | | | **Measurable Objectives** | | | | | |
| (a) | | | Each Agency shall establish measurable objectives, including interim milestones in increments of five years, to achieve the sustainability goal for the basin within 20 years of Plan implementation and to continue to sustainably manage the groundwater basin over the planning and implementation horizon. | 200, 207, 212, 221:223, 236:237 | 6.2.7, 6.3.7, 6.4.5, 6.6.6, 6.7.7 | | | |
| (b) | | | Measurable objectives shall be established for each sustainability indicator, based on quantitative values using the same metrics and monitoring sites as are used to define the minimum thresholds. | 200, 207, 212, 221:223, 236:237 | 6.2.7, 6.3.7, 6.4.5, 6.6.6, 6.7.7 | | | |
| (c) | | | Measurable objectives shall provide a reasonable margin of operational flexibility under adverse conditions which shall take into consideration components such as historical water budgets, seasonal and long-term trends, and periods of drought, and be commensurate with levels of uncertainty. | 200, 207, 212, 221:223, 236:237 | 6.2.7, 6.3.7, 6.4.5, 6.6.6, 6.7.7 | | | |
| (d) | | | An Agency may establish a representative measurable objective for groundwater elevation to serve as the value for multiple sustainability indicators where the Agency can demonstrate that the representative value is a reasonable proxy for multiple individual measurable objectives as supported by adequate evidence. | 207 | 6.3.7 | | | |
| (e) | | | Each Plan shall describe a reasonable path to achieve the sustainability goal for the basin within 20 years of Plan implementation, including a description of interim milestones for each relevant sustainability indicator, using the same metric as the measurable objective, in increments of five years. The description shall explain how the Plan is likely to maintain sustainable groundwater management over the planning and implementation horizon. | 188:190 | 6.1 | | | |
| (f) | | | Each Plan may include measurable objectives and interim milestones for additional Plan elements described in Water Code Section 10727.4 where the Agency determines such measures are appropriate for sustainable groundwater management in the basin. | 200, 207, 212, 221:223, 236:237 | 6.2.7, 6.3.7, 6.4.5, 6.6.6, 6.7.7 | | | |
| (g) | | | An Agency may establish measurable objectives that exceed the reasonable margin of operational flexibility for the purpose of improving overall conditions in the basin, but failure to achieve those objectives shall not be grounds for a finding of inadequacy of the Plan. | 200, 207, 212, 221:223, 236:237 | 6.2.7, 6.3.7, 6.4.5, 6.6.6, 6.7.7 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |

| Article 5. | | | Plan Contents for North San Benito Basin | GSP Document References | | | | |
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| | | | | Page Numbers of Plan | Or Section Numbers | Or Figure Numbers | Or Table Numbers | Notes |
| | | | Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code. | | | | | |
| **SubArticle 4.** | | | **Monitoring Networks** | | | | | |
| **§ 354.32.** | | | **Introduction to Monitoring Networks** | | | | | |
| | | | This Subarticle describes the monitoring network that shall be developed for each basin, including monitoring objectives, monitoring protocols, and data reporting requirements. The monitoring network shall promote the collection of data of sufficient quality, frequency, and distribution to characterize groundwater and related surface water conditions in the basin and evaluate changing conditions that occur through implementation of the Plan. | | | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Section 10733.2, Water Code. | | | | | |
| **§ 354.34.** | | | **Monitoring Network** | | | | | |
| (a) | | | Each Agency shall develop a monitoring network capable of collecting sufficient data to demonstrate short-term, seasonal, and long-term trends in groundwater and related surface conditions, and yield representative information about groundwater conditions as necessary to evaluate Plan implementation. | 259:269 | 7.1 | | Table 7-1 | |
| (b) | | | Each Plan shall include a description of the monitoring network objectives for the basin, including an explanation of how the network will be developed and implemented to monitor groundwater and related surface conditions, and the interconnection of surface water and groundwater, with sufficient temporal frequency and spatial density to evaluate the affects and effectiveness of Plan implementation. The monitoring network objectives shall be implemented to accomplish the following: | | | | | |
| | (1) | | Demonstrate progress toward achieving measurable objectives described in the Plan. | 259:269 | 7.1 | | Table 7-1 | |
| | (2) | | Monitor impacts to the beneficial uses or users of groundwater. | 259:269 | 7.1 | | Table 7-1 | |
| | (3) | | Monitor changes in groundwater conditions relative to measurable objectives and minimum thresholds. | 259:269 | 7.1 | | Table 7-1 | |
| | (4) | | Quantify annual changes in water budget components. | 259:269 | 7.1 | | Table 7-1 | |
| (c) | | | Each monitoring network shall be designed to accomplish the following for each sustainability indicator: | | | | | |
| | (1) | | Chronic Lowering of Groundwater Levels. Demonstrate groundwater occurrence, flow directions, and hydraulic gradients between principal aquifers and surface water features by the following methods: | | | | | |
| | | (A) | A sufficient density of monitoring wells to collect representative measurements through depth-discrete perforated intervals to characterize the groundwater table or potentiometric surface for each principal aquifer. | 260:262, 275 | 7.1.1 | Figure 7-1 | Table 7-1 | |
| | | (B) | Static groundwater elevation measurements shall be collected at least two times per year, to represent seasonal low and seasonal high groundwater conditions. | 260:262, 275 | 7.1.1 | Figure 7-1 | Table 7-1 | |
| | (2) | | Reduction of Groundwater Storage. Provide an estimate of the change in annual groundwater in storage. | 263:264 | 7.1.2 | | | |

| Article 5. | | | Plan Contents for North San Benito Basin | GSP Document References | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Page Numbers of Plan | Or Section Numbers | Or Figure Numbers | Or Table Numbers | Notes |
| | (3) | | Seawater Intrusion. Monitor seawater intrusion using chloride concentrations, or other measurements convertible to chloride concentrations, so that the current and projected rate and extent of seawater intrusion for each applicable principal aquifer may be calculated. | 265 | 7.1.4 | | | |
| | (4) | | Degraded Water Quality. Collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues. | 260, 265:267, 278 | 7.1.5 | Figure 7-4 | Table 7-1 | |
| | (5) | | Land Subsidence. Identify the rate and extent of land subsidence, which may be measured by extensometers, surveying, remote sensing technology, or other appropriate method. | 260, 264, 277 | 7.1.3 | Figure 7-3 | Table 7-1 | |
| | (6) | | Depletions of Interconnected Surface Water. Monitor surface water and groundwater, where interconnected surface water conditions exist, to characterize the spatial and temporal exchanges between surface water and groundwater, and to calibrate and apply the tools and methods necessary to calculate depletions of surface water caused by groundwater extractions. The monitoring network shall be able to characterize the following: | | | | | |
| | | (A) | Flow conditions including surface water discharge, surface water head, and baseflow contribution. | 260, 267:269, 276 | 7.1.6 | Figure 7-2 | Table 7-1 | |
| | | (B) | Identifying the approximate date and location where ephemeral or intermittent flowing streams and rivers cease to flow, if applicable. | 260, 267:269, 276 | 7.1.6 | Figure 7-2 | Table 7-1 | |
| | | (C) | Temporal change in conditions due to variations in stream discharge and regional groundwater extraction. | 260, 267:269, 276 | 7.1.6 | Figure 7-2 | Table 7-1 | |
| | | (D) | Other factors that may be necessary to identify adverse impacts on beneficial uses of the surface water. | 260, 267:269, 276, 279 | 7.1.6 | Figure 7-2, Figure 7-5 | Table 7-1 | |
| (d) | | | The monitoring network shall be designed to ensure adequate coverage of sustainability indicators. If management areas are established, the quantity and density of monitoring sites in those areas shall be sufficient to evaluate conditions of the basin setting and sustainable management criteria specific to that area. | 259:269, 275:279 | 7.1 | Figure 7-1:7-5 | Table 7-1 | |
| (e) | | | A Plan may utilize site information and monitoring data from existing sources as part of the monitoring network. | 259:269, 275:279 | 7.1 | Figure 7-1:7-5 | Table 7-1 | |
| (f) | | | The Agency shall determine the density of monitoring sites and frequency of measurements required to demonstrate short-term, seasonal, and long-term trends based upon the following factors: | | | | | |
| | (1) | | Amount of current and projected groundwater use. | 259:269 | 7.1 | | Table 7-1 | |
| | (2) | | Aquifer characteristics, including confined or unconfined aquifer conditions, or other physical characteristics that affect groundwater flow. | 259:269 | 7.1 | | Table 7-1 | |

| Article 5. | | | Plan Contents for North San Benito Basin | GSP Document References | | | | |
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| | | | | Page Numbers of Plan | Or Section Numbers | Or Figure Numbers | Or Table Numbers | Notes |
| | (3) | | Impacts to beneficial uses and users of groundwater and land uses and property interests affected by groundwater production, and adjacent basins that could affect the ability of that basin to meet the sustainability goal. | 259:269 | 7.1 | | Table 7-1 | |
| | (4) | | Whether the Agency has adequate long-term existing monitoring results or other technical information to demonstrate an understanding of aquifer response. | 259:269 | 7.1 | | Table 7-1 | |
| (g) | | | Each Plan shall describe the following information about the monitoring network: | | | | | |
| | (1) | | Scientific rationale for the monitoring site selection process. | 259:269 | 7.1 | | | |
| | (2) | | Consistency with data and reporting standards described in Section 352.4. If a site is not consistent with those standards, the Plan shall explain the necessity of the site to the monitoring network, and how any variation from the standards will not affect the usefulness of the results obtained. | 269:271 | 7.2 | | | |
| | (3) | | For each sustainability indicator, the quantitative values for the minimum threshold, measurable objective, and interim milestones that will be measured at each monitoring site or representative monitoring sites established pursuant to Section 354.36. | 259:269 | 7.1 | | | |
| (h) | | | The location and type of each monitoring site within the basin displayed on a map, and reported in tabular format, including information regarding the monitoring site type, frequency of measurement, and the purposes for which the monitoring site is being used. | 259:269 | 7.1 | | | |
| (i) | | | The monitoring protocols developed by each Agency shall include a description of technical standards, data collection methods, and other procedures or protocols pursuant to Water Code Section 10727.2(f) for monitoring sites or other data collection facilities to ensure that the monitoring network utilizes comparable data and methodologies. | 269:271 | 7.2 | | | |
| (j) | | | An Agency that has demonstrated that undesirable results related to one or more sustainability indicators are not present and are not likely to occur in a basin, as described in Section 354.26, shall not be required to establish a monitoring network related to those sustainability indicators. | 259:269 | 7.1 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10723.2, 10727.2, 10727.4, 10728, 10733, 10733.2, and 10733.8, Water Code | | | | | |
| **§ 354.36.** | | | **Representative Monitoring** | | | | | |
| | | | Each Agency may designate a subset of monitoring sites as representative of conditions in the basin or an area of the basin, as follows: | | | | | |
| (a) | | | Representative monitoring sites may be designated by the Agency as the point at which sustainability indicators are monitored, and for which quantitative values for minimum thresholds, measurable objectives, and interim milestones are defined. | 271 | 7.3 | | | |
| (b) | | | (b) Groundwater elevations may be used as a proxy for monitoring other sustainability indicators if the Agency demonstrates the following: | | | | | |

| Article 5. | | | Plan Contents for North San Benito Basin | GSP Document References | | | | |
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| | (1) | | Significant correlation exists between groundwater elevations and the sustainability indicators for which groundwater elevation measurements serve as a proxy. | 271 | 7.3 | | | |
| | (2) | | Measurable objectives established for groundwater elevation shall include a reasonable margin of operational flexibility taking into consideration the basin setting to avoid undesirable results for the sustainability indicators for which groundwater elevation measurements serve as a proxy. | 271 | 7.3 | | | |
| (c) | | | The designation of a representative monitoring site shall be supported by adequate evidence demonstrating that the site reflects general conditions in the area. | 271 | 7.3 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10727.2 and 10733.2, Water Code | | | | | |
| **§ 354.38.** | | | **Assessment and Improvement of Monitoring Network** | | | | | |
| (a) | | | Each Agency shall review the monitoring network and include an evaluation in the Plan and each five-year assessment, including a determination of uncertainty and whether there are data gaps that could affect the ability of the Plan to achieve the sustainability goal for the basin. | 272:274 | 7.5 | | Table 7-2 | |
| (b) | | | Each Agency shall identify data gaps wherever the basin does not contain a sufficient number of monitoring sites, does not monitor sites at a sufficient frequency, or utilizes monitoring sites that are unreliable, including those that do not satisfy minimum standards of the monitoring network adopted by the Agency. | 272:274 | 7.5 | | Table 7-2 | |
| (c) | | | If the monitoring network contains data gaps, the Plan shall include a description of the following: | | | | | |
| | (1) | | The location and reason for data gaps in the monitoring network. | 273 | | | Table 7-2 | |
| | (2) | | Local issues and circumstances that limit or prevent monitoring. | 272:274 | 7.5 | | Table 7-2 | |
| (d) | | | Each Agency shall describe steps that will be taken to fill data gaps before the next five-year assessment, including the location and purpose of newly added or installed monitoring sites. | 272:274 | 7.5 | | Table 7-2 | |
| (e) | | | Each Agency shall adjust the monitoring frequency and density of monitoring sites to provide an adequate level of detail about site-specific surface water and groundwater conditions and to assess the effectiveness of management actions under circumstances that include the following: | | | | | |
| | (1) | | Minimum threshold exceedances. | 259:269 | 7.1 | | | |
| | (2) | | Highly variable spatial or temporal conditions. | 259:269 | 7.1 | | | |
| | (3) | | Adverse impacts to beneficial uses and users of groundwater. | 259:269 | 7.1 | | | |
| | (4) | | The potential to adversely affect the ability of an adjacent basin to implement its Plan or impede achievement of sustainability goals in an adjacent basin. | 259:269 | 7.1 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10723.2, 10727.2, 10728.2, 10733, 10733.2, and 10733.8, Water Code | | | | | |
| **§ 354.40.** | | | **Reporting Monitoring Data to the Department** | | | | | |

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| | | | | Page Numbers of Plan | Or Section Numbers | Or Figure Numbers | Or Table Numbers | Notes |
| | | | Monitoring data shall be stored in the data management system developed pursuant to Section 352.6. A copy of the monitoring data shall be included in the Annual Report and submitted electronically on forms provided by the Department. | | | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10728, 10728.2, 10733.2, and 10733.8, Water Code. | | | | | |
| **SubArticle 5.** | | | **Projects and Management Actions** | | | | | |
| **§ 354.42.** | | | **Introduction to Projects and Management Actions** | | | | | |
| | | | This Subarticle describes the criteria for projects and management actions to be included in a Plan to meet the sustainability goal for the basin in a manner that can be maintained over the planning and implementation horizon. | | | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Section 10733.2, Water Code. | | | | | |
| **§ 354.44.** | | | **Projects and Management Actions** | | | | | |
| (a) | | | Each Plan shall include a description of the projects and management actions the Agency has determined will achieve the sustainability goal for the basin, including projects and management actions to respond to changing conditions in the basin. | 287:289 | 8.2 | | Table 8-2 | |
| (b) | | | Each Plan shall include a description of the projects and management actions that include the following: | | | | | |
| | (1) | | A list of projects and management actions proposed in the Plan with a description of the measurable objective that is expected to benefit from the project or management action. The list shall include projects and management actions that may be utilized to meet interim milestones, the exceedance of minimum thresholds, or where undesirable results have occurred or are imminent. The Plan shall include the following: | | | | | |
| | | (A) | A description of the circumstances under which projects or management actions shall be implemented, the criteria that would trigger implementation and termination of projects or management actions, and the process by which the Agency shall determine that conditions requiring the implementation of particular projects or management actions have occurred. | 291:328 | 8.3.3:8.12.3 | | | |
| | | (B) | The process by which the Agency shall provide notice to the public and other agencies that the implementation of projects or management actions is being considered or has been implemented, including a description of the actions to be taken. | 291:328 | 8.3.4:8.12.4 | | | |
| | (2) | | If overdraft conditions are identified through the analysis required by Section 354.18, the Plan shall describe projects or management actions, including a quantification of demand reduction or other methods, for the mitigation of overdraft. | | NA | | | |
| | (3) | | A summary of the permitting and regulatory process required for each project and management action. | 291:328 | 8.3.5:8.12.5 | | Tables 8-2 | |

| Article 5. | | | Plan Contents for North San Benito Basin | GSP Document References | | | | |
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| | | | | Page Numbers of Plan | Or Section Numbers | Or Figure Numbers | Or Table Numbers | Notes |
| | (4) | | The status of each project and management action, including a time-table for expected initiation and completion, and the accrual of expected benefits. | 293:328 | 8.3.8:8.12.7 | | | |
| | (5) | | An explanation of the benefits that are expected to be realized from the project or management action, and how those benefits will be evaluated. | 291:328 | 8.3.7:8.12.7 | | | |
| | (6) | | An explanation of how the project or management action will be accomplished. If the projects or management actions rely on water from outside the jurisdiction of the Agency, an explanation of the source and reliability of that water shall be included. | 290:327 | 8.3.1:8.12.1 | | | |
| | (7) | | A description of the legal authority required for each project and management action, and the basis for that authority within the Agency. | 280:318 | 8.1:8.8 | | | |
| | (8) | | A description of the estimated cost for each project and management action and a description of how the Agency plans to meet those costs. | 293:328 | 8.3.9:8.12.7 | | | |
| | (9) | | A description of the management of groundwater extractions and recharge to ensure that chronic lowering of groundwater levels or depletion of supply during periods of drought is offset by increases in groundwater levels or storage during other periods. | 289:318, 323:326 | 8.3:8.8, 8.11 | | | |
| (c) | | | Projects and management actions shall be supported by best available information and best available science. | 289:328 | 8.3:8.12 | | | |
| (d) | | | An Agency shall take into account the level of uncertainty associated with the basin setting when developing projects or management actions. | 290:328 | 8.3.2:8.12.3 | | | |
| | | | Note: Authority cited: Section 10733.2, Water Code. | | | | | |
| | | | Reference: Sections 10727.2, 10727.4, and 10733.2, Water Code. | | | | | |

# APPENDIX D

# Communication Plan

# Community Engagement Plan

**For Development and Adoption of a Groundwater Sustainability Plan (GSP) for San Benito County Water District Groundwater Sustainability Agency (GSA)**

- **Commenced October 2018**
- **Adoption of GSP: SBCWD, November 2021, SCVWD, December 2021**

## Purpose, Outcomes, and Goals

The purpose of the Community Engagement Plan (CEP) was to support the San Benito County Water District (District) GSA and Santa Clara Valley Water District (the GSA for portions of the basin in Santa Clara County) in (1) engaging the general community, stakeholders, and other interested parties by providing them with balanced and objective information to assist in understanding the Sustainable Groundwater Management Act (SGMA), available options, and recommendations, (2) creating an open process for public input on the development of the Groundwater Sustainability Plan (GSP), (3) performing required public noticing, and (4) documenting in the GSP the opportunities for public engagement and active involvement of diverse social, cultural, and economic elements of the population within the basin area.

These communication and outreach efforts support the overarching purpose of SGMA, which is to ensure local sustainable groundwater management in medium- and high-priority groundwater basins statewide.

**Outcomes**: The desired outcome for this CEP was to achieve adoption of the GSP with input from and in consideration of the basin's diverse people, economy, and ecosystems.

**Plan Goals**: SGMA requires GSAs to consider the interests of all beneficial uses and users of groundwater and encourage involvement of diverse social, cultural, and economic elements of the population within the basin area during GSP preparation.

The goals of the Community Engagement Plan were to:

- Enhance understanding and inform the public about water and groundwater resources in the basin,
- Inform the public and stakeholders of the purpose, benefits, and need for sustainable groundwater management and a sustainable groundwater management plan (GSP).
- Engage a diverse group of interested parties and stakeholders and promote informed feedback from stakeholders, the general community, and groundwater-dependent users throughout the GSP preparation.
- Reach out to and engage disadvantaged communities throughout the GSP preparation process.
- Employ a comprehensive public engagement process utilizing a variety of outreach methods that make public participation easy and accessible; hold meetings at times and venues that encourage broad participation.
- Respond to public concerns and provide accurate and up-to-date information.
- Manage the community engagement program in a manner that provides maximum value to the public and an efficient use of GSA and local agency resources.

**Time Period**: The CEP is a fluid, working document - updates and revisions to this plan were made through 2021 before being finalized as part of the draft and final GSP. This CEP is intended to cover communication and outreach efforts from June 2018 through December 2021.

**Audiences**: Among the interested parties which the GSA must consider and engage with when developing the GSP are:

- Agricultural users of water
- Domestic well owners
- Municipal well operators
- Public water system operators
- General population of urban water users
- Land use planning agencies
- Environmental users of groundwater
- Surface water users
- The federal government
- California Native American tribes
- California Department of Water Resources
- Disadvantaged communities

See Appendix A for a list of the interested parties/stakeholders identified within the basin area.

**Approach**

To truly engage the public in development of a GSP that is science-based, complex, technical, and includes achievable outcomes, the GSA will:

- Educate the public in compelling ways. Communicate what may often be complex concepts in simple and compelling ways with graphics and examples.
- Manage expectations. Avoid "anything goes" meetings that might pursue unrealistic and unpractical approaches.
- Show how the input received has been incorporated into the plan or process. Demonstrating to the public how their ideas have been reflected in the plan or planning process is an important piece to the puzzle.
- Remain focused on results. Understand objectives of each public meeting and facilitate the achievement of those objectives.
- Respond to stakeholder inquires in a timely manner.

## Communications Tools and Forums

**Collateral (Informational) Materials**

Developing a variety of collateral materials is critical to successful education and necessary to circulate consistent, accurate information. A range of materials were developed, including:

- Overview Fact Sheet: SGMA and its requirements, the District's role as GSA (and Santa Clara Valley Water District, the GSA for portions of the basin in Santa Clara County), general groundwater and basin information (bilingual)
- Water Management Fact Sheet: water supply sources, partnerships, groundwater management tools (bilingual)
- GSP Requirements Fact Sheet: review of SGMA/GSA/GSP, goals and requirements of the GSP (bilingual)
- GSP Progress Report 2020: Summary of the progress of the Groundwater Sustainability Plan and the draft chapters 1-9.
- Groundwater Management Fees Fact Sheet: explanation of the methodology and rationale behind the fees to support the GSP
- Draft Plan Complete Fact Sheet: Summary of the Plan, Plan Area, Groundwater Conditions and Potential Projects and Management actions

**Public Workshops**
Public educational workshops provide opportunities for people to learn about groundwater, SGMA, financing options, and GSP elements. Workshops were organized in a variety of ways, including open houses, "stations" where people can ask questions one-on- one, world café style, and traditional presentations, which facilitated question and answer sessions. In order to solicit feedback from people who may not be comfortable speaking in public, workshops included small group breakout discussions.

Six workshops were held, between fall, 2018 and winter, 2021: Kickoff, Groundwater Conditions, Sustainability Criteria, Management Options, Management Actions, and Draft GSP. A public hearing on GSP Adoption was in November 2021.

Due to the pandemic, starting in early spring 2020, all workshops were held via Zoom. This platform allowed the GSA to be engaged with the public in workshops. The SBCWD/GSA website was also a valuable tool to disseminate information to the public. Items such as presentations to the Technical Advisory Committee (TAC) were published on the website, along with draft chapters, an easy to navigate comments page and other informative information to help the public understand our local basin, the GSP process and what management actions and projects were being considered. Mailchimp, a platform that helps you manage customers and other interested parties, was also utilized to inform those that signed-up of any developments with the plan.

**Other Public Meetings/Hearings**
These were formal opportunities for people to provide official comments for the record, on programs, plans, and proposals. SGMA requires that a public meeting be held prior to the adoption of a fee and that public hearings are held for the adoption of GSP elements and the final GSP. There are also constitutional requirements for public hearings for some fee/rate options. The GSA held required public meetings/hearings, but also used less formal public workshops (described above) to solicit feedback and information early in the process. Monthly updates on GSP progress and milestones were also given at the SBCWD's monthly board meetings.

**Media**

- News Releases: at milestones and for public workshops, for distribution to local and regional media, as well as to email subscribers to the releases. List of news releases and articles:

  **January 2015**, BenitoLink (online news media), Free Lance Newspaper and website, "New Legislation adds to the Need to Manage Local Water Resources" – Shawn Novack, Water Conservation Program Manager
  **September 2015** – BenitoLink, article on "Water Forum" a live workshop where SGMA was discussed. John Chadwell, reporter
  **May 2017** – BenitoLink, "County water district will control basin as state takeover looms", John Chadwell
  **April 2017** – BenitoLink, article on Water Forum, a live workshop where SGMA was discussed, "Experts, politicians speak at Water Forum", BenitoLink Staff
  **October 2018** – BenitoLink, Free Lance newspaper and website. "Community Invited to first workshop on Groundwater Sustainability Plan", Shawn Novack, Water Conservation Program Manager
  **June 2019**, BenitoLink, Free Lance newspaper and website, "Understanding the Sustainable Groundwater Management Act", Shawn Novack, Water Conservation Program Manager
  **August 2019**, BenitoLink, "Groundwater Plan is Moving Along", Shawn Novack Water Conservation Program Manager
  **March 2020**, BenitoLink, "Water Resources Association of San Benito County updates community on Groundwater Sustainability Plan", Shawn Novack, Water Conservation Program Manager

**July 2021**, BenitoLink, “Water agency releases Groundwater Sustainability Plan for public review”, BenitoLink Staff

- Advertising: ads for public workshops were published in local newspapers or online news sites

**Website**

The District’s new website (www.sbcwd.com – unveiled in summer, 2018) has a set of pages dedicated to the Sustainable Groundwater Management project (Project). These pages were used as a tool for distributing and archiving communications materials as well as a repository for studies and reports. The website was updated as frequently as new information became available, usually monthly. The Project home page is also provided in Spanish, and all other pages can be translated via the Google translate tool on each page.

The dedicated web pages include the following SGMA/GSA/GSP information:

- Project home page
  - Introduction/summary
  - Latest update
  - Email signup tool
- About SGMA
  - The Sustainable Groundwater Management Act
  - SGMA Groundwater Management Tools
- SBCWD’s Role & Responsibilities
  - Groundwater Sustainability Agency
- About Groundwater & Our Basins
  - What is Groundwater?
  - SBCWD’s Groundwater Basins
  - Basin Conditions
  - The Role of Surface Water
- Community Involvement
  - Importance of Community Involvement
  - Role of the TAC
  - Upcoming public meetings/workshops
  - Email signup tool
- Resources & Documents
  - External links
  - SBCWD GSA and related documents
- FAQs

**Social Media**

Postings to third-party platforms such as the “What’s Going on in Hollister” Facebook page and the Next Door neighborhood social media site, served as an additional channel of information/updates to community members.

**Disadvantaged Community Engagement**
Disadvantaged Communities (DACs) are specifically referenced in SGMA as an interested party. A large percent of the people living in the DAC areas are relatively recent immigrants from Spanish-speaking countries.

Connecting with communities through existing organizations such as League of United Latin American Citizen (LULAC) and through community events and schools provided an opportunity to share information and solicit feedback on rate/fee options and GSP elements. Bilingual materials in Spanish are available.

**Governance Agencies Briefings**
GSA Board members were encouraged to periodically brief local officials (city councils, the county, members of other elected and appointed bodies) with updates on GSA activities. A meeting of local elected officials took place in December 2020 for a briefing on the Groundwater Sustainability Plan.

During the period of GSP development, the GSA presented to the public each chapter of the GSP, which included topics of Sustainability Criteria, Management Actions/Monitoring, Implementation Plan and Fee Structure/Development.

- **Audiences**
  - An existing list of stakeholders was utilized, with a focus on landowners who may be affected by Sustainability Criteria and Management Actions. Plus, the GSA's website has a sign-up area for interested parties to receive updates on the Plans development.
- **Key Messages**
  - Defined Sustainability Criteria and Management Actions
  - Explained why these are needed as part of the GSP, how they fit into the big picture
  - Provided information on what they might mean to stakeholders/landowners
  - Provided examples (primarily of Management Actions), making clear that they are in development and input is requested
  - Offered information on upcoming opportunities to comment/participate in development of Sustainability Criteria and Management Actions elements
- **Tools**
  - Developed fact sheet "Progress Report 2020" – provide brief overview; status of GSP development; next steps; updated schedule (English and Spanish versions)
  - Informational boards focusing on Sustainability Criteria, and Management Actions
  - Updated website to reflect current status and upcoming steps (updated monthly)
  - Distributed news releases announcing community meetings on these issues
  - Drafted talking points outlining concepts of Sustainability Criteria and Management Actions, for use by GSA board and staff
  - Drafted direct mail piece sent to key stakeholders/potentially affected landowners with overview information on the concepts of Sustainability Criteria and Management Actions; provided additional direct mail inviting them to relevant community meetings
  - Drafted articles for the media and WRASBC newsletters
  - Developed print and web ads as needed for community meetings or milestones
  - Conducted one-on-one discussions with those expressing overt concerns
  - Encouraged community leaders who are willing to publicly express their support for the GSP to do so

Appendix A*: Consideration of Interests

**This list is not exhaustive or exclusive*

Cities, Towns, Counties

- City of Hollister
- City of San Juan Bautista
- San Benito County
- Santa Clara County
- San Benito County Planning Commission
- Hollister Planning Commission
- San Juan Bautista Planning Commission

Native American Tribes

Federal Government Agencies

- National Oceanic & Atmospheric Administration/National Marine Fisheries Service
- US Army Corps of Engineers
- Natural Resource Conservation Service
- US Fish and Wildlife Service
- US Environmental Protection Agency

State Government Agencies

- California Coastal Conservancy
- California Department of Water Resources (DWR)
- California Department of Fish and Wildlife
- California Parks and Recreation, Hollister Hills SVRA

Regional Government Agencies

- Association of Monterey Bay Area Governments (AMBAG)
- Central Coast Regional Water Quality Control Board (RWQCB) – Region 3
- Central Coast Resource Conservation & Development Council
- Pajaro River Watershed Flood Prevention Authority (PRWFPA)
- San Benito Resource Conservation District

Non-Government Organizations

- San Benito County Farm Bureau
- Central Coast Groundwater Coalition
- Water Resources Association of San Benito County
- San Benito Agricultural Land Trust
- Wildlands Inc.

Planning and Conservation League
Sierra Club, Loma Prieta Chapter
The Nature Conservancy

Public Water Systems

- Sunnyslope County Water District
- San Benito County Water District
- Santa Clara Valley Water District
- Aromas Water District
- Tres Pinos County Water District

Agriculture

- San Benito County Farm Bureau

Organizations that Represent Environmental Uses of Groundwater

- Central Coast Groundwater Coalition
- Sierra Club
- Nature Conservancy

Organizations Representing Disadvantaged Communities

- League of United Latin American Citizens (LULAC)

Private Well Owners

Business Organizations

- City of Hollister Chamber of Commerce
- City of San Juan Bautista Chamber of Commerce
- San Benito County Chamber of Commerce

Education

- San Benito High School District
- Aromas/San Juan Unified School District
- San Benito County Office of Education
- Hollister School District

Businesses / Developers

- Arnold/Bannon's Mobile Home Park
- Casa De Fruta Orchards and Water System
- Whispering Pines Inn

Service /Political Organizations

- League of Women Voters
- Democratic and Republican Clubs
- Rotaries
- Kiwanis
- SIRS
- Community Foundation for San Benito County

**Technical Advisory Committee meetings**:

Although not required by SGMA, the District valued the contributions of a Technical Advisory Committee (TAC), to assist in reviewing and contributing to the technical aspects of the GSP as its elements were produced. The TAC was made up of individuals selected to represent GSP-related subject areas, including but not limited to environmental, technical, and land use planning fields. This diverse group of experts in their respective fields were responsible for reviewing the GSP scope of work, draft products, and materials prepared by consultants, analyzing them, and providing recommendations to the GSP Technical Team to develop a technically-sound GSP. The TAC members and their affiliated organizations are presented below:

| Name | Organization |
|---|---|
| Benny Young | County of San Benito |
| Garrett Haertel | San Benito County Water District |
| Jeff Micko | Micko Consultants |
| Abraham Prado | City of Hollister |
| Roger Pierno | Valley Water |
| Stan Pura | Mission Ranches |
| Don Ridenhour | San Benito County resident / PE |
| Paul Rovella | Johnson, Rovella, Retterer, Rosenthal & Gilles, LLP |
| Bob Swanson | Bob Swanson Ranch LLC |
| Greg Swett | San Benito County Farm Bureau |
| Drew Lander | General Manager Sunnyslope County Water District |

Process for the TAC Committee:

- Present materials

- TAC reviews materials
- TAC comments
- Revise as needed

Sixteen TAC meetings were held:

1. August 2018 – Explanation of SGMA and expectations of TAC responsibilities
2. November 2018 – Overview of GSP & Plan Area. What is sustainability
3. January 2019 – Continued discussion on defining sustainability
4. April 2019 - Introduction to the Hydrogeologic Conceptual Model and groundwater conditions
5. August 2019- Management areas, updated sustainability criteria, schedule
6. October 2019 – Draft section on Water Budget presented, sustainability goal definition, GSP schedule
7. January 2020 – Revised Water Budget, Numerical Model, Sustainability Criteria for water quality
8. February 2020 – Continued discussion Sustainability Criteria for water quality
9. April 2020 – TAC meeting held by Zoom. Setting Sustainability Criteria Groundwater Levels
10. July 2020 – TAC meeting held via Zoom. Setting Sustainability Criteria for Chronic Decline of Groundwater Storage
11. August 2020 – TAC meeting held via Zoom. Continued discussion Chronic Decline of Groundwater Storage. Next steps for Sustainability Criteria
12. September 2020 - TAC meeting held via Zoom. Monitoring network and reporting. Measuring agricultural pumping. Summary of data gaps and next steps.
13. November 2020 - TAC meeting held via Zoom. Measuring groundwater use. Discussed meters, satellite data and ground sensors.
14. December 2020 - TAC meeting held via Zoom. Continued discussion on measuring groundwater use. Discussed funding GSP development and implementation.
15. February 2021 - TAC meeting held via Zoom. Discussion on monitoring and managed aquifer recharge. Projects and Management Actions
16. April 2021 - TAC meeting held via Zoom. Simulate future scenarios including climate change, growth and land use changes. Projects and Management Actions and implementation.

Six Public Workshops were held:

1. November 2018 – Introduction to SGMA and Groundwater Sustainability Agency role.
2. June 2019 – SGMA and the GSP process. Plan Area, Hydrogeologic Conceptual Model, Overview of North San Benito Basin, Aquifer materials, Groundwater conditions, Groundwater quality.
3. September 2020 – Workshop held via Zoom. Topics: SGMA and the GSP process. Update on what's been accomplished and what needs to be accomplished. Discussion on groundwater levels, groundwater quality, GDEs, storage, water budget, what is sustainability, minimum thresholds, one basin with four management areas.
4. December 2020 – Water budget and sustainable yield.
5. March 2021 – Implementation: monitoring, reporting, projects and management actions. Funding GSP implementation.
6. August 2021 – Overview of SGMA and GSP process, North San Benito County Basin defined, Sustainable Management, Projects and

Management Actions. It was at this meeting the Draft GSP was presented to public.

July 2021 - Public Meeting on Groundwater Management Fee

Mailers:
1,340 direct mail pieces were sent to landowners outside of the Hollister Urban Area with 5+ acre parcels

Articles:
Water Resources Association San Benito County newsletter (bill insert):
*Keeping our Local Groundwater Basin Sustainable 2018*

San Benito County Farm Bureau:
Newsletter to members with information about SGMA/GSP 2021

SBCWD Website (Sustainability Pages):
Updates done monthly
Website, email sign-up:
Chapters of the GSP were posted to the District website encouraging comments from the community
Progress Reports
Meeting dates

Booth at San Benito County Fair October 1st-3rd, 2021

Staffed booth at San Benito County Fair Pavilion. A Fact Sheet entitled: Draft Plan Completed was available to the public and a representative was on hand for questions. Information on how to view/comment on GSP was also available.

GSP Adoption Dates (public hearings):

SBCWD November 17, 2021
SCVWD (Valley Water) December 14, 2021

*Send to DWR for review after adoption

# APPENDIX E

# Technical Memoranda

Data to Support GSP Preparation, December 19, 2018

Summary of Management Area Definition for North San Benito Basin, August 14, 2019

Data Management System, May 2021

December 19, 2018

TECHNICAL MEMORANDUM

**To:** Jeff Cattaneo, GSP Project Manager
San Benito County Water District GSA

**From:** Maureen Reilly, PE, Chad Taylor, PG, CHG, and Iris Priestaf, PhD

**Re:** Data to Support GSP Preparation

## 1. EXECUTIVE SUMMARY

San Benito County Water District (SBCWD) and Santa Clara Valley Water District (SCVWD) are the Groundwater Sustainable Agencies (GSAs) for their respective service areas overlying the Bolsa, Hollister, San Juan Bautista, and Tres Pinos Valley groundwater basins, termed collectively as the North San Benito Groundwater Basin (Basin). In accordance with the Sustainable Groundwater Management Act (SGMA), SBCWD and SCVWD are preparing a Groundwater Sustainability Plan (GSP) for the Basin. The purpose of this Technical Memorandum (TM) is to assess the availability of data to support the GSP.

SBCWD and SCVWD have a long history of groundwater management and data collection. These agencies regularly collect, assess, and report on groundwater conditions and these data serve as the bulk of what is needed to support the GSP. In addition, the California Department of Water Resource (DWR) has been developing state and regional data sets to help local agencies fill data gaps; some examples are the subsidence data available on the SGMA Map Viewer and the state-wide landuse for 2014.

Nonetheless, there are still data gaps, generally defined in DWR's GSP Regulations as a lack of information that significantly affects the understanding of the basin setting or the evaluation of GSP implementation effectiveness and potentially limits the ability to know if a basin is being sustainably managed. As documented in this TM, gaps have been identified in available data on surface water and streamflow, availability of groundwater monitoring wells in some areas of the basin, hydrogeological data including aquifer parameters and basin depth, specific knowledge of well locations and well construction, and data on groundwater pumping. The GSP preparation process will likely reveal some additional data gaps; however, this early assessment of data allows timely development of plans to fill data gaps with more monitoring, additional analyses, or improved data collection.

## 2. INTRODUCTION

Preparation of a GSP requires compilation, organization, checking, and subsequent analysis of relevant data and information relating to the hydrology, climate, topography, soils, land use conditions, hydrogeology, groundwater, and water use in a basin. SBCWD and SCVWD have actively monitored and managed water resources in their respective service areas for decades, and the availability of information reflects long-standing cooperative efforts among these and other agencies at the local, regional, state, and federal levels. SBCWD, which encompasses most (>90 percent) of the basin, has conducted active monitoring and has prepared Annual Groundwater Reports for over 30 years; these annual reports compile and analyze a range of data addressing climate, groundwater levels/storage, water quality, surface water flow, water imports, wastewater discharges and water recycling, water balances, and water use in the context of basin management. The data compilation and management for the GSP builds on this existing monitoring and data management and incorporates relevant data from SCVWD to provide complete coverage for the Basin.

To comply with SGMA and GSP Regulations, the existing monitoring and data management efforts are being expanded and refined to collect types of data relevant to SGMA sustainability criteria[1]. Many of the datasets summarized in this TM have been compiled from readily-accessed public sources or previously completed reports, while others have been requested from state and local agencies. Consistent with Best Management Practices provided by the Department of Water Resources (DWR), these data have been reviewed for quality and consistency and compiled into standardized formats to facilitate further use and analysis in preparation of the GSP; these formats include an Access database, an ESRI Geographic Information System (GIS) geodatabase, Excel workbooks, and written reports. Data also are considered in terms of study period, selecting a study period that best represents basin conditions and recognizes SGMA requirements.

This TM addresses the following:

- Study periods
- Data types and sources
- Technical and reporting standards
- A data management system (DMS)
- Initial identification of data gaps.

## 3. STUDY PERIODS

SGMA documentation and analysis involves definition of various study periods (and time steps) for historical, current, and projected future conditions. In brief, historical conditions must include at least 10 years. Availability of data for update, extension, and refinement of the numerical model is considered key. The study period for the numerical model begins in water year 1975 and will be extended to 2017, using available data. This period includes

[1] Groundwater level decline, storage depletion, water quality degradation, subsidence, and adverse impacts on connected surface water and groundwater-dependent ecosystems (GDEs). Seawater intrusion is not applicable.

droughts and wet periods, with an average annual rainfall of 12.97 inches, which is comparable to the long-term average of 12.9 inches (1875-2017). To comply with SGMA, consideration of the future will involve projection of rainfall and streamflow data into the future for 50 years (e.g., use data from 1967-2017).

# 4. DATA TYPES AND SOURCES

This section summarizes data types and sources with the intent of evaluating overall availability of information; references are provided as part of the GSP document.

## 4.1 Hydrology

### 4.1.1 Climate Data (precipitation, evaporation, temperature)

Climate data collection stations and records have been reviewed and assessed for the previously mentioned Annual Reports. A key data source is the California Irrigation Management Information System (CIMIS), which is a program unit within DWR that manages a network of more than 145 automated weather stations in California. This network is designed to assist irrigators in managing their water resources more efficiently. The two stations in the Basin are:

- Station #126 located in Hollister with available data from 6/9/1994
- Station #143 located in San Juan with available data from 1/1/1998

Precipitation data from CIMIS station #126 have been affected by periodic irrigation overspray that has been recorded on the sensors. The District is considering means to resolve this problem.

Long term precipitation data are available from various Hollister gage stations from 1875 to 1996; these data were published in the 1996 Annual Groundwater Report. Together the historical station and CIMIS records provide 143 years of rainfall data. Additional data are available from the National Oceanic and Atmospheric Administration (NOAA) and other sources.

Information on the geographic distribution of precipitation has been collected from the PRISM Climate Group, which gathers climate observations from a wide range of monitoring networks, applies sophisticated quality control measures, and develops spatial climate datasets. These datasets incorporate a variety of modeling techniques and are available at multiple resolutions covering the period from 1895 to the present. These datasets include elevation-varying average precipitation isohyets that can be used to estimate or simulate precipitation throughout the watershed contributing to Basin. Additional isohyetal maps are available (for example, from SCVWD). For geographic distribution of evapotranspiration, DWR zone mapping is available.

### 4.1.2 Surface Water Body Location Mapping

Mapping data for surface water features have been provided from publicly available sources. These mapped data include locations of aqueducts, rivers, streams, drainages, lakes, and ponds. These data are presented in the project geodatabase in feature classes named *HydrologyArcs,* and *HydrologyPolygons*.

In addition to surface water body mapping, local subwatershed area mapping also is available. These mapped subwatersheds provide a standard nested watershed delineation scheme using the State Water Resources Control Board (SWRCB) numbering scheme. The hierarchy of watershed designations consists of six levels of increasing specificity: Hydrologic Region (HR), Hydrologic Unit (HU), Hydrologic Area (HA), Hydrologic Sub-Area (HSA), Super Planning Watershed (SPWS), and Planning Watershed (PWS). The dataset in the project geodatabase includes all the subwatersheds within the Pajaro River watershed.

#### 4.1.3 Surface Water and Streamflow Data

Four streamflow gage stations are maintained in or near the Basin by the United States Geological Survey (USGS) with funding by SBCWD. These stations are located on San Benito River Near Willow Creek School (USGS 11156500), San Benito River at Hwy 156 Near Hollister Ca (USGS 11158600), Tres Pinos Creek Near Tres Pinos Ca (USGS 11157500) and Pacheco Creek Near Dunneville, CA (USGS 11153000). These stations are all active and have records that begin in February 1938, December 1970, February 1938, and 1940, respectively. In addition, USGS maintains a gage on the Pajaro River at Chittenden, which is downstream of the confluence of the Pajaro and San Benito rivers; this gage has records extending back to 1939.

In previous years, the District monitored select locations on a quarterly basis and this information is included in the project database. In recent years this monitoring has been interrupted partly because most tributary waterways have been dry during the drought.

#### 4.1.4 Mapping of Natural Communities Commonly Associated with Groundwater

One of the components of the GSP Regulations is identification of Groundwater Dependent Ecosystems (GDEs), which are defined in the GSP Regulations as ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. A statewide database and mapping tools, developed by DWR, provides geographic information on Natural Communities Commonly Associated with Groundwater. While these do not necessarily represent GDEs, the dataset is a starting point in identifying GDEs. The mapping data for watersheds surrounding the Basin are included in the project geodatabase in the *Hydrology* feature dataset in feature classes named *GDE_NCCAGWetlands* and *GDE_NCCAGVegetation*.

### 4.2 Topography, Soils, Land Uses

#### 4.2.1 Ground Surface Elevation Data

Ground surface elevation data are available from the USGS in the form of National Elevation Dataset (NED) GIS grid files (rasters) and raster and vector topographic map datasets. Both datasets have been compiled for the area surrounding the Basin. The 10-meter resolution NED data have been combined into a single raster.

#### 4.2.2 Aerial Photographs

Aerial photographs of the area surrounding the basin have been downloaded from the USGS National Aerial Imagery Program (NAIP) for 2004, 2005, 2006, 2009, 2010, 2012, 2014, and 2016. These aerial photographs are all rectified GIS raster datasets and included in the project geodatabase.

#### 4.2.3 Soil Maps

Soil information for the areas surrounding the Basin have been downloaded from the Natural Resources Conservation Service (NRCS, 2018). Soil data are mapped and maintained by NRCS in a standardized format that is compatible with tools that NRCS makes freely available to the public. The soils data for the area surrounding the basin have been maintained in the standard NRCS formats to facilitate flexible future use. These raw data are available for use in the preparation of a number of soil data presentations and analyses. The hydrologic soil group data from these datasets have been also mapped using the NRCS *Soil Data Development Toolbox.* These data are in the *Soils* feature dataset in the project geodatabase.

#### 4.2.4 Soil Index

The Soil Agricultural Groundwater Banking Index (SAGBI) is a suitability index for groundwater recharge on agricultural land, for example water spreading in dormant orchards or on fallow land. The SAGBI is based on five major factors for managed aquifer recharge on agricultural lands: deep percolation, root zone residence time, topography, chemical limitations, and soil surface condition. The coverage is available through an online web tool by the California Soil Resource Lab at UC Davis and UC-ANR and DWR https://gis.water.ca.gov/app/cadwrlanduseviewer/.

#### 4.2.5 Land Use Maps

Land use map data have been collected from DWR, the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP), and counties of San Benito and Santa Clara. The available land use maps are indicated below:

- DWR: 2014 statewide land use mapping specifically developed for SGMA and GSPs.
- San Benito County: 1997 and 2002
- Santa Clara County: 2014
- San Benito County Water District Update: 2010
- FMMP: 1984, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, and 2016
- County Crop Reports
- Land Use and General Plans: County, Hollister, San Juan Bautista

##### *4.2.5.1 DWR Land Use Maps*

DWR has an ongoing program to conduct annual land-use surveys. The emphasis is mapping agricultural land and crop types, but also includes information on general urban land uses and native vegetation (i.e., undeveloped land). DWR surveys include more than 70 different crops or crop categories. Some surveys, but not all, have mapped irrigation methods and water sources. For San Benito County, maps are available in GIS format for years 1997 and 2002. Todd Groundwater and SBCWD updated the DWR 2002 land use map using a 2010 aerial photo in the northern county area to assess changes in irrigation demand. Results have been documented in a technical memorandum and included in SBCWD's Annual Groundwater Report.

DWR has been developing a state-wide land use map and online mapping tool. The coverage has been downloaded and stored in the GSP geodatabase.

#### *4.2.5.2 Farmland Mapping and Monitoring Program*

Farmland mapping data are available as GIS polygon files and included in the geodatabase. The FMMP datasets present farmland by broad category related to its overall quality, as described below.

FMMP's study area is contiguous with modern soil surveys developed by the US Department of Agriculture (USDA). A classification system that combines technical soil ratings and current land use is the basis for the Important Farmland Maps of these lands. Most public land areas, such as National Forests and Bureau of Land Management holdings, are not mapped. The categories include:

- Prime Farmland (P)
- Farmland of Statewide Importance (S)
- Unique Farmland (U)
- Farmland of Local Importance (L)
- Grazing Land (G)
- Urban and Built-up Land (D)
- Other Land (X)
- Water (W)

#### *4.2.5.3 County Crop Reports*

The San Benito County Agricultural Commissioner publishes annual reports on the total crop acreage by crop in the county. Crop Reports are available on the Commissioner's website from 1941 through 2016. While the crop reports do not show the location of acreages, county-wide changes in crop type and total area are informative in years when DWR land use maps are not available. Crop reports are also available for Santa Clara but the reports only present totals for the whole county and not for the small area in the groundwater basin.

#### *4.2.5.4 General Plans*

San Benito County, Santa Clara County, the City of Hollister, and the City of San Juan Bautista publish general plans that show current and future land use for their planning areas. The coverages associated with these plans are stored in the GSP geodatabase.

### 4.3 Hydrogeology

#### 4.3.1 Geologic Mapping of Surficial Geology and Faults

Surficial geology in the area of the Basin has been mapped by the California Geological Survey (CGS) in the 2002 *Geologic Map of Monterey 30' x 60' Quadrangle and Adjacent Areas*. This mapped geology has been digitized into GIS formats available from the CGS, and these complete datasets are included in the GSP geodatabase. In addition to this digital geologic map, there are also published geologic maps are available in other formats. These include the 1972 *Ground-Water Hydrology of the Hollister and San Juan Valleys, San Benito County* prepared by Kilburn (USGS) and numerous geologic maps for individual topographic quadrangles prepared by Brabb, Clark, Dibblee, and others and published by the USGS.

#### 4.3.2 Well Records, Lithology, and Well Construction

The well completion reports for all the sections within the Basin were requested and received from DWR on behalf of SBCWD. Appropriate confidentiality of well completion reports is being maintained per agreements among SBCWD, SCVWD, and DWR. SBCWD has been the permitting agency in San Benito County since 2004 and maintains well records in addition to those available from DWR. SBCWD well record files include more information than the DWR records including borehole and well locations, construction, and use. SBCWD well files have been scanned to support the GSP.

Well completion reports from DWR and those from SBCWD files are being used to aid construction of cross sections and to assist in definition of lateral basin boundaries and bottom. The first step has been identification of the geographic location of each borehole or well. Few of the well record files from DWR or SBCWD include reliable geographic coordinates (e.g. latitude and longitude); accordingly, borehole and well locations must be estimated based on other information in the well record files. Some DWR records and all SBCWD records include San Benito County Assessor's Parcel Numbers (APNs) that can be used to identify the property on which the well or borehole is located. Those DWR records that include neither location coordinates nor APN can only be located based on maps provided by drillers or well owners; these maps are often inadequate. The well records from both sources have been reviewed and organized according to ease of location identification. Boreholes and wells that can be readily located from geographic coordinates or APN have been plotted and are included in GIS datasets; this includes all wells from SBCWD well records that correspond to current APNs. The remaining well records are being further reviewed and those that are close to planned cross section lines will be plotted and added to the GIS datasets. Following the completion of the borehole and well location task, the well records for the located wells will be digitized to capture general well information (i.e. identification, owner, type, size, etc.) and well construction and lithology data for use in the creation of cross sections.

#### 4.3.3 Subsidence

The online DWR SGMA mapping tool provides several datasets to quantify subsidence that has occurred and the potential for subsidence:
https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

#### *4.3.3.1 NASA JPL InSAR Dataset*
Vertical ground surface displacement rates are derived from Interferometric Synthetic Aperture Radar (InSAR) data collected by the European Space Agency (ESA) Sentinel-1A satellite and processed by the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL), under contract with DWR. Changes in vertical displacement can be viewed through the DWR SGMA mapping tool. This monitoring program began in 2015 and does not document subsidence that occurred prior to that date.

#### *4.3.3.2 UNAVCO Continuous GPS Sites*
Also available through the DWR SGMA mapping tool is the Continuous GPS (CGPS) stations and associated data. These stations continuously measure the three-dimensional (3D) position of a point on or near the earth's surface. For subsidence studies, vertical movement (subsidence and uplift) is most relevant; data on horizontal movement can help discern tectonic movement that is an important local factor. There are seven stations within and around the Basin with data from as early as 2004.

## 4.4 Groundwater Monitoring

### 4.4.1 Groundwater Elevation Data
As with well locations, groundwater elevation records have been collected from multiple sources, including previous investigations, SBCWD, SCVWD, USGS NWIS, DWR CASGEM, and others. Data from these sources have been collected, reviewed, and compiled into a single unified groundwater elevation dataset. SBCWD has been monitoring groundwater since 1977 and drilled a multiport nested well in 2005 which is regularly monitored. The current SBCWD network totaled 91 wells in October 2017. SCVWD provides quarterly data for 10 wells in the Llagas area, located on the north side of the Pajaro River.

In addition, water levels from DWR's Water Data library and the USGS National Water Information System have been included in the project database to ensure all historical measurements are included. Including all three sources, the Groundwater Elevation database contains 272 unique wells with data ranging from 1924 to 2018.

For wells with only depth to water measurements and no reference elevation data, groundwater elevations have not been calculated. In addition, wells with water level data, water quality data, pumping data, and well logs have not been cross referenced. Often the same well may have multiple local names in addition to a state well number. The GSP process includes assignment to each well of a unique identifier and removal of duplicate information.

Groundwater elevation data are presented in the *Groundwater Levels* project database, which has been structured according to the requirements of the DWR CASGEM program.

### 4.4.2 Groundwater Quality Database
SBCWD currently monitors a distributed network of 18 wells for water quality. Data from these monitoring wells and other water quality data are included in SBCWD's water quality database. SBCWD maintains this comprehensive water quality database, created in 2004

with a State Local Groundwater Assistance Grant and updated every three years. The most recent update in 2016 included available data from SBCWD, Regional Water Quality Control Board (including regulated facilities, wastewater plants, and spills), California State Water Resources Control Board (including municipal and small water systems, Tres Pinos Water District, City of Hollister, and Sunnyslope County Water District (SSCWD). In addition, data published as part of previous investigations have been added to the database. The database now contains over 450,000 records from 175 water systems or regulated facilities and over 1,800 monitoring locations.

## 4.5 Water Use

### 4.5.1 Production Wells/Pumping Data

Groundwater is pumped by private well owners for irrigation, industrial, and domestic uses and by public water supply retailers for municipal and small community purposes.

#### *4.5.1.1 Municipal water supply wells*

The major municipal suppliers are the City of Hollister, Sunnyslope County Water District, and City of San Juan Bautista. All three agencies report their monthly pumping to SBCWD for publication in the Annual Groundwater Report. The City of Hollister has four active wells, Sunnyslope has five active wells, and San Juan Bautista has two active wells. Monthly pumping data are available for all three agencies from 1995 to 2018.

#### *4.5.1.2 Agricultural and rural domestic water use*

Estimates of agricultural pumping amounts are available for the Zone 6 portion of the Basin. SBCWD monitors the hours of operation of large wells in Zone 6 and converts hours of operation to production volume based on infrequent measuremens of pump discharge rate. This approach is incapable of accounting for changes in pump discharge pressure (for sprinkler versus furrow irrigation, for example) or seasonal and interannual changes in static depth to water. Hours of pump operation are recorded on a semi-annual basis. This information is included in the database. Pumping in areas outside of Zone 6 is not metered. For groundwater modeling purposes, estimates of agricultural pumping at a field scale have been computed using crop type, crop coefficient, evapotranspiration, and irrigation efficiency. Rural domestic use in Zone 6 is evaluated through an annual survey sent by SBCWD to registered well owners (excepting the relatively large well monitored by SBCWD); most of these pumpers probably would be considered too small (de minimis) and exempt from SGMA requirements for monitoring groundwater use.

#### *4.5.1.3 Small water system wells*

There are about 100 small water systems in the Basin. The general location and number of wells are available from the State Water Resources Control Board Division of Drinking Water. A table of these systems, estimated population, and number of supply wells is in the database; this information is used for estimating water consumption. The California Environmental Health Tracking Program http://cehtp.org/water/map-viewer revealed the approximate location of 50 systems in San Benito County and one system in Santa Clara County.

#### 4.5.2 Imported Water

SBCWD and SCVWD manage the imported water from the Central Valley Project (CVP) for their respective service areas. Imported water data volumes, uses, and locations of delivery are documented by SBCWD for Zone 6 and included in the project database. The volumes of imported water delivered to municipal sources, agricultural uses, managed recharge, and evaporative losses are recorded monthly from 1988 to 2018. Major imported water delivery pipelines are included in the GIS datasets in the project geodatabase.

SCVWD delivers some imported water to portions of the Basin in Santa Clara County. SCVWD provided semiannual delivery volumes for the two customers in the GSP area from 1995 to 2017.

#### 4.5.3 Recycled Water and Wastewater

The City of Hollister produces recycled water for irrigation purposes, including landscape irrigation in the City's Riverside (Brigantino) Park . SBCWD provides delivery of recycled water to nearby agricultural customers. Delivered amounts and distribution locations are included in the project database.

The City of Hollister and Sunnyslope discharge some wastewater in unlined ponds. The approximate amount of groundwater recharge from these ponds is calculated on a water year basis and included in the project database.

### 4.6 Planning Documents and other Studies

#### 4.6.1 Jurisdictional Areas of State, Federal, and Local Agencies

State, local, and federal boundaries within and surrounding the Basin have been compiled from state and federal sources. These boundaries include all water districts and other local agencies near the basin as well as federally owned land. These boundaries are included in the *JurisdictionalAreas* feature dataset in the project geodatabase.

#### 4.6.2 Water Resources Planning Documents and Technical Studies

Numerous planning documents and technical studies are available for reference in preparing the GSP; recent key documents are listed below. State planning documents will also be included, including the Water Quality Control Plan (Basin Plan).

- Annual Groundwater Reports
- Groundwater Management Plan (1998 and 2003)
- Development of a Water Quality Monitoring Program (2004)
- Salt Nutrient Management Plan (2014)
- Pajaro River Watershed Integrated Regional Water Management Plan (2007)
- Hollister Urban Area Water and Wastewater Master Plan Report (2008)
- Urban Water Management Plan (2016)
- San Benito County General Plan Update (2016)

## 5. Technical and Reporting Standards

Compilation of data and information to support the GSP has adhered to standards for data, reporting, monitoring, and GIS, as applicable (**Reg. § 352**). Data are documented with source of the data, types and methods of measurements, and comments on protocols, when available. Well information will include available data, per requirements of **Reg. § 352.4 (c)**.

## 6. Data Management System (DMS)

SBCWD has been collecting and compiling groundwater data annually including water levels, water quality, and water use for the Annual Groundwater Report. These data and data from SCVWD and other sources are being compiled in a relational database, which consists of an Access database, GIS geodatabase, and Excel workbooks and has capabilities for queries to quickly check and summarize data. As part of the GSP, the data management system has been redesigned to be practicable, usable, intuitive, and cost effective. The DMS will have the capability to distinguish data according to subbasins and management areas.

A second TM detailing the final DMS and its uses will be prepared after the GSP analysis has been completed.

## 7. Data Gap Identification and Evaluation

The available data described above have been reviewed considering SGMA requirements and sustainability criteria to identify gaps in geographic and temporal coverage. The DWR GSP Regulations define a data gap as *a lack of information that significantly affects the understanding of the basin setting or evaluation of the efficacy of Plan implementation and could limit the ability to assess whether a basin is being sustainably managed.* The following data gaps have been identified; recommendations are provided for their resolution with the recognition that 1) definition of significant data gaps may change as GSP preparation proceeds and 2) the means of resolving data gaps may change, including the timing.

### 7.1.1 Climate Data (precipitation, evaporation, temperature)

Previous Annual Reports have relied on precipitation data from the Hollister CIMIS station; however, overspray from nearby irrigation sprinklers has variously affected the rain gage. This problem has been recognized by the District which is considering means of restoring accurate data collection. Compilation and evaluation of other rainfall data sources (e.g., NOAA) could support replacement and/or correction of the CIMIS data.

### 7.1.2 Surface Water and Streamflow Data

There currently are four active surface water monitoring stations, which are operated by USGS. In addition, SBCWD historically has measured flows at intervals on selected locations; these measurements were intended mostly to yield information on surface water-groundwater interactions and to thereby support water balance analyses and modeling. The GSP update and extension of the water balance and model is the appropriate time to review and revamp the SBCWD surface water monitoring efforts. Information on rates of percolation along surface water channels (involving synoptic surveys) has been identified as a data gap. In addition, identification of groundwater-dependent ecosystems (GDEs) may require additional surface water monitoring and groundwater elevation monitoring that is linked to monitoring of groundwater levels in water supply wells. Information is needed on groundwater discharges within and near the basin, including springs, seeps, and wetlands.

#### 7.1.3 Stormwater Flow

A portion of the stormwater in the City of Hollister is captured and recharged in the wastewater treatment ponds. This stormwater represents a source of supply that may be amenable to additional management actions as part of the GSP, pending documentation of past recharged volumes, monitoring of these flows, and consideration of future capture and recharge plans from the City of other local agencies.

#### 7.1.4 Groundwater Monitoring Wells

SBCWD has been addressing gaps in its monitoring program for groundwater elevation and quality. As summarized in the attached memorandum, SBCWD has developed a plan to identify new monitoring locations; the attached map showing monitored and unmonitored areas also has been developed. SBCWD recognizes that preparation of the GSP is an opportunity to expand the groundwater monitoring programs to the southern portion of the Basin, to identify areas where data are needed to support water balance analyses and modeling for management areas (as may be defined), and to provide monitoring for sustainability criteria such as surface water-groundwater interactions and GDEs.

#### 7.1.5 Hydrogeologic Conceptual Model

The southern portions of the Basin warrant particular attention because information on hydrogeology and groundwater conditions is relatively sparse. Available data will be analyzed for description of the hydrogeologic conceptual model, documentation of groundwater conditions, and quantification of water budgets, and specific data gaps will be defined. Suitable existing wells will be identified for use as potential monitoring points; exploratory drilling and development of new monitoring facilities is likely warranted.

#### 7.1.6 Well Completion Reports and Data Management

Well completion reports have been compiled from DWR and SBCWD and have been categorized with regard to reliability of location information and potential usefulness in developing the hydrogeologic conceptual model (including cross sections). Identification of well locations is likely to be ongoing; nonetheless, focused areas for well location efforts may be defined as part of GSP preparation.

In addition, the wells with water level data, water quality data, pumping data, and well logs have not been cross referenced. Often the same well may have multiple local names in addition to a state well number. As part of the GSP process, each located well is being assigned with a unique identifier and duplicate information is being removed.

#### 7.1.7 Groundwater Pumping and Use

SGMA requires annual reporting of groundwater use for all users in a basin except the de minimis extractors (pumping two acre-feet/year or less). Groundwater pumping is measured in SBCWD Zone 6 but not elsewhere. Accordingly, the monitoring program will be reviewed in terms of extension to cover the entire basin.

Information on irrigation schedules and efficiencies has been identified as needed to calculate return flows from agricultural water use.

**Attachments:**

**SBCWD Technical Memorandum, Sustainable Groundwater Management Act-Process for Establishing Well Network to Monitor Groundwater in San Benito County, November 21, 2018.**

**Todd Groundwater, Monitored and Unmonitored Areas, North San Benito County, map prepared for SBCWD, December 2018.**

# TECHNICAL MEMORANDUM

| | |
|---|---|
| **Subject:** | Sustainable Groundwater Management Act – |
| | Process for Establishing Well Network to Monitor Groundwater in San Benito County |
| **Prepared For:** | Jeff Cattaneo, P.E. SBCWD General Manager |
| **Prepared by:** | David Macdonald, Assistant Engineer |
| **Reviewed by:** | Garrett Haertel, P.E. Deputy District Engineer |
| **Date:** | November 21, 2018 |

**Organization of TM**

- Background
- Purpose
- Discussion
- Conclusions
- Recommendations

## BACKGROUND

San Benito County Water District (SBCWD) has continuously managed the groundwater in San Benito County for over 50 years. In 2017, SBCWD became the Groundwater Sustainability Agency (GSA) for San Benito County to satisfy requirements of the Sustainable Groundwater Management Act (SGMA). This designation allows SBCWD to be the lead agency in preparing a Groundwater Sustainability Plan (GSP) for a significant portion of San Benito County.

After reviewing the current network of monitored wells, it became evident that in order to fully comply with SGMA, additional wells were needed to increase monitoring coverage of the groundwater basin.

## PURPOSE

The purpose of this technical memorandum is to detail the procedure for finding and adding new wells to the monitoring network.

## DISCUSSION

Additional wells are needed in the San Juan Bautista, Tres Pinos Valley, Bolsa, and Hollister sub-basins in order to provide quality coverage. Todd Groundwater is SBCWD's consultant regarding groundwater management, and they have provided a map titled "Historically Monitored Wells" which indicates areas where data is lacking. These areas were targeted in the search for additional wells to add to the monitoring network. SBCWD utilized the following procedure to locate potential wells to add extra coverage within the groundwater subbasins.

**Finding Wells for Monitoring Groundwater Conditions**

First Method

1. Determine areas of need based on the "Historically Monitored Wells" map.
2. Use county GIS map to determine Assessor's Parcel Number (APN) of parcels within areas of need.
3. Use the APNs to locate well logs within SBCWD's files.
4. Locate the well on an aerial map to verify location/existence.

Second Method

1. Search the targeted areas on an aerial map to locate wells that may not be in SBCWD's files. This is done by looking for pipes and lone power poles in locations where a well would be advantageous.
2. Use the coordinates from Google Maps to map the location of the well on ArcGIS.
3. Use county GIS map to determine APN numbers of parcels within areas of need.
4. Confirm and verify location.

**Acquiring Rights to Use Wells for Monitoring Groundwater Conditions**

1. Use APN's to determine the owner of each well.
2. Produce and send a letter requesting permission to access the well for water level measurements and/or test water quality.
3. Once permission is granted, visit site and determine method of measurement/testing.

**Repairing/Re-activating Previous Wells for use**

1. Determine wells with access issues and follow up with owner to get keys/access.
2. Determine wells that can be altered/repaired to re-activate, and assess access.
3. If well can be reactivated, assess well condition (functioning, collapsed, etc.)

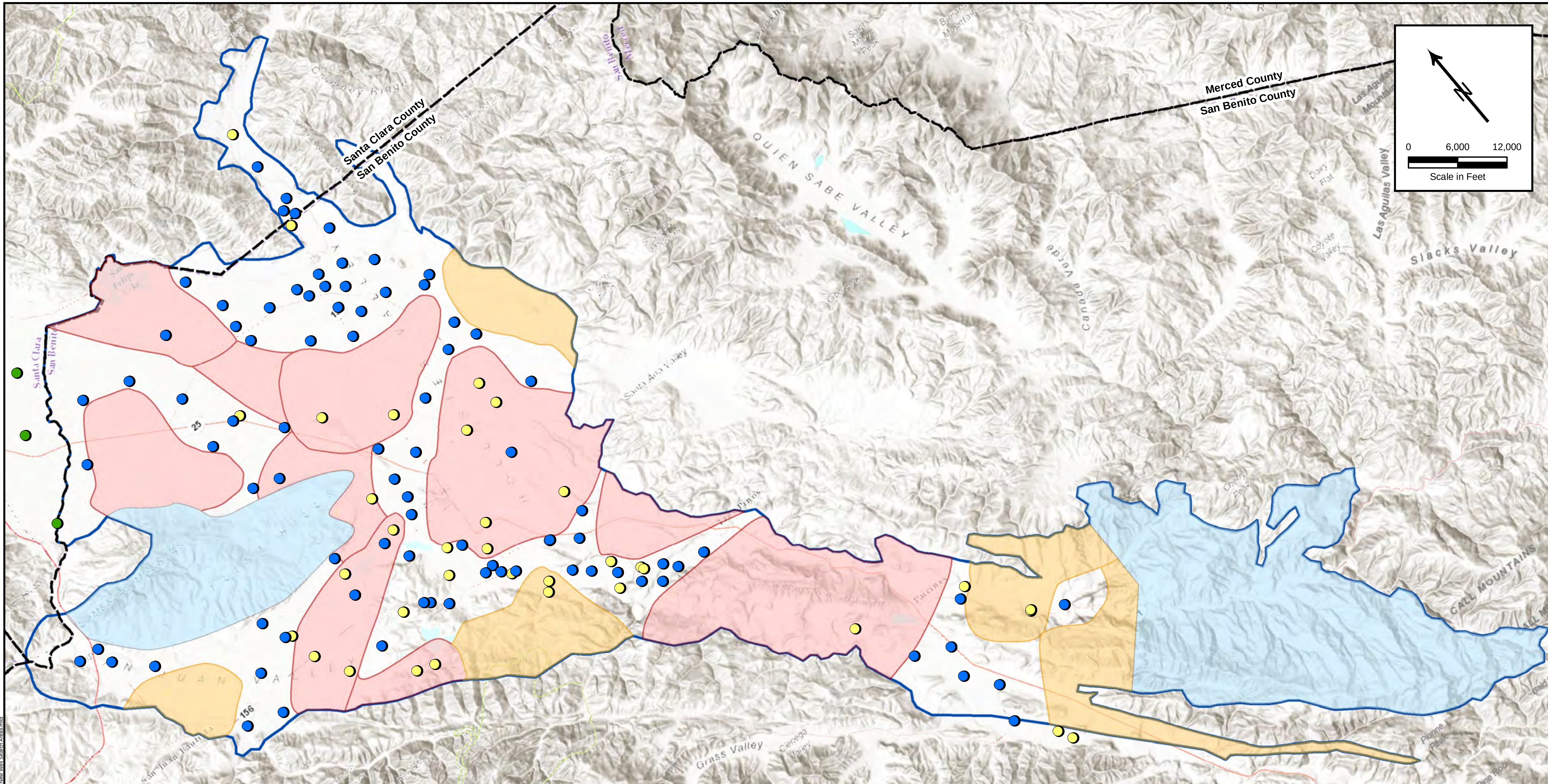
## CONCLUSIONS

More monitoring wells are necessary to cover the entire area of the groundwater basins in San Benito County. This effort will improve the quality and credibility of data that SBCWD can produce to ensure compliance with SGMA. SBCWD's groundwater management activities can be further improved by increasing the amount of data collected within the county subbasins.

## RECOMMENDATIONS

Based on this information it is recommended that the following actions be taken:

- Locate as many potential wells as possible.
- Request Owners to allow SBCWD access/permission to monitor groundwater conditions.
- Increase long term monitoring network.




- SBCWD Monitored Wells, October 2018
- SCVWD Monitored Wells, October 2018
- Well Monitored in Prior Years and not October 2018
- Adequately Monitored Areas
- High Priority Target Area
- Low Priority Area
- Areas with Few to No Wells
- North San Benito Basin

December 2018

TODD GROUNDWATER

**Monitored and Unmonitored Areas North San Benito Basin**

TODD GROUNDWATER

August 14, 2019

## TECHNICAL MEMORANDUM DRAFT

**To:** Jeff Cattaneo, GSP Project Manager
San Benito County Water District GSA

**From:** Iris Priestaf, PhD

**Re:** Summary of Management Area Definition for North San Benito Basin GSP

## 1. INTRODUCTION

This memorandum summarizes Management Areas as subdivisions of the North San Benito Basin and in terms of their role in the GSP. As defined in the GSP Regulations, the purpose of Management Areas (MAs) is to *facilitate implementation of the GSP*. The major objective for this Summary Technical Memorandum is to present the rationale for creating each MA.

Management Areas will be described in the GSP, specifically in the upcoming Section 6, Sustainable Management Criteria, which is scheduled for presentation to the TAC in May 2020. This Section 6 will describe the sustainability goal, present MAs, characterize undesirable results, and establish minimum thresholds and measurable objectives for each sustainability indicator. These indicators will be described for each MA. Consistent with the GSP Regulations, MAs will be presented in terms of:

- Reason for creation of each management area
- If a GSP includes one or more management areas, the GSP shall include descriptions, maps, and other information required by the GSP Regulations sufficient to describe conditions in those areas
- Level of monitoring and analysis appropriate for each MA
- Explanation of how management of MAs will not cause undesirable results outside the MA

The North San Benito Basin shown in **Figure 1** encompasses about 205 square miles in northern San Benito County including small portions in southern Santa Clara County. The Basin is in the Pajaro River watershed; most of the area is drained by the San Benito River and its tributaries, while northeastern portions are drained by tributaries to the Pajaro River. The Basin is characterized by a series of valleys bounded and separated by uplands. Relatively large valleys include Paicines Valley, San Juan Valley, Hollister Valley, and the Bolsa, which is a broad, flat area bounded by the Pajaro River on the north. The major valleys are the locales of intensive groundwater use, irrigated agriculture, the cities of Hollister and San Juan Bautista, and rural communities, while the uplands are mostly rangeland. **Figure 1** illustrates the elongated shape and varied topography of the North San Benito Basin, which are factors in defining Management Areas. Stated simply, the Basin is too long and varied to be managed easily as a single unit, so more than one MA is warranted for GSP implementation.

A major factor in defining Management Areas is availability of water supply sources. While recognizing that water supply availability (in terms of sources, infrastructure, and institutional arrangements) can change in the future, current availability is a reasonable starting point. SBCWD provides local surface water from Hernandez and Paicines reservoirs that is provided to a local zone of benefit, Zone 3, and imported Central Valley Project (CVP) water that is provided to Zone 6. Zones 3 and 6 are shown on **Figure 2,** including areas of overlap. CVP water also is provided by Santa Clara Valley Water District (SCVWD) to some customers in Santa Clara County.

Since the 1950s, SBCWD has managed local groundwater using various definitions of local groundwater basins and subbasins. DWR previously defined four subbasins and basins (including Tres Pinos Valley Basin and three subbasins of the Gilroy-Hollister: Bolsa, Hollister, and San Juan Bautista); these have been combined into the North San Benito Basin. SBCWD also defined subbasins in 1996 to support its groundwater management in northern portions of the basin. These were based on hydrogeologic and other factors, including Zone 6 boundaries. The Zone 6 subbasins included Pacheco, Bolsa Southeast, San Juan, Tres Pinos, and Hollister (with additional subdivisions). A Bolsa subbasin (outside Zone 6) was defined.

As defined in the GSP Regulations, a Management Area is an area within a basin for which the GSP may identify different minimum thresholds, measurable objectives, monitoring, or projects and management actions based on differences in water use sector, water source type, geology, aquifer characteristics, or other factors. While an MA may have different minimum thresholds and may be operated to different measurable objectives than the basin at large, undesirable results must be defined consistently throughout the basin and the operation of the MA must be managed in a way that does not cause undesirable results outside the MA. The purpose of dividing a basin into management areas is to facilitate implementation of the GSP.

This memorandum presents four Management Areas for the North San Benito Basin as shown in **Figures 1 and 2**:

- Southern
- Hollister
- San Juan
- Bolsa

The definition of each MA is described in the following sections in terms of the basis for creation of the MA. The MAs will be used in the water budget analysis (to be presented in Section 5 of the GSP) and in numerical modeling. MAs will be used to help define the sustainability criteria (undesirable results, minimum thresholds, management objectives), which will be described in Section 6.

## 2. DEFINITION OF SOUTHERN MANAGEMENT AREA

As shown in the maps, the Southern MA is characterized by uplands and small valleys along the San Benito River and Tres Pinos Creek. Land uses are predominantly rural residential, rangeland, and agricultural (mostly truck crops and vineyards), which rely on groundwater supply provided mostly by private wells.

A key factor differentiating the Southern MA from the other MAs is access to Zone 3 surface water and the absence of any effects of Central Valley Project (CVP) water delivered to Zone 6. Pumping in the MA is also distant from the adjoining Hollister MA. Most of the pumping is in Paicines and Tres Pinos Creek Valleys, which are separated from the Hollister MA by three miles of more rugged terrain where there is little pumping. Groundwater in Southern MA is recharged in part by releases from Hernandez and Paicines reservoirs, and portions of Southern MA are within Zone 3. No imported water is provided to Southern MA, which does not overlap with Zone 6.

## 3. DEFINITION OF HOLLISTER MANAGEMENT AREA

As shown in **Figures 1** and **2,** the Hollister MA includes the Hollister Valley and adjacent uplands mostly to the south. The Hollister MA differs from the adjoining MAs because of its variety of land uses, multiple jurisdictions, and multiple sources of water supply. Its boundary with the Bolsa and Southern MAs follows the boundary of Zone 6. The boundary with the San Juan MA—which includes part of Zone 6—crosses the narrow point in the valley floor at the upstream end of the San Juan Valley and traces the topographic divides on either side of the gap. The Hollister Valley includes intensive agriculture, rangeland, rural residential, urban, and industrial land uses. The MA includes all or portions of the City of Hollister, Sunnyslope County Water District, Pacheco Pass Water District, Tres Pinos County Water District, Hollister Hills SVRA, and areas in Santa Clara County.

Sources of water supply include local groundwater (recharged in part by releases from Hernandez and Paicines reservoirs), CVP imported water, and recycled water. Most of the MA is within Zone 6 and it includes lands that are in both Zone 3 and Zone 6. A small amount of CVP water also is provided by SCVWD to a few customers in Santa Clara County parts of the MA. Production wells include irrigation, domestic, and public water supply wells throughout the MA, with greater well density in the northern half of the MA.

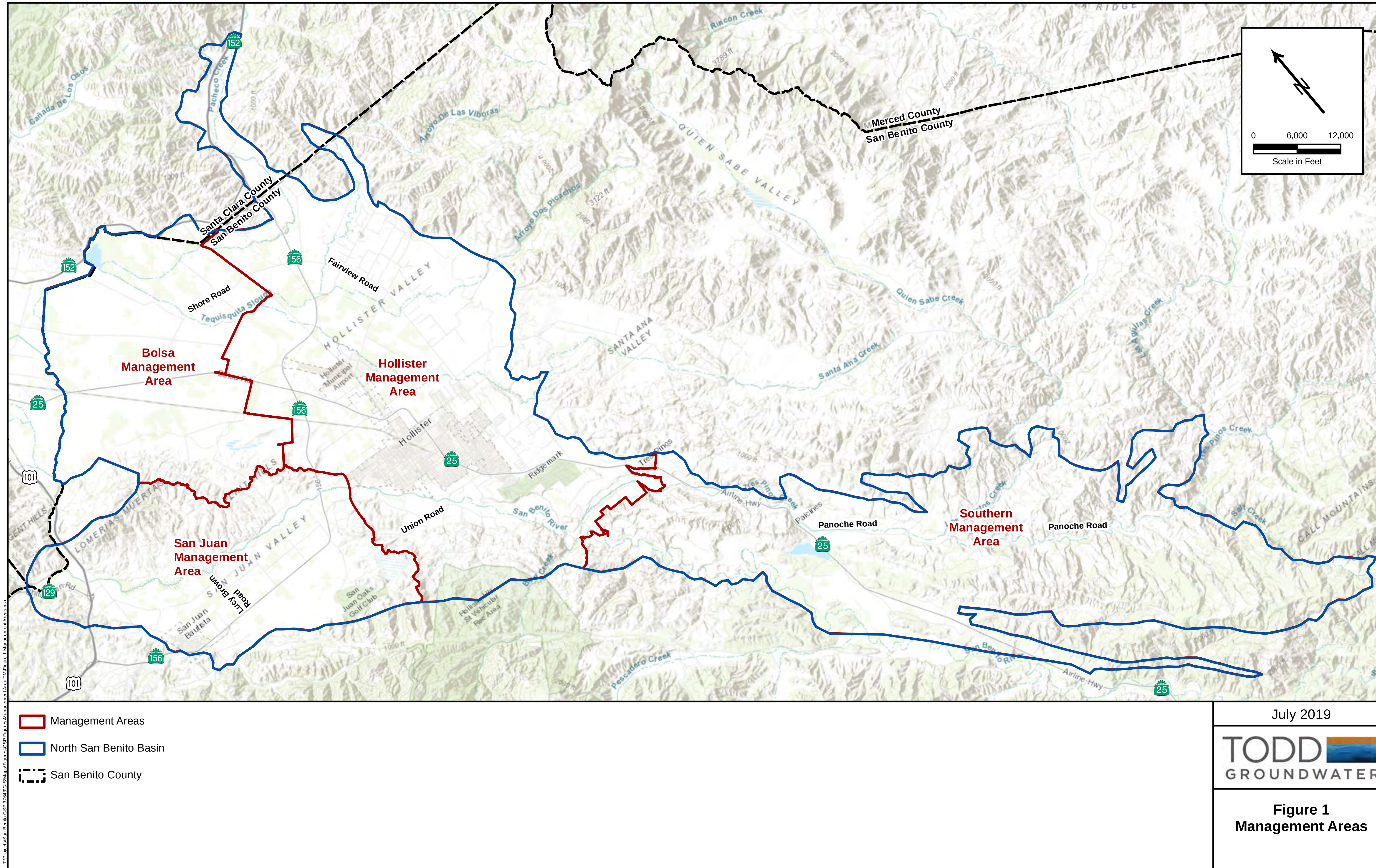
## 4. DEFINITION OF SAN JUAN MANAGEMENT AREA

The San Juan MA includes the San Juan Valley and adjacent uplands. Important characteristics of the San Juan MA are the various land uses, multiple jurisdictions, and multiple sources of water supply. The San Juan Valley is characterized by prime farmland and intensive agriculture, while the uplands are mostly rangeland with some rural residential and industrial land uses. The MA includes most of the City of San Juan Bautista and small areas of the City of Hollister, Aromas Water District, and Santa Clara County.

Sources of water supply include local groundwater (recharged in part by releases from Hernandez and Paicines reservoirs) and CVP imported water. The valley portions of the MA are mostly within Zone 3 and Zone 6 with some areas in Zone 6 only (see **Figure 2**). The MA differs from the Hollister MA primarily because of a much higher proportion of agricultural land and water use, and an absence of recycled water use.

## 5. DEFINITION OF BOLSA MANAGEMENT AREA

The Bolsa has long been recognized for its distinct topography and groundwater conditions, although its boundaries have been defined variously by USGS, DWR, and SBCWD. As shown in **Figure 1**, the Bolsa is a predominantly flat, relatively low-elevation area. It shares a watershed boundary with the San Juan MA and the Zone 6 boundary with the Hollister MA. It is the only MA bounding another groundwater basin, the Llagas Basin in Santa Clara County. It also differs from the adjacent Hollister and San Juan MAs by not having direct access to CVP imports or managed recharge from Hernandez and Pacines Reservoirs. It is outside of SBCWD's Zone 6 and Zone 3. Important characteristics of the Bolsa MA include the predominantly agricultural and rural land uses and complete reliance on groundwater supply provided through private wells.

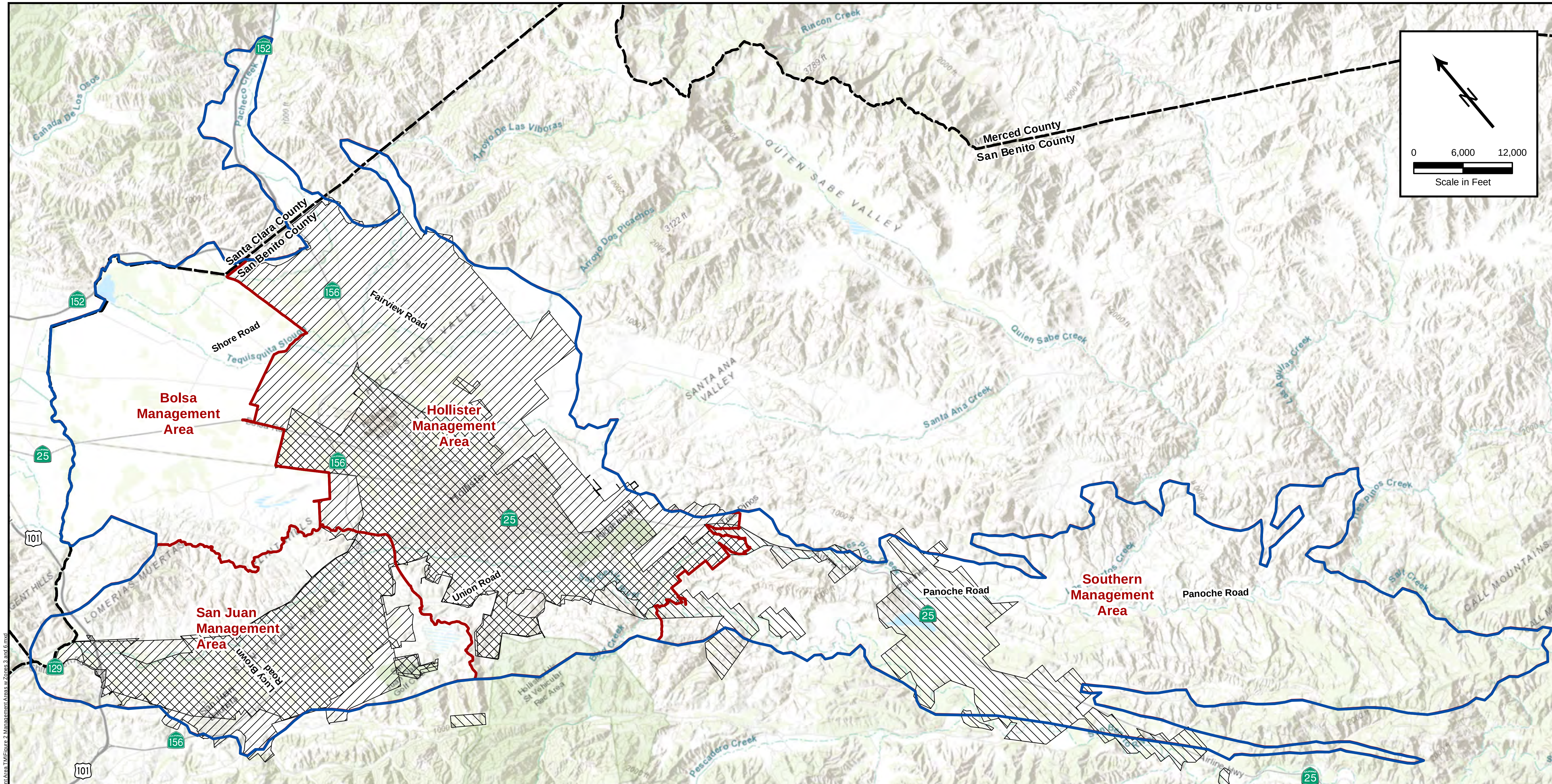



July 2019

TODD GROUNDWATER

**Figure 1**
**Management Areas**

Path: T:\Projects\San Benito GSP 37643\GIS\Maps\Figures\GSP Figures\Management Area TM\Figure 1 Management Areas.mxd




Management Areas

San Benito County Water District Zone 6

San Benito County Water District Zone 3

North San Benito Basin

San Benito County

July 2019

TODD GROUNDWATER

**Figure 2**
**Management Areas and Zones of Benefit**

May 10, 2021

## TECHNICAL MEMORANDUM

**To:** Jeff Cattaneo, GSP Project Manager
San Benito County Water District GSA

**From:** Maureen Reilly, PE, Chad Taylor, PG, CHG, and Iris Priestaf, PhD

**Re:** Data Management System (DMS)

## 1. EXECUTIVE SUMMARY

San Benito County Water District (SBCWD) and Santa Clara Valley Water District (SCVWD) are the Groundwater Sustainable Agencies (GSAs) for their respective service areas overlying the North San Benito Groundwater Basin (Basin). In accordance with the Sustainable Groundwater Management Act (SGMA), SBCWD and SCVWD are preparing a Groundwater Sustainability Plan (GSP) for the Basin. The purpose of this Technical Memorandum (TM) is to document the Data Management System (DMS) developed as part of the GSP.

SBCWD and SCVWD have a long history of groundwater management and data collection. These agencies regularly collect, assess, and report on groundwater conditions and these data are fundamental to the GSP. In addition, the California Department of Water Resource (DWR) has been developing state and regional data sets to help local agencies fill data gaps.

SBCWD has been collecting and compiling groundwater data annually including water levels, water quality, and water use for the GSP and Annual Groundwater Report. As part of the GSP, the data management system has been redesigned to be practicable, usable, intuitive, and cost effective. The data (and data from SCVWD and other sources) are being compiled in a relational database, which consists of an Access database, GIS geodatabase, and Excel workbooks. This DMS has capabilities for queries to quickly check and summarize data. This memo outlines the type of data available in the DMS and details how the data are stored. More information on available data is documented in the technical memorandum, “Data to Support GSP Preparation” (Todd 2018).

## 2. DMS TYPES AND SOURCES

Data collected and compiled for the GSP have been stored in a variety of formats based on the type of data collected. Spatial information such as ArcGIS files, aerial imagery, and or other map sources, is stored in a Geodatabase. Tabular data collected are stored in subject-specific relational databases. Additional datasets are stored in files best suited for analysis. To be specific, climate data are stored in an Excel workbook to allow for cumulative departure calculations, scanned well documents are stored as images to preserve the detail on the hardcopy forms, and online datasets updated by other agencies are included by reference. Discussed below are the data formats and the type of data available within that format.

# 3. GEODATABASE

Spatial data are stored in two connected geodatabases, a general geodatabase and an ArcHydro geodatabase. A Geodatabase allows spatial files to be easily accessed and transferred with all appropriate spatial information. Within the North San Benito Geodatabases, consistent and progressive folder structures have been constructed to group associated data sets.

## 3.1 Jurisdiction Boundaries

The basin boundaries for the North San Benito Groundwater Basin, management areas, and zone of benefit designations are available as spatial coverages in the geodatabase. Other jurisdictional boundaries including city limits, spheres of influence, and county limits are also included. The Assessor Parcel map received from San Benito County is also included as a coverage.

## 3.2 Surface Water Body Location and Watershed Mapping

Mapping data for surface water features have been provided from publicly available sources. These mapped data include locations of aqueducts, reservoirs, rivers, streams, drainages, lakes, and ponds. These data are presented in the project geodatabase in feature classes named *HydrologyArcs,* and *HydrologyPolygons*. DWR defined watershed coverages are also stored in the ArcHydro geodatabase names *Watershed*.

## 3.3 Mapping of Natural Communities Commonly Associated with Groundwater

GSP Regulations require identification of Groundwater Dependent Ecosystems (GDEs), which are defined as ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. A statewide database and mapping tool, developed by DWR, provides geographic information on Natural Communities Commonly Associated with Groundwater (NCAAG). While these do not necessarily represent GDEs, the dataset is a starting point in identifying GDEs. The mapping data for watersheds surrounding the Basin are included in the project geodatabase in the *Hydrology* feature dataset in feature classes named *GDE_NCCAGWetlands* and *GDE_NCCAGVegetation*.

### 3.4 Ground Surface Elevation Data

Ground surface elevation data are available from the USGS in the form of National Elevation Dataset (NED) GIS grid files (rasters) and raster and vector topographic map datasets. Both datasets have been compiled for the area surrounding and including the Basin. The 10-meter resolution NED data have been combined into a single raster.

### 3.5 Aerial Photographs

Aerial photographs of the area surrounding the Basin have been downloaded from the USGS National Aerial Imagery Program (NAIP) for 2004, 2005, 2006, 2009, 2010, 2012, 2014, and 2016. These aerial photographs are all rectified GIS raster datasets and included in the project geodatabase.

### 3.6 Soil Maps

Soil information for the Basin and surrounding areas have been downloaded from the Natural Resources Conservation Service (NRCS, 2018). Soil data are mapped and maintained by NRCS in a standardized format that is compatible with tools that NRCS makes freely available to the public. The soils data for the area surrounding the basin have been maintained in the standard NRCS formats to facilitate future use. These raw data are available for preparation of a various soil data presentations and analyses. The hydrologic soil group data from these datasets have been also mapped using the NRCS *Soil Data Development Toolbox.* These data are in the *Soils* feature dataset in the project geodatabase.

### 3.7 Land Use Maps

Land use map data have been collected from DWR, the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP), and counties of San Benito and Santa Clara. The available land use maps are indicated below:

- DWR: 2014 statewide land use mapping specifically developed for SGMA and GSPs.
- San Benito County: 1997 and 2002
- Santa Clara County: 2014
- San Benito County Water District Update: 2010
- FMMP: 1984, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, and 2016
- County Crop Reports
- Land Use and General Plans: County, Hollister, San Juan Bautista

### 3.8 Geologic Mapping of Surficial Geology and Faults

Surficial geology of the Basin has been mapped by the California Geological Survey (CGS) in the 2002 *Geologic Map of Monterey 30' x 60' Quadrangle and Adjacent Areas*. This mapped geology has been digitized into GIS formats available from the CGS, and these complete datasets are included in the GSP geodatabase. In addition to this digital geologic map, there are also published geologic maps are available in other formats. These include the 1972 *Ground-Water Hydrology of the Hollister and San Juan Valleys, San Benito County* prepared by Kilburn (USGS) and numerous geologic maps for individual topographic quadrangles prepared by Brabb, Clark, Dibblee, and others and published by the USGS.

### 3.9 Subsidence - NASA JPL InSAR Dataset

Vertical ground surface displacement rates are derived from Interferometric Synthetic Aperture Radar (InSAR) data collected by the European Space Agency (ESA) Sentinel-1A satellite and processed by the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL), under contract with DWR. Changes in vertical displacement can be viewed through the DWR SGMA mapping tool. Data are downloaded from the SGMA data viewer annually and stored in the project geodatabase.

### 3.10 Subsidence - UNAVCO Continuous GPS Sites

Also available through the DWR SGMA mapping tool is the Continuous GPS (CGPS) stations and associated data. These stations continuously measure the three-dimensional (3D) position of a point on or near the earth's surface. For subsidence studies, vertical movement (subsidence and uplift) is most relevant; data on horizontal movement can help discern tectonic movement that is an important local factor. Data are downloaded from the SGMA data viewer annually and stored in the project geodatabase.

### 3.11 Imported Water Infrastructure

The locations of major imported water delivery pipelines (San Felipe, Hollister Conduit, and laterals) are included in the GIS datasets in the project geodatabase. The locations of Water Treatment Plants and wastewater facilities are also stored in the geodatabase.

### 3.12 Climate Data

The CIMIS stations and other climate locations are available in the geodatabase as a point coverage. In addition, the PRISM isohyets are available as a raster.

### 3.13 Surface Water Gage Locations

The locations of USGS surface water gages and locations of previous District surface water monitoring are also stored in the Geodatabase.

### 3.14 Well Records, Lithology, and Well Construction

Well records are included in the GIS datasets in the project geodatabases. This includes information for known and locatable wells in the Basin. Well completion reports for the entire Basin were requested and received from DWR on behalf of SBCWD. Appropriate confidentiality of well completion reports is being maintained per agreements among

SBCWD, SCVWD, and DWR. SBCWD has been the permitting agency in San Benito County since 2004 and maintains well records in addition to those available from DWR. SBCWD well record files include more information than the DWR records including borehole and well locations, construction, and use. SBCWD well files were scanned to support the GSP.

The well records from both sources have been reviewed and organized and data from these record sets are included in the project geodatabases. Boreholes and wells that could be readily located from geographic coordinates or assessor's parcel number (APN) were plotted and are included in the GIS datasets; this includes all wells from SBCWD well records that correspond to current APNs, those wells from SBCWD records that include latitude and longitude or other location coordinates, and those wells from DWR records that include location coordinates or other information making them locatable. As a note, wells with valid APNs were plotted at the centroid of the associated parcel. The remaining well records were further reviewed, and those that could be located now are recorded with location information.

All locatable wells were organized into GIS datasets compatible with the ArcHydro data structure for use in development of the hydrogeologic conceptual model, cross sections, and numerical model. Those wells close to planned cross section lines were further reviewed, and lithology and well construction information was digitized into GIS data tables using the ArcHydro data structure. These data were combined with other geologic and hydrogeologic information to prepare cross sections. Cross section datasets are also stored in the project geodatabases in the ArcHydro data structure. Compilation of this information is ongoing.

# 4. ACCESS DATABASES

Tabular data are linked in relational databases by subject. The DMS includes four stand-alone databases for groundwater elevation, groundwater quality, water use, and surface water monitoring. Each database, including locational information as State Plane coordinates, is updated annually.

## 4.1 Surface Water Database

### 4.1.1 Surface Water and Streamflow Data

Four streamflow gage stations are maintained in or near the Basin by the United States Geological Survey (USGS) with funding by SBCWD. These stations are located on San Benito River Near Willow Creek School (USGS 11156500), San Benito River at Hwy 156 Near Hollister Ca (USGS 11158600), Tres Pinos Creek Near Tres Pinos Ca (USGS 11157500) and Pacheco Creek Near Dunneville, CA (USGS 11153000). These stations are all active and have NWIS records that begin in October 1998, October 1988, October 1996, and October 2006, respectively. In addition, USGS maintains a gage on the Pajaro River at Chittenden, which is downstream of the confluence of the Pajaro and San Benito rivers; this gage has records extending back to 1939. Data for these stations are downloaded from the USGS annually and the database is updated.

Additional monitoring by the District will be used to update this database as appropriate.

## 4.2 Groundwater Elevation Database

The Groundwater Elevation Database includes relevant information about the wells and elevation data. The database is structured into tables with information on well location, well construction, and monitoring data. There are several queries designed to summarize and extract data for annual reporting.

### 4.2.1 Well Locations – Groundwater Elevation

Well locations for all wells with available water level data are included as a table in a relational database.

### 4.2.2 Well Construction – Groundwater Elevation

The database also includes a table or relevant well construction as available.

### 4.2.3 Groundwater Elevation Data

As with well locations, groundwater elevation records have been collected from multiple sources, including previous investigations, SBCWD, SCVWD, USGS NWIS, DWR CASGEM, and others. Data from these sources have been collected, reviewed, and compiled into a single unified groundwater elevation dataset. The database table is updated annually for the Annual Report.

## 4.3 Groundwater Quality Database

The groundwater quality database combines water quality data from a variety of sources for a comprehensive repository of regional water quality data. The relational database includes locations for all wells with water quality data, a table of water quality data, a table with information on the water system that was sampled, and a table of constituents monitored with agency codes, reporting levels, and applicable water quality goals. Queries are included to extract data on the key constituents of concern.

### 4.3.1 District Monitoring

SBCWD currently monitors a distributed network of 18 wells for water quality. Data from these monitoring wells and other water quality data are integrated into the comprehensive water quality database. District data are updated annually.

### 4.3.2 Regional Monitoring

In addition to District collected data, the comprehensive database includes available data from SBCWD, Regional Water Quality Control Board (including regulated facilities, wastewater plants, and spills), California State Water Resources Control Board (including municipal and small water systems, Tres Pinos Water District, City of Hollister, and Sunnyslope County Water District (SSCWD). In addition, data published as part of previous investigations have been added to the database. These datasets are updated triennially; recent updates occurred in 2013, 2016, and 2019.

### 4.3.3 Small Water System Wells

There are about 100 small water systems in the Basin, as defined by the State. The general location and number of wells are available from the State Water Resources Control Board Division of Drinking Water. A table of these systems, estimated population, and number of supply wells is in the database; this information is used for estimating water consumption. The California Environmental Health Tracking Program http://cehtp.org/water/map-viewer indicates the approximate location of 50 systems in San Benito County and one system in Santa Clara County. This information is tied to the reported water quality for these wells and updated triennially.

## 4.4 Water Use Database

Existing water use data for Zone 6 (both groundwater pumping and CVP deliveries) is stored in a relational database. In the future, groundwater use will be determined basin-wide, and this expansion and improvement of the monitoring program will include replacement of the existing power meter use in Zone 6. This database has been and will continue to be updated annually.

### 4.4.1 Production Wells/Pumping Data

Groundwater is pumped by private well owners for irrigation, industrial, and domestic uses and by public water supply retailers for municipal and small community purposes. As currently available, information for each well, type of user, water source, and meter number is included in the database.

The major municipal suppliers are the City of Hollister, Sunnyslope County Water District, and City of San Juan Bautista. All three agencies report their monthly pumping to SBCWD for publication in the Annual Groundwater Report. As of 2020, the City of Hollister has four active wells, Sunnyslope has five active wells, and San Juan Bautista has two active wells.

Estimates of agricultural pumping amounts are available for the Zone 6 portion of the Basin. SBCWD monitors the hours of operation of large wells in Zone 6 and converts hours of operation to production volume based on infrequent measurements of pump discharge rate. This approach is incapable of accounting for changes in pump discharge pressure (for sprinkler versus furrow irrigation, for example) or seasonal and interannual changes in static depth to water. Hours of pump operation are recorded on a semi-annual basis. This information is included in the database. Pumping in areas outside of Zone 6 is not metered as of 2021.

### 4.4.2 Imported Water

SBCWD and SCVWD manage the imported water from the Central Valley Project (CVP) for their respective service areas. Imported water data volumes, uses, and locations of delivery are documented by SBCWD for Zone 6 and included in the project database. The volumes of imported water delivered to municipal sources, agricultural uses, managed recharge, and evaporative losses are recorded monthly. Locations of major imported water delivery pipelines are included in the GIS datasets in the project geodatabase.

SCVWD delivers some imported water to portions of the Basin in Santa Clara County. SCVWD provided semiannual delivery volumes for the two customers in the GSP area.

#### 4.4.3 Recycled Water and Wastewater

The City of Hollister produces recycled water for irrigation purposes, including landscape irrigation in the City's Riverside (Brigantino) Park. SBCWD provides delivery of recycled water to nearby agricultural customers. Delivered amounts and distribution locations are included in the water use database.

## 5. OTHER FORMATS

### 5.1 Climate Data (precipitation, evaporation, temperature) - Excel

Climate data are compiled and stored as an Excel file. The workbook also calculates the cumulative departure of precipitation and local water year type by quintiles.

A key data source is the California Irrigation Management Information System (CIMIS), which is a program unit within DWR that manages a network of more than 145 automated weather stations in California. This network is designed to assist irrigators in managing their water resources more efficiently. The two stations in the Basin are:

- Station #126 located in Hollister with available data from 6/9/1994
- Station #143 located in San Juan with available data from 1/1/1998

### 5.2 Soil Index

The Soil Agricultural Groundwater Banking Index (SAGBI) is a suitability index for groundwater recharge on agricultural land, for example, water spreading in dormant orchards or on fallow land. The SAGBI is based on five major factors for managed aquifer recharge on agricultural lands: deep percolation, root zone residence time, topography, chemical limitations, and soil surface condition. The coverage is available through an online web tool by the California Soil Resource Lab at UC Davis and UC-ANR and DWR https://gis.water.ca.gov/app/cadwrlanduseviewer/.

## 6. DATA MANAGEMENT STORAGE

The DMS will continue to be updated with more recent data for annual reports and the GSP 5-year update. It is expected that new datasets will be added as projects and management actions are enacted to fille data gaps. For example, remote sensing raster files and tabular data will be added to quantity basin-wide water use.

The geodatabase, Access databases, and excel workbooks are updated annually as part of the Annual Report. The District will maintain a copy of the annually updated files.

# APPENDIX F

# Annual Groundwater Reports

- Annual Groundwater Report WY 2015
- Annual Groundwater Report WY 2016
- Annual Groundwater Report WY 2017
- Annual Groundwater Report WY 2018
- Annual Groundwater Report WY 2019
- Annual Groundwater Report WY 2020

2015

# San Benito County Water District

## Annual Groundwater Report

SAN BENITO COUNTY WATER DISTRICT
ESTABLISHED
NOV. 3, 1953
HOLLISTER, CA 95024

TODD GROUNDWATER

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# ANNUAL GROUNDWATER REPORT

## WATER YEAR 2015

DECEMBER 2015

TODD GROUNDWATER

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# WATER YEAR 2015

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# ES EXECUTIVE SUMMARY

## *PURSUING SUSTAINABILITY*

This Annual Groundwater Report for San Benito County Water District (District) describes groundwater conditions in the San Benito County portion of the Gilroy-Hollister basin. It documents water supply sources and uses, groundwater levels and storage, and District management activities for water year 2015. Recommendations are provided with regard to groundwater replenishment, pumping, and the amount of water to import for water year 2016.

The 2014 Sustainable Groundwater Management Act (SGMA) continued to develop in 2015 with clarifications to the law through Senate Bill 13 (effective January 1, 2016) and through development of regulations by the Department of Water Resources (DWR). In brief, SGMA requires sustainable groundwater management for designated medium- and high-priority groundwater basins[1], including in San Benito County. Much SGMA activity this year has focused on defining groundwater basin boundaries as the physical basis for management, establishing Groundwater Sustainability Agencies (GSAs), and laying the groundwork for Groundwater Sustainability Plans (GSPs). The special section of this year's report addresses initial steps in this process, basin boundary modification and GSA formation. Boundary-specific actions are recommended for the District; it is recommended that the District establish itself as GSA for medium-priority subbasins in San Benito County.

Groundwater use increased this year as available imported water was limited. Groundwater represented 86 percent of total supply, mostly for agricultural use. The result of the increased groundwater use was continued groundwater level decline throughout much of the basin's agricultural area, specifically San Juan Subbasin.

Water levels continue to decline in San Juan, Hollister West, Bolsa SE, and Tres Pinos subbasins but remain above historical lows. The San Juan subbasin continues to rely on groundwater use to offset limited supplies of imported water. Since the beginning of this multiple year drought in 2012, groundwater levels have decreased as much as 38 feet in parts of the subbasin and on average 28 feet decline across the subbasin. Management activities to facilitate recovery should target areas with the most significant declines.

Precipitation in water year 2016 is expected to be above average but that alone is unlikely to be sufficient for full recovery from the multiple year drought. Additional wet years with snowpack in the Sierra and responsive water conservation (among other factors) will be needed before imported water supplies are replenished and depleted groundwater storage is recovered.

[1] Except when specified, "basin" is used generally to include basins and subbasins.

# 1 INTRODUCTION

The San Benito County Water District (District) was formed by a special act of the State with responsibility and authority to manage groundwater. The special act allows the Board of Directors to require an annual groundwater report and, as documented in Appendix A, specifies the minimum content of the report should the District choose to prepare one. The District, at its discretion, has also directed that specific Annual Reports include focused discussion of selected topics; this year, the focused topic is the Sustainable Groundwater Management Act (SGMA). This 2014 legislation mandates sustainable management for high and medium priority basins, including several in San Benito County. This Annual Report, prepared at the request of the District, documents water supply sources and use, groundwater levels and storage, and District management activities from October 2014 through September 2015.

It is intended to present an overview of the state of the groundwater basin. It also conveys considerable information, including tables and figures, which are provided largely in Appendices B through E. Appendix F provides information on water rates and charges, Appendix G provides information on drought recovery, and Appendix H is a list of acronyms.

Throughout this report, water volumes and changes in storage are shown to the nearest acre-foot (AF). These values are accurate to one to three significant digits (depending on the measurement). All digits are retained in the text to maintain as much accuracy as possible during subsequent calculations, but results should be rounded appropriately.

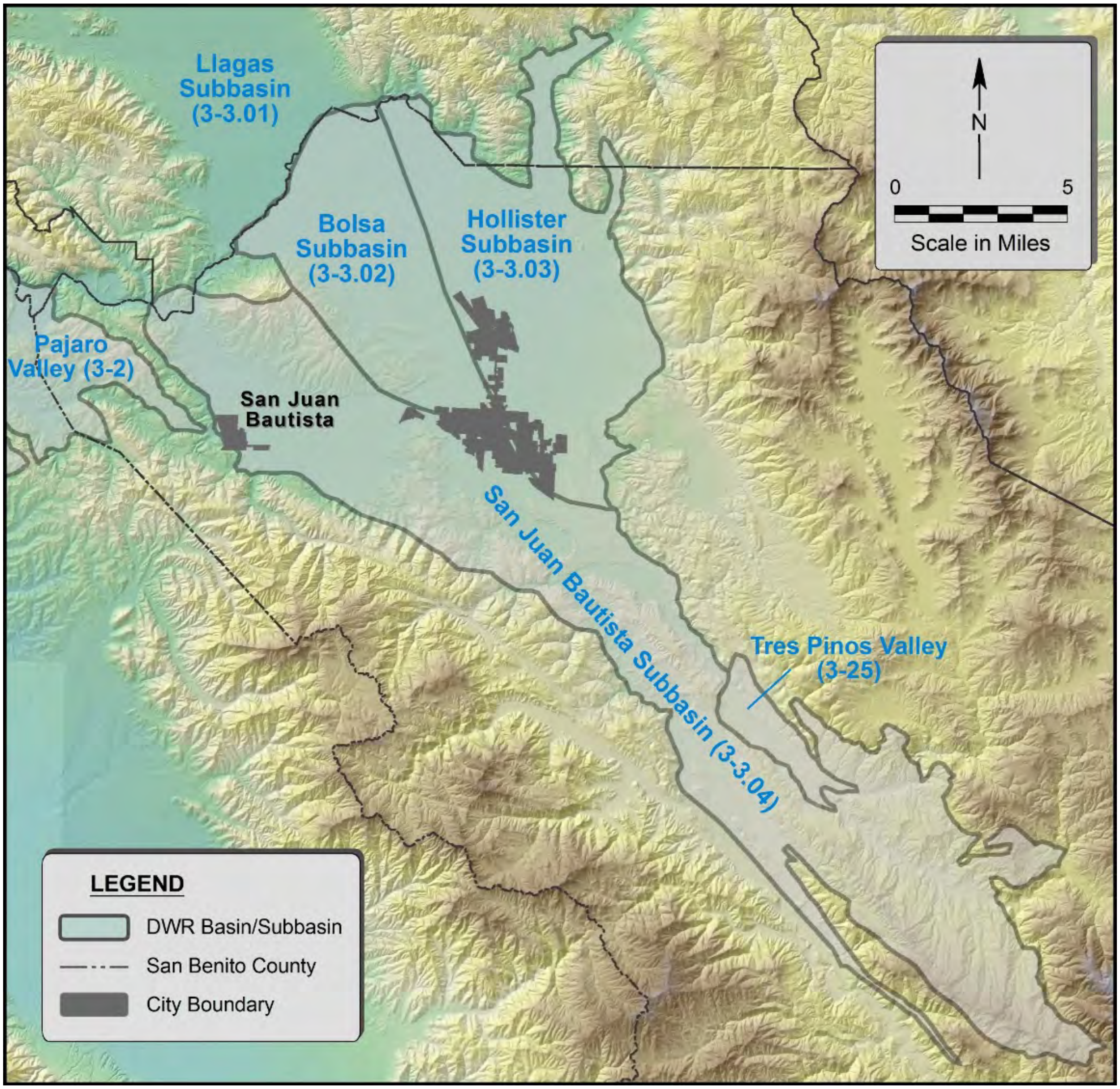
## Acknowledgments

This report was prepared by Iris Priestaf, PhD, Maureen Reilly, PE, Chad Taylor, PG, CHg, and Gus Yates, PG, CHg of Todd Groundwater. We appreciate the assistance of San Benito County Water District staff, particularly Jeff Cattaneo and David MacDonald.

## Geographic Areas

This report focuses on the northern San Benito County portion of the Gilroy-Hollister groundwater basin (**Figure 1**), which extends into southern Santa Clara County. The San Benito part of the basin encompasses the City of Hollister, City of San Juan Bautista, unincorporated residential areas, and expansive areas of irrigated agriculture. The Department of Water Resources (DWR) originally defined the Bolsa, Hollister, and San Juan Bautista Subbasins largely on geology.  DWR is accepting requests to revise groundwater basin boundaries. Section 3 discusses the current boundaries and possible revisions in detail.

**Figure 1. DWR Defined Basins and Subbasins.**



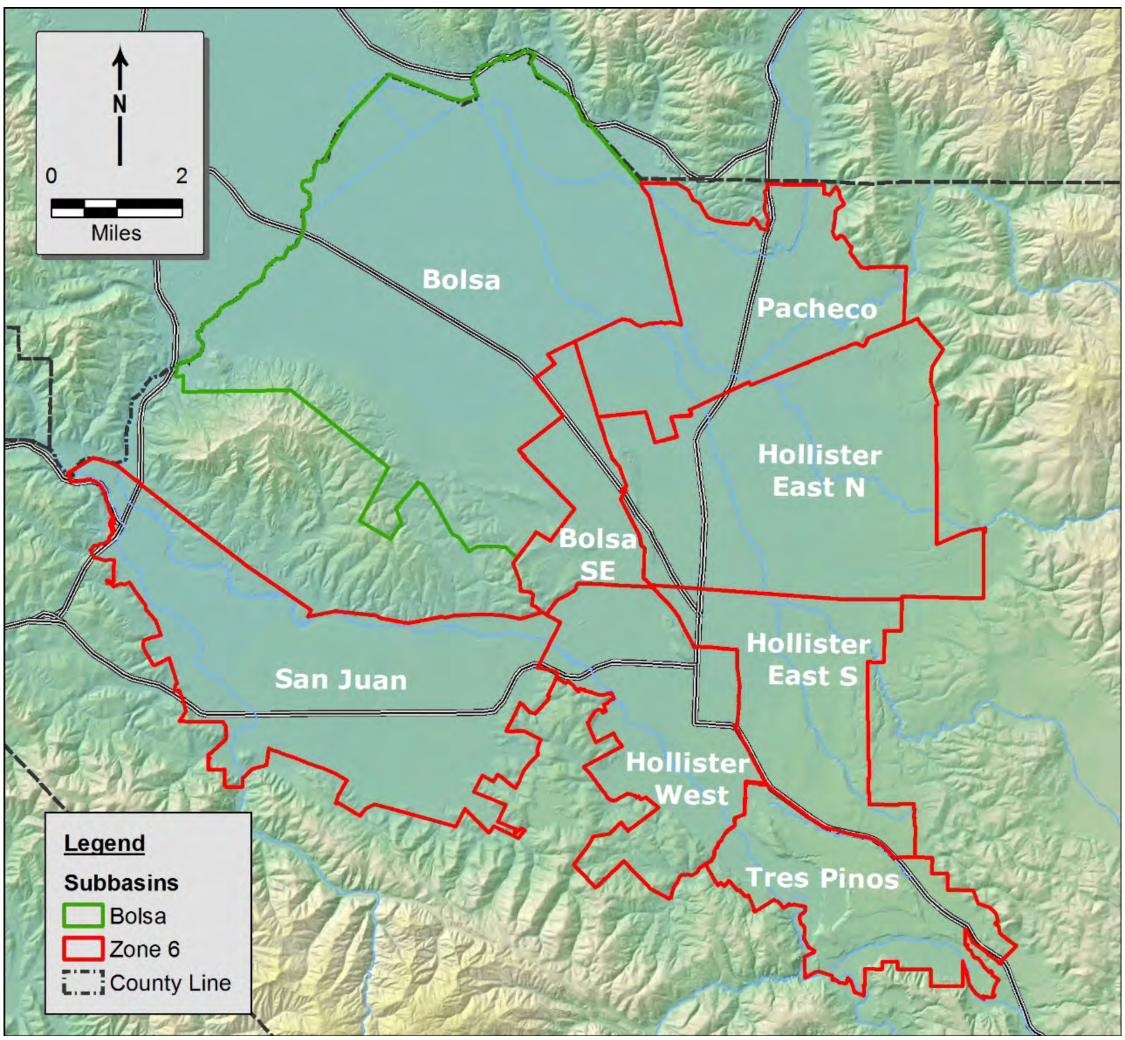

The District currently manages water resources, and groundwater in particular, using different geographic areas. It focuses its management on three Zones of Benefit, listed in Table 1. For the purposes of District groundwater management and annual reporting, seven subbasins were delineated in 1996: Bolsa, Bolsa Southeast (SE), Pacheco, Hollister East (North and South), Tres Pinos, Hollister West, and San Juan subbasins (**Figure 2**). These subbasins were defined based on hydrogeologic and significant local factors (i.e., Zone 6 boundaries) and used effectively for management and data collection for the past 19 years. They differ from the subbasins defined by DWR and identified for compliance with the Sustainable Groundwater Management Act. Of the subbasins shown on Figure 2, only the Bolsa subbasin receives no CVP deliveries and relies entirely on local groundwater.

Future GSA formation and development of GSPs will be accomplished in terms of DWR defined basins and subbasins, discussed in Section 3. For GSPs and other future reporting, the groundwater data may need to be collected and presented for management areas consistent with DWR defined basins.

**Table 1. District Zones of Benefit**

| Zone | Area | Provides |
|---|---|---|
| 1 | Entire County | Specific District administrative expenses |
| 3 | San Benito River Valley (Paicines to San Juan) and Tres Pinos River Valley (Paicines to San Benito River) | Operation of Hernandez and Paicines reservoirs and related groundwater recharge and management activities |
| 6 | San Juan, Hollister East, Hollister West, Pacheco, Bolsa SE, and Tres Pinos subbasins | Importation and distribution of CVP water and related groundwater management activities |

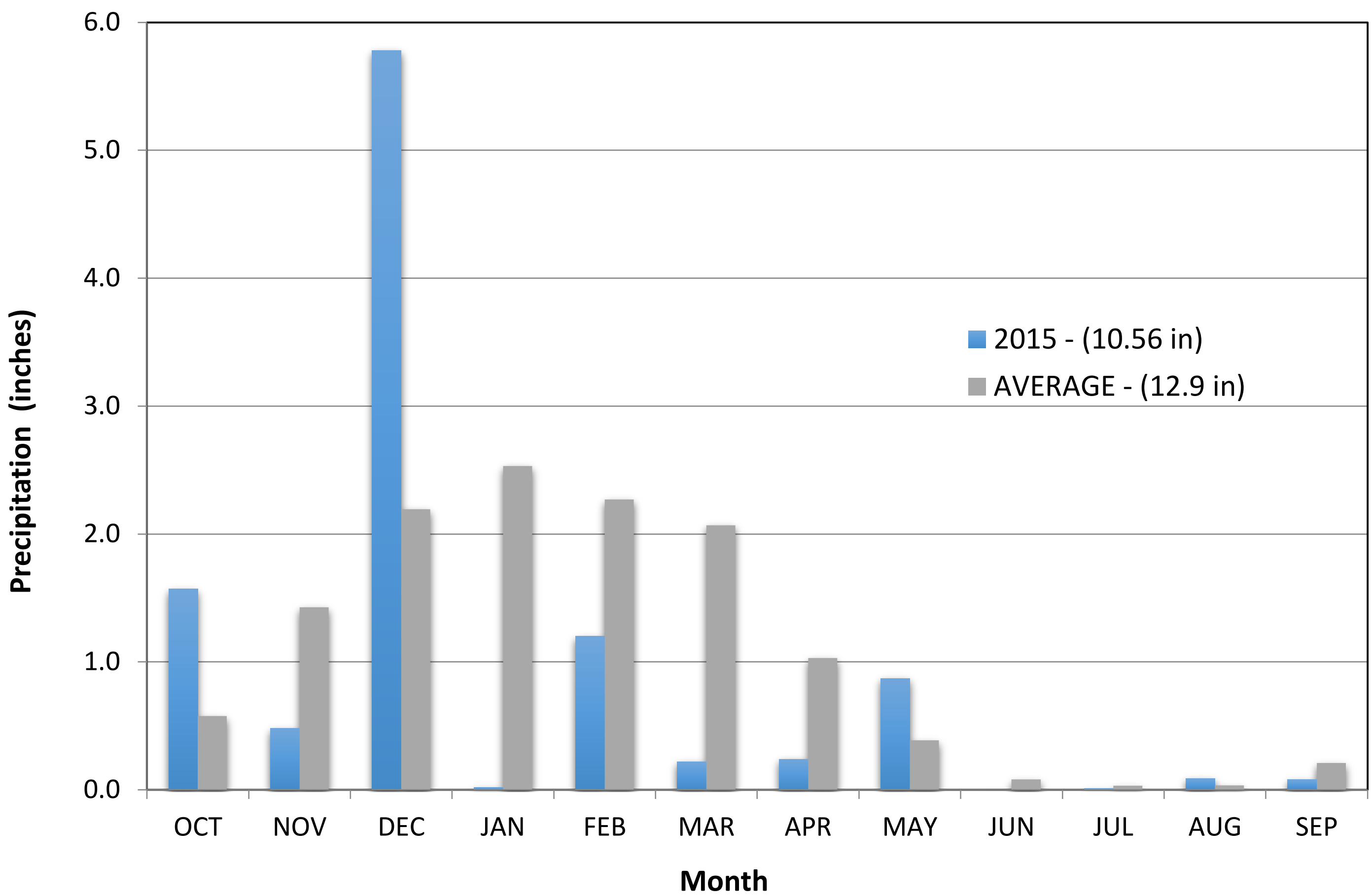
**Figure 2. Locations of SBCWD Subbasins**



## Hydrologic Conditions

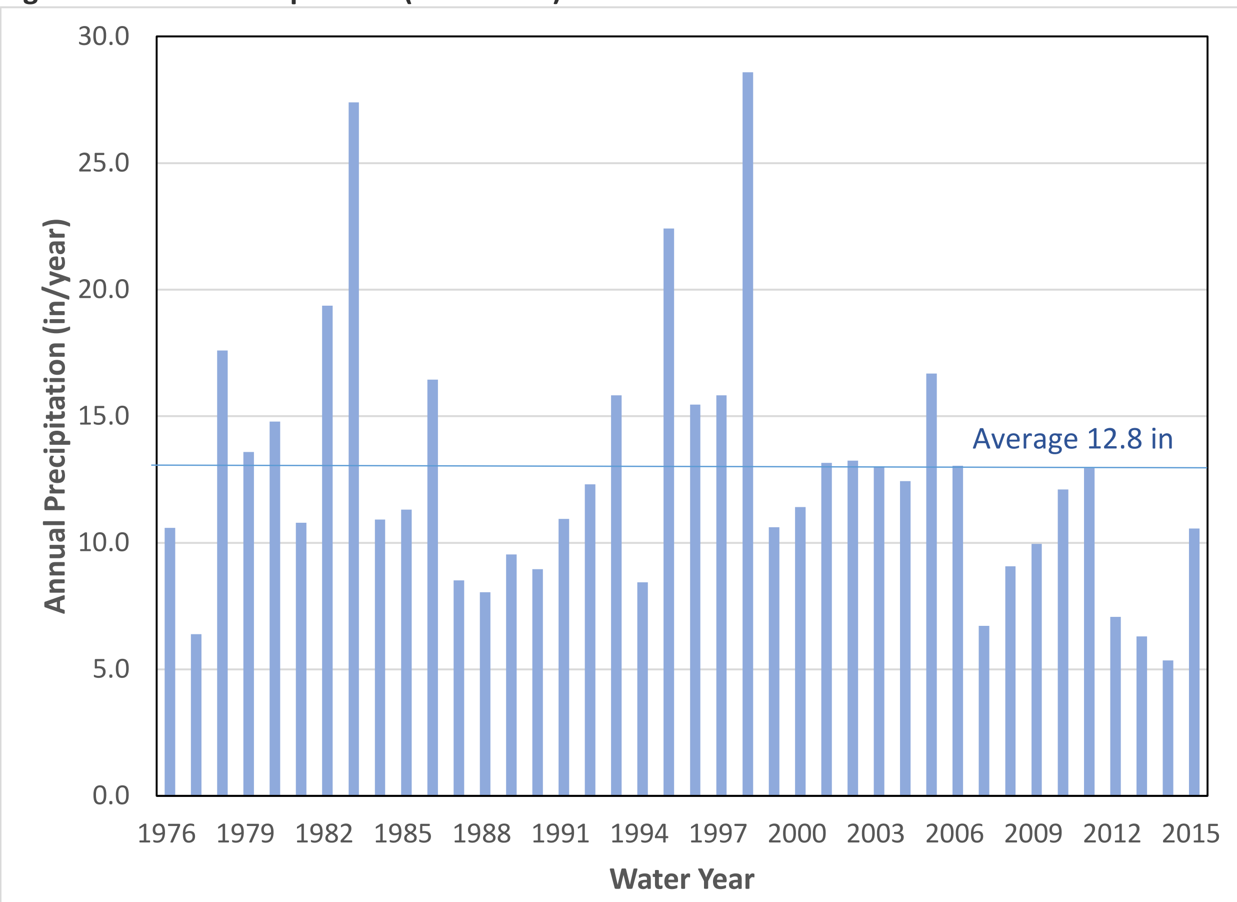
Local rainfall—wet and dry years—is one driver of hydrologic conditions in the basin, affecting volumes of certain basin inflows (e.g., deep percolation) and outflows (groundwater pumping). Dry years also may be characterized by reduced CVP allocations (recognizing that drought often is extensive across California) and some increase in agricultural irrigation (to offset lack of rainfall); both of these factors can result in increased groundwater pumping. In 2015, overall precipitation was 10.56 inches (**Figure 3**), which is below the long term average (1875-2015) of 12.8 inches but higher than the last three years. Over half the rainfall fell in December as a result of a few large storms. The intensity of such events tend to result in more runoff and less groundwater percolation than more moderate rainfall. January was unusually dry: zero rainfall. This suggests that storms have been more variable and seasonal patterns are less predictable.

**Figure 3. Monthly Precipitation in Water Year 2015**



Water year is the fourth year of a multiple year drought, where annual precipitation has been less than the long term average. Over the last nine years, annual precipitation in only one year (2011) has equaled the long term average. As shown in **Figure 4**, the average annual precipitation over the past nine years has been significantly less than the long term average (1875-2015). Relative to historical droughts (see also Appendix B), the recent drought has been prolonged (compare to drought of 1987-1992) with the exception of 2011 and relatively extreme (compare 2014 to 1977). Recovery of groundwater levels from previous droughts was accomplished with management activites using available imported water and recharge of local surface water.

**Figure 4. Annual Precipitation (1976-2015)**



# 2 MANAGEMENT ACTIVITIES

The District is active in water management activities including water resources planning, water conservation, development of additional water sources, augmentation of groundwater resources, and distribution of CVP water. The District also maintains a comprehensive monitoring program, including regular measurement of groundwater pumping, annual evaluation of groundwater storage change, and assessment of regional water quality.

## Water Resources Planning

In 2015, the District was engaged in various projects, programs and planning efforts that address water supply, water quality, and wastewater management. Most of these activities are focused on how to maximize CVP deliveries when available or to develop supplies for use when CVP imports are not available. It is expected that the recent variability in CVP allocations will continue in the future because of climate change and environmental policy.

- **Lessalt Treatment Plant Upgrade.** The Lessalt Water Treatment Plant (WTP) was built in 2003 to treat CVP imports for urban use. As of 2015, the plant has been upgraded to treat an average of 2MGD (2,240 AFY).
- **West Hills Water Treatment Plant**. The second surface water treatment plant to treat CVP imports (for delivery to urban areas currently not served by the Lessalt WTP) has begun construction. The plant is located at the West Hills Site, near the San Juan subbasin north of Union Road. It is designed to treat an average annual capacity of 3 MGD (based on a 4.5 MGD design capacity).
- **North County Groundwater.** In addition to development of local surface water supplies, the Master Plan also identified north county groundwater subbasins as sources of long-term supply. Current planning suggests the North County could produce an additional 1,400 AFY to 2,000 AFY in the near future.
- **Recycled Water Project**. Additional distribution systems will be added to the City of Hollister Reclamation facility, expected to begin in late 2015. This system will increase the use of recycled water in the District. Recycled water will augment supply to agricultural users in the Hollister subbasin area.

- **Ongoing Planning.** The Hollister Urban Area (HUA) is currently working on two water supply planning documents, the HUA Master Plan Update and the HUA Urban Water Management Plan (UWMP). The documents are expected to be complete by July 2016.

- **Sustainable Groundwater Management Act**. SGMA, the most significant groundwater legislation in California history, requires sustainable management by local agencies. The subbasins of the Gilroy-Hollister Basin must have Groundwater Sustainability Plans in place by 2022.The District may take on the role of Groundwater Sustainability Agency. Section 3 of this report provides a detailed look at what that entails.

## Water Conservation

Water conservation is an important tool to manage demands on the groundwater basin. During this multiple year drought, the state has mandated water retailers to reduce their demand. This state-ordered demand reduction, together with the expansion of ongoing water conservation efforts, has successfully lowered water demand. Water conservation efforts in San Benito County are conducted mostly through the Water Resources Association (WRA), composed of representatives from the District, City of Hollister, City of San Juan Bautista, and Sunnyslope County Water District (SSCWD).

**State Mandated Conservation.** On April 1, 2015, Governor Brown issued an Executive Order mandating water reductions in urban areas to reduce potable urban water usage by 25 percent statewide. The City of Hollister and SSCWD are required to submit their monthly water demand reduction accomplishments to the State Water Resources Control Board. For example, as of September 2015, the City of Hollister and Sunnyslope reduced 26.4 and 36.2 percent from 2013 water use, respectively, surpassing the mandated conservation. The reduced municipal demand is shown on Figure E-5 in Appendix E.

**Water Softener Rebate Programs.** Since 2008, a program has been in place to issue rebates to those water customers who remove a SRWS without replacement ($300) or with transition to an off-site exchange service ($250). In July of 2014, the City of Hollister enacted an ordinance that prohibits the installation of self-regenerating water softeners (SRWS) that use sodium and/or potassium salts.

**Irrigation Education.** The District, in collaboration with the WRA, has been offering a series of classes since 2009 on irrigation efficiency and other agriculture practices.These workshops provide concepts, tools, and examples for optimizing irrigation and nitrogen management efficiency in row, tree, and greenhouse crop production. The classes also focus on keeping records and acquiring data needed for water quality regulation and reporting. The WRA also offers classes to residential customers. These classes instruct customers on topics such as: efficient irrigation practices, converting landscapes to be water wise and composting.

**Water Efficient Landscape Plans.** The WRA website provides three sample Water Efficient Landscape Plans available for download. The themes include dry creek, strolling, and meadow. These plans help show residential users ways to make their landscape appealing and efficient. In addition, WRA provides other residential landscape information such as lawn guides, and a water wise garden brochure.

**Turf Removal Program.** In July 2014 the WRA added a Turf Removal Program to encourage customers to remove high water use turf areas from residential parcels. This program complements the irrigation hardware rebates and free water efficient landscape plans. In Fiscal Year 15/16 the program expanded from offering a $1 per square of turf removed up to 500 square feet to 1,000 square feet. The only land cover allowed in the area where the turf is removed includes: drought tolerant or native plants, permeable hardscapes and/or a combination. As of November 2015, over 88,000 square feet of turf have been removed in the Hollister Urban Area.

Other ongoing water conservation programs include:

"Promoting The Efficient Use of Water"

- Irrigation rebate program
- Green Business Committee
- Home water survey program
- Toilet replacement program
- High-efficiency clothes washer program
- Education program (classroom presentations, fieldtrips to reclamation plant and water treatment plant, Ag in the Classroom, Farm Day)
- Outreach programs including ads in local newspaper, bill inserts, newsletters, San Benito County Fair, Water Awareness Month (May), Water-wise demonstration garden, water conservation library for public use, WRA website, and web and print ads in the Hollister Free Lance newspaper and website.

These ongoing water conservation programs have successfully reduced water demand in the basin. However, some of these measures may be reaching saturation. For example, the number of remaining toilets eligible for rebates are limited, as many residents have already installed low flow toilets. It is important to continue and diversify these plumbing and landscape conversion programs and public outreach to encourage the public to continue to use water wisely.

## Managed Percolation

**Percolation of Local Surface Water.** In most years, local surface water released from Hernandez and Paicines Reservoirs is percolated along the San Benito River and Tres Pinos Creek. Releases of local surface water have been limited typically to percolation upstream of the confluence of San Benito River and Tres Pinos Creek. This has helped maintain groundwater levels without causing shallow groundwater problems and competing for available storage space with the City of Hollister wastewater percolation ponds.

This year, for the second year in a row, both Paicines and Hernandez were dry for the entire year because of ongoing drought conditions; there were no releases from either reservoir.

**Percolation of Wastewater.** Wastewater is percolated by the City of Hollister at its Domestic and Industrial plants, and is also percolated at the SSCWD Ridgemark Facilities and by Tres Pinos Water District. Recent changes in operation of the wastewater facilities have decreased the volume percolating to the groundwater. Information about the amount of groundwater recharged from these wastewater facilities is found in Appendix D.

**Percolation of CVP Water.** In the past, CVP percolation was used to recharge the groundwater basin. CVP percolation peaked in 1997 and was reduced subsequently in response to the successful recovery of the groundwater basin from overdraft. Direct in-stream recharge of CVP water is not expected to occur because of concerns for release of invasive Dreissenid mussels. A table of historical percolation is found in Appendix D.

# 3 SUSTAINABLE GROUNDWATER

The Sustainable Groundwater Management Act (SGMA) of 2014 provides a process and timeline for sustainable management of groundwater basins by local agencies, such as San Benito County Water District. SGMA applies to groundwater basins or subbasins designated by DWR as high- or medium priority, such as the Hollister, San Juan Bautista, and Bolsa subbasins. It requires establishment of one or more Groundwater Sustainability Agencies (GSAs) that encompass a basin or subbasin, development of one or more Groundwater Sustainability Plans (GSPs), and achievement of groundwater sustainability within 20 years.

This section summarizes a timeline for compliance with SGMA, along with the District's current plan for Annual Groundwater Reports, and potential District actions. It also presents an overview of key provisions of the SGMA with a focus on initial steps for revising or accepting DWR basin boundaries and for becoming a GSA. Potential funding also is discussed.

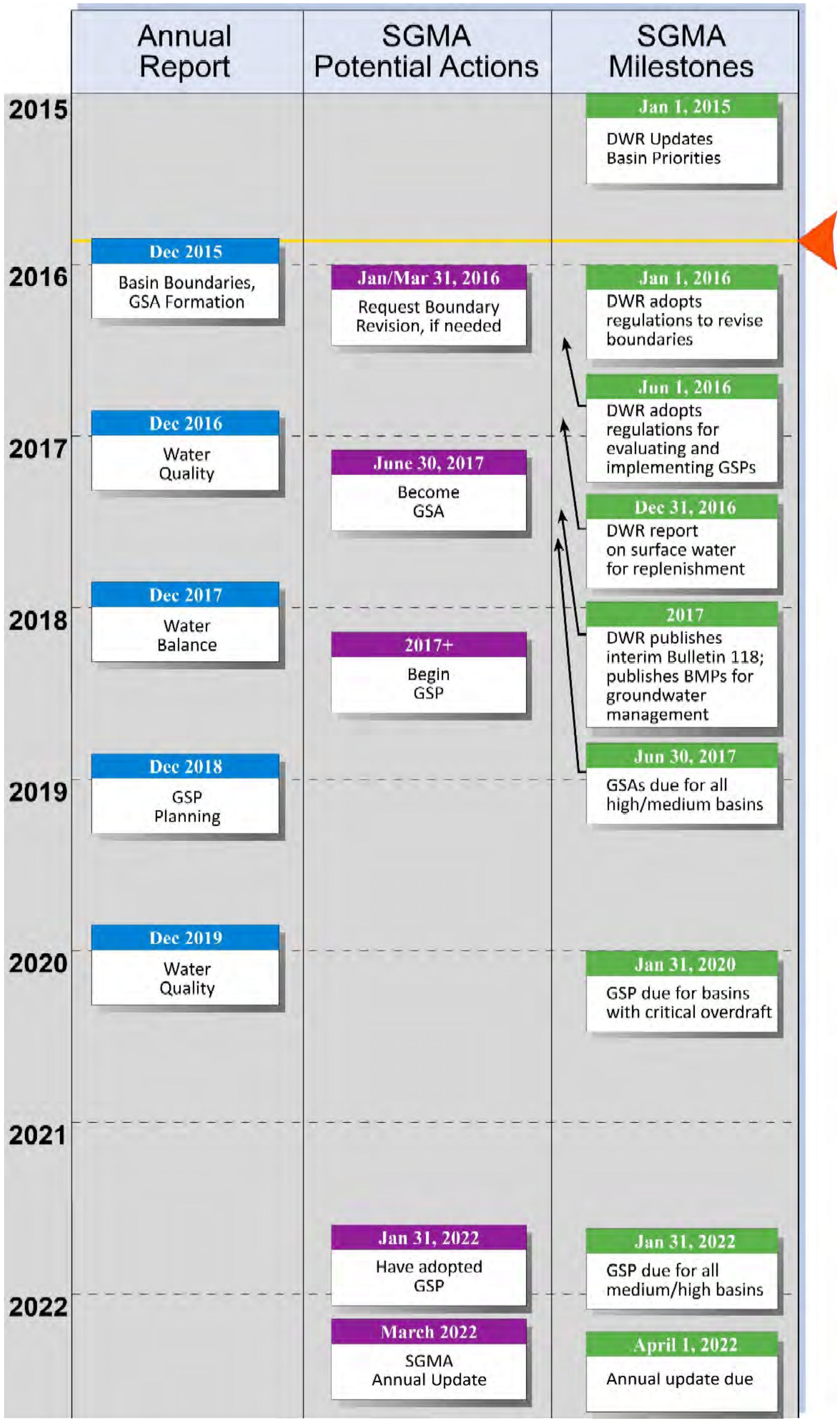
## Timeline

The next page presents a timeline from 2015 to 2022. The left column describes the sequence of the District's Annual Groundwater Reports, the right column presents key milestones for compliance with SGMA, and the center provides potential District actions.

The timeline begins in 2015; the first SGMA milestone was DWR's update and finalization of the basin priorities by January 31, 2015. As anticipated in the 2014 Annual Report, there were no priority changes for local basins.[2] In the left column, this 2015 Annual Report addresses issues concerning basin boundaries. As of December 2015, DWR has developed draft regulations for agencies to request basin boundary revisions. These regulations become law on January 1, 2016, at which time a 90-day window opens (through March 31, 2016) during which local agencies can submit a basin boundary modification request. In the future, other such request periods will be scheduled.

Precise definition of basin boundaries (and areas) is important because these are the areas within which a GSA manages (and assesses fees). This 2015 Annual Report also addresses GSA formation; as illustrated on the timeline, this is required by June 30, 2017. A GSA (or conceivably more than one) is required to encompass the Hollister, San Juan Bautista, and Bolsa subbasins, as is one or more GSPs, which can be prepared thereafter (illustrated on the timeline in 2018) and completed by January 31, 2022.

[2] For the sake of brevity, the term "basin" is used generally to include basins and subbasins, except when a specific subbasin is mentioned.


Annual Report
SGMA Potential Actions
SGMA Milestones
2015
2016
2017
2018
2019
2020
2021
2022
Jan 1, 2015
DWR Updates Basin Priorities
Dec 2015
Basin Boundaries, GSA Formation
Jan/Mar 31, 2016
Request Boundary Revision, if needed
Jan 1, 2016
DWR adopts regulations to revise boundaries
Jun 1, 2016
DWR adopts regulations for evaluating and implementing GSPs
Dec 2016
Water Quality
June 30, 2017
Become GSA
Dec 31, 2016
DWR report on surface water for replenishment
Dec 2017
Water Balance
2017+
Begin GSP
2017
DWR publishes interim Bulletin 118; publishes BMPs for groundwater management
Dec 2018
GSP Planning
Jun 30, 2017
GSAs due for all high/medium basins
Dec 2019
Water Quality
Jan 31, 2020
GSP due for basins with critical overdraft
Jan 31, 2022
Have adopted GSP
Jan 31, 2022
GSP due for all medium/high basins
March 2022
SGMA Annual Update
April 1, 2022
Annual update due

The next Annual Reports are scheduled, as shown, to provide the regular triennial updates on water quality and the water balance. These 2016 and 2017 efforts (water quality and water balance respectively) will provide basic technical information to support the preparation of a GSP that may begin in 2018. As shown in the right column, at the same time (2016 and 2017), DWR will provide support for SGMA by publishing regulations for GSPs, reports on available surface water for replenishment, and regulations on best management practices.

## Affected Basins

Under SGMA, DWR has ranked all California groundwater basins identified in DWR Bulletin 118 (DWR 2003) as very low, low, medium or high priority. Prioritization criteria include factors such as number of public supply wells, total wells, irrigated acreage, population, reliance on groundwater, impacts on streamflow and habitat, and occurrence of problems (e.g., overdraft, seawater intrusion, and subsidence). A medium- or high-priority basin has State-wide importance, but may or may not be in trouble. In addition, a low- or very-low priority basin may or may not have problems; moreover, its ranking is not intended to downplay its local significance. Rankings will be updated regularly; the next update will occur after basin boundaries are finalized in 2016.

SGMA compliance for low and very-low priority basins is not required, but an overlying water or land use agency may volunteer to be a GSA and prepare a GSP. Very low rankings were assigned to the Santa Ana, Upper Santa Ana, Quien Sabe, Tres Pinos, San Benito River, Dry Lake, Bitter Water, Hernandez, Panoche, and Vallecitos valley basins (see Figure C-1 for locations).

The Hollister, San Juan Bautista, and Bolsa subbasins of the Gilroy-Hollister Basin have been ranked as medium priority and thus are subject to SGMA. In addition, the Llagas subbasin of the Gilroy-Hollister Basin (Santa Clara County) has been designated as high priority, and the Pajaro Valley Groundwater Basin (which overlaps Santa Cruz, Monterey, and San Benito counties) has been deemed high priority. Moreover, the Pajaro Valley Groundwater Basin has been designated as critically overdrafted. This has important ramifications for GSP preparation and implementation; specifically, GSPs for such overdrafted basins must be adopted with implementation underway by 2020 (two years early) and sustainability must be achieved by 2040.

## Basin Boundaries

Boundaries for all California groundwater basins have been defined by DWR, mostly based on geology, particularly contacts between unconsolidated sediments (e.g., alluvium) and lower-permeability geologic formations outside the basin, or geologic features like faults. Subbasin boundaries may also include jurisdictional boundaries such as county lines.

As noted in the 2014 Annual Report, some of the basin boundaries (as delineated by DWR) present hydrogeologic or governance issues. For example, the boundary dividing the Gilroy-Hollister Valley Basin between the Llagas and Bolsa/Hollister subbasins does not coincide neatly with the San Benito-Santa Clara county line. As a result, small portions of the Bolsa and Hollister subbasins extend into Santa Clara County where the District has no jurisdiction. Similarly, small marginal areas of the Llagas subbasin lap into San Benito County.

SGMA provides for basin boundary adjustments, some of which have been initiated already by DWR. In 2015, DWR began to realign some digitally-mapped (GIS) boundaries of basins to more accurately correspond with the original written descriptions in DWR Bulletin 118. These linework improvements mostly pertain to county lines and updated river locations, mostly in the Central Valley, but also include some of the above-mentioned subbasin boundaries along the Pajaro River and San Benito-Santa Clara county line.

In addition, local agencies may request that DWR revise the boundaries of a basin, including establishing new subbasins. Draft regulations for basin boundary revisions were developed by DWR through a public process in 2015 and the resulting Basin Boundary Emergency Regulation provisions went into effect on November 16, 2015. In brief, the regulations describe:

- The authority and intent of the regulations
- Definitions for key terms
- Description of Boundary Modification Categories, including scientific (based on geologic or hydrologic conditions) and jurisdictional (involving addition, deletion, or relocation of a boundary that promotes sustainable groundwater management)
- Procedures for modification requests and public input
- Description of the required information to support the proposed modification
- Methodology and criteria for evaluation by DWR
- Procedures for the adoption by DWR of boundary modifications.

The regulations are extensive and detailed, and description is beyond the scope of this report. Nonetheless, some fundamentals are noted below:

- Basin boundaries are defined by the written description in Bulletin 118 (until revised)
- An entire basin/subbasin must be covered by a GSA and GSP (or multiples of each) to avoid being designated as probationary and thereby risking State intervention
- Any proposed changes must be demonstrated to support sustainable management in the proposed basin and to avoid adversely affecting achievement of sustainability in adjacent basins.

DWR has developed an extensive, interactive and evolving website for SGMA that provides substantial information and multiple tools, both for local agencies and for the public and stakeholders. Selected links to the website are provided at the end of this section.

As noted previously, boundary modification requests can be made between January 1 and March 31, 2016; these will be reviewed by DWR and if approved, the changes will be published in the next version of Bulletin 118 (in 2017) and will be ready for the remainder of the SGMA process, in other words, GSA formation and GSP development.

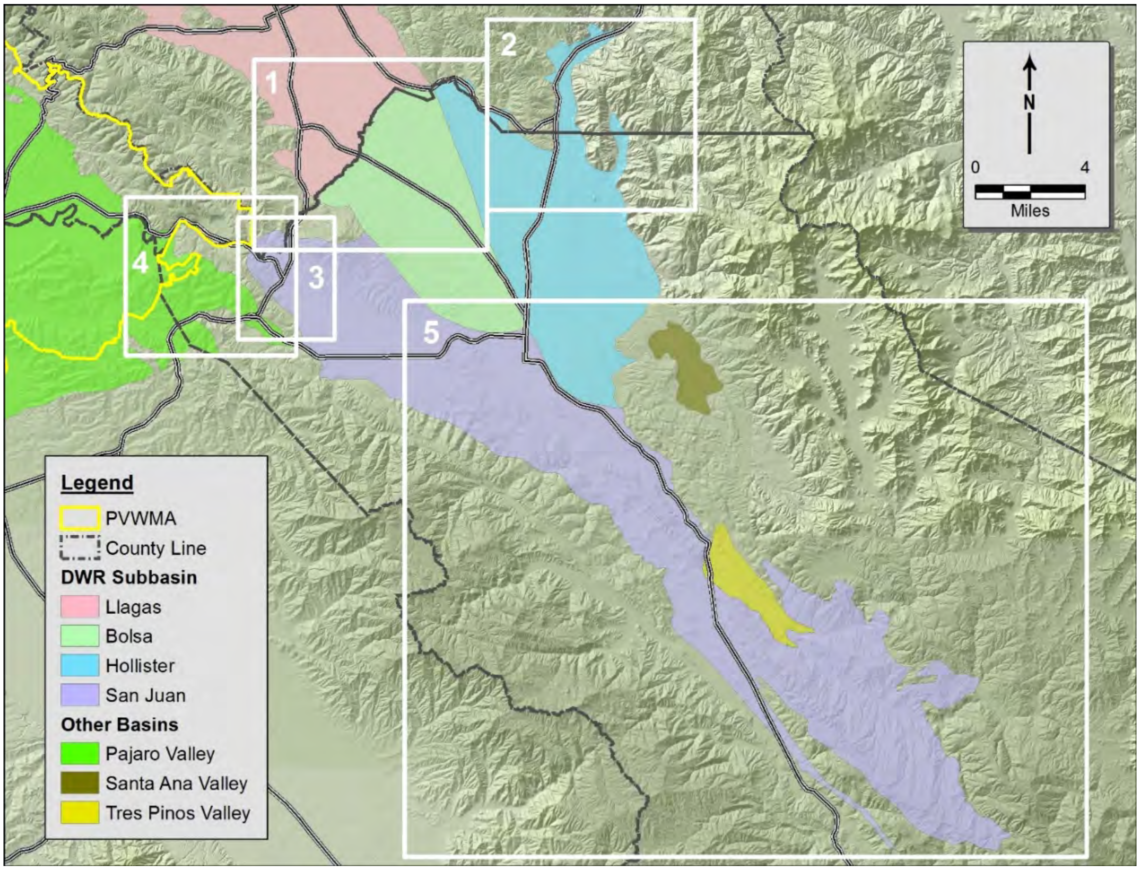
## Local Basin Boundary Issues

Local basin boundaries were examined for this Annual Report in order to identify any issues that might prompt a basin boundary modification request. This involved application of existing GIS information to delineate the relevant, sometimes intertwined boundaries, including mapped boundaries related to Bulletin 118, local subbasins defined in 1996 and used in Annual Reports since then, plus county and water agency boundaries.

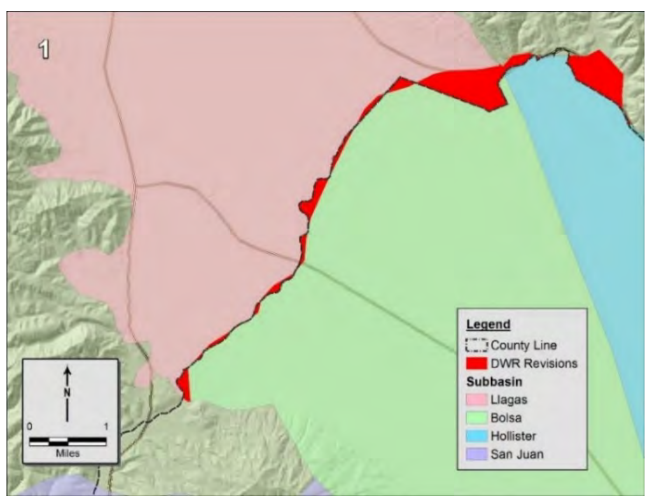
Background information also was reviewed. Various geologic maps were examined with regard to Bulletin 118 mapped boundaries in order to establish the provenance of Bulletin 118 boundaries and consider their accuracy and usefulness for District management purposes. The written descriptions in Bulletin 118 also were reviewed, recognizing their primacy in defining boundaries. In addition, the factors used in establishing the local 1996 subbasins were reviewed, as was a subsequent review of local boundaries (Yates, 2006).

The review focused on the medium- and high-priority groundwater basins/subbasins in and adjacent to northern San Benito County, which are subject to SGMA. This review identified five potential areas of concern; these are indicated on **Figure 5** and discussed below in numerical order.

**Figure 5. Areas of Potential Boundary Concerns**



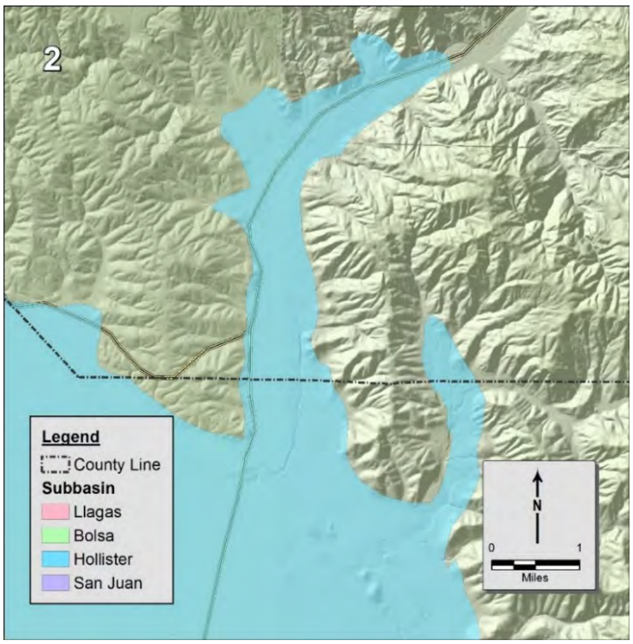

1. **Llagas-Bolsa and Llagas-Hollister Boundary along the Pajaro River/County Line**




The boundary between the Llagas-Bolsa and Llagas-Hollister subbasins does not coincide neatly with the San Benito-Santa Clara county line, but in some areas is aligned with the Pajaro River. This would cause governance issues for both San Benito County Water District and Santa Clara Valley Water District (SCVWD). Recognizing these issues in a number of California basins with river/county boundaries, DWR has begun to realign some boundaries to better represent Bulletin 118 intent and to specify the county line as the boundary. For San Benito and Santa Clara counties, the respective subbasin areas are shown on Inset Map 1 along with the areas affected by DWR revisions. These edits apparently reassign these areas between the Llagas and the Bolsa or Hollister subbasins, so all areas would remain subject to SGMA, and be under the appropriate jurisdiction. This represents an effective solution.

**2. Santa Clara-San Benito County Line and Hollister Subbasin**

Portions of the Hollister subbasin extend into Santa Clara County as shown on Inset Map 2. The subbasin is predominantly within San Benito County and the jurisdiction of the District, and is actively managed by the District. The portions in Santa Clara County are hydrogeologically continuous and connected with the remainder of the subbasin. These are alluvial areas (e.g., Pacheco Creek Valley and Las Viboras Valley) and productive groundwater areas that support irrigation and domestic production wells or are apparently capable of such production. They are upstream of the San Benito County portion of the Hollister Subbasin with potential for downstream impacts. Accordingly, these areas are part of the Hollister Subbasin and should be part of subbasin management.

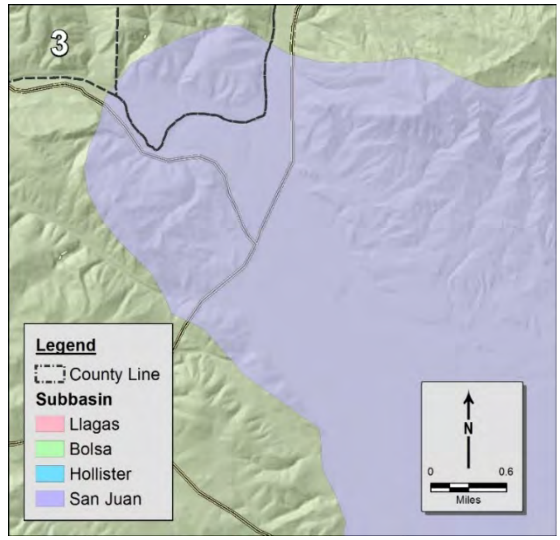



These areas are within SCVWD jurisdiction—for which SCVWD is the exclusive GSA—but apparently are not actively managed by SCVWD. In addition, SGMA provides SCVWD (and other exclusive GSAs) the ability to "opt out" of being a GSA, in which case, the County of Santa Clara is the default GSA. Nonetheless, the entire basin—including these areas—is required to be addressed in a GSP. Given the location of these areas within SCVWD and given their upgradient status relative to the remainder of the Hollister subbasin managed by SBCWD, then collaborative management between the two districts would support compliance and avoid probation (should a GSP not be prepared). The two districts should collaboratively manage the areas through an agreement such as a Memorandum of Agreement.

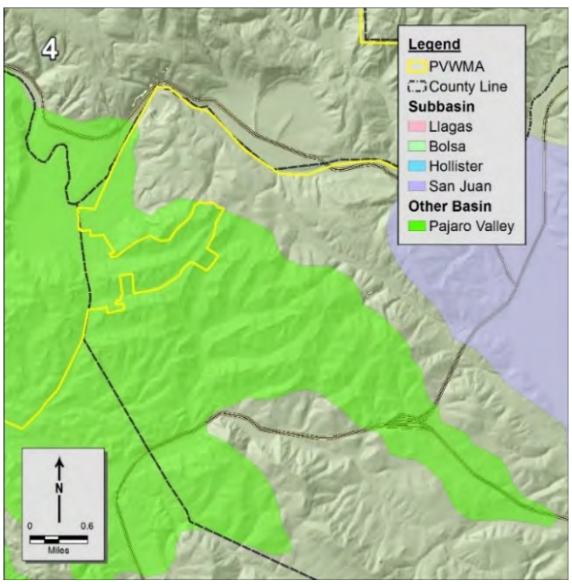
**3. Portion of San Juan Subbasin in Santa Clara County**

As shown Inset Map 3, a small portion of the San Juan Subbasin has been mapped as extending across the Pajaro River into Santa Clara County. Bulletin 118 text indicates that the Pajaro River (which is coincident with the county line here) is the northern boundary of the San Juan subbasin, but the small area may contain an aquifer that is hydrogeologically continuous with the remainder of the San Juan Subbasin and sufficiently warranted to be part of the subbasin. At this time, the District is sharing available well information with SCVWD to assess the small area.

This small area may be appropriate for DWR to realign the mapped boundaries to better represent Bulletin 118 intent and to specify the county line as the boundary. The county line would be preferred because it does not shift as does a river. If the boundary is not edited, SCVWD is the GSA (although it may opt out), but the area still would need to be included in a GSP. If not addressed in a GSP, coverage of the San Juan Subbasin by a GSP would be incomplete, and the GSP for San Juan Subbasin would be deemed inadequate, risking probation. Unless resolved by DWR realignment, SCVWD and/or SBCWD could request an internal jurisdictional boundary adjustment for this portion of the basin boundary to coincide with the county line.




**4. Portion of Pajaro Valley Basin in San Benito County but not PVWMA**



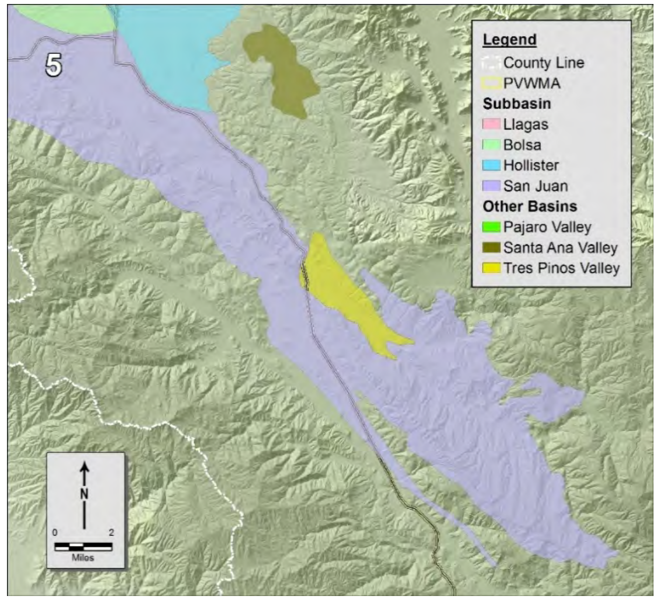

In Bulletin 118, the Pajaro Valley Basin is described as bounded on the east by the San Andreas Fault and pre-Quaternary formations. This indicates that the basin extends into San Benito County; DWR boundaries are depicted on Inset Map 4. Pajaro Valley Water Management Agency (PVWMA) was established to manage that basin and the PVWMA website indicates that PVWMA boundaries were drawn as closely as possible to match the basin boundaries described in Bulletin 118-80. Inset Map 4 indicates that PVWMA jurisdiction does not completely encompass the Pajaro Valley Basin, resulting in potentially unmanaged areas in San Benito County and District jurisdiction.

General knowledge of local groundwater conditions in eastern Pajaro Valley Basin suggests that the potentially unmanaged area may not warrant inclusion in any groundwater basin. To avoid a potential unmanaged area, PVWMA and SBCWD should collaborate to evaluate the status of this area. A boundary modification request may be needed, noting that the Pajaro Valley Basin (designated as critically overdrafted) should have a GSP by the early deadline of 2020.

If the portion of the Pajaro Valley Basin into San Benito County is confirmed as part of the groundwater basin, then a GSA is needed to provide full coverage; candidates would be PVWMA (preferred as the agency established to manage the basin), the District, or San Benito County (as the default). It is recommended that the District continue discussions with PVWMA to address this area.

**5. Basin boundaries internal to SB County: San Juan, Tres Pinos, Santa Ana, and others**

Bulletin 118 boundaries are different from the subbasin boundaries that were defined for the District in 1996 and used thereafter in Annual Reports (compare Figures 1 and 2). Inset Map 5 shows the southern portion of the San Juan Subbasin (as defined by Bulletin 118), which extends far into areas with currently minimal development, data, and management. Nonetheless, these southern areas are included by DWR in the medium-priority San Juan subbasin and are subject to SGMA. Other basins in southern San Benito County are very low priority; for example, Inset Map 5 shows the Santa Ana Valley and Tres Pinos Valley basins, which also currently have minimal development and are not subject to SGMA. Accordingly, the DWR basin definitions present management issues with regard to monitoring, management, and reporting in a cost-effective and equable manner.




One option would involve a request to subdivide the San Juan Subbasin into northern and southern portions. The northern portion would remain medium priority and the southern part would likely by very low priority. This would require a series of District actions, including a process of notification to DWR and the public, provision of supporting information, and submittal of technical information. Such a request would face a "high bar" of demonstrating that the subdivision is supportive of sustainable management both for the new subbasin and adjacent basins. This is technically possible, but would require an investment of time and money without guarantee of success.

Alternatively, the default DWR basin boundaries can be accepted (at least for the near term), and modifications can be made internally and gradually to groundwater monitoring and management practices. This latter option recognizes that the DWR boundaries have been used by the District, for example, for the Salt and Nutrient Management Plan (Todd Groundwater, 2013) and for CASGEM compliance. Internal modification can be made through the Annual Reporting process and would involve redefining the 1996 subbasins as management areas and some adaption of data collection, data analyses, and reporting.

## Groundwater Sustainability Agencies

SGMA requires that a Groundwater Sustainability Agency (GSA) be established for all medium and high priority basins by June 30, 2017. One or more GSAs may be formed in a basin, but coverage of the basin must be complete. Any local water or land use agency or combination of local agencies overlying a groundwater basin may elect to be a GSA. Some agencies that have been created by statute to manage groundwater already have been deemed the exclusive agencies to comply with the Act within their boundaries, unless the agency elects to opt out. Both SCVWD and PVWMA are already identified in the legislation as exclusive agencies. As a default, counties will be assumed to be the GSAs for unmanaged basins or unmanaged portions of basins.

Given its historical groundwater management leadership in San Benito County and its County-wide jurisdiction, it is recommended that the District elect to be a GSA for the medium-priority subbasins within its jurisdiction. (It may also consider electing to be GSA for other basins regardless of priority ranking).

In brief, the process of forming a GSA includes:

- developing a detailed description of the proposed boundaries of the basin or portion of the basin to be managed by the GSA
- preparing new bylaws, ordinances or authorities (including review of existing authorities/limitations in the District's founding act to identify potential contradictions)
- developing a list of stakeholders and preparing an explanation of how their interests will be considered in the GSP
- holding a properly-noticed hearing and passing a resolution
- providing a notice to DWR within 30 days (including documentation of the above items).

After 90 days, if no other agency elects to be GSA, then the District would become the exclusive GSA for the basin or portion of the basin.

Once established, a GSA will have authorities and management tools for compliance with SGMA and achievement of sustainability. Recognizing that GSAs will be involved in various management activities, SGMA has provided the ability to assess various fees to establish and implement the GSP (Cristy, 2015). Costs of planning and monitoring (operations) may be paid from fees collected from property owners, in particular, those who extract groundwater. Project capital costs may also be funded from property fees.

Another source of funding for project costs will be State loans and grants. For example, the Water Quality, Supply, and Infrastructure Improvement Act of 2014 (Proposition 1) was approved by the voters in November 2014; the Sustainable Groundwater Planning (SGWP) Grant Program provides funds to eligible applicants (including public agencies) for projects that develop and implement sustainable groundwater planning and projects. Available funding amounts to a total of $100,000,000. The first round of funding, directed to stressed counties, is underway.

DWR has developed an extensive and interactive website to assist with SGMA. Selected links that provide useful information and tools are provided in the box below.

**DWR INTERNET RESOURCES**

- Announcements
  http://www.water.ca.gov/groundwater/sgm/index.cfm
- Basin Prioritization
  http://www.water.ca.gov/groundwater/sgm/SGM_BasinPriority.cfm
- Basin Boundary Modifications
  http://www.water.ca.gov/groundwater/sgm/basin_boundaries.cfm
- Groundwater Sustainability Agencies
  http://www.water.ca.gov/groundwater/sgm/gsa.cfm
- Planning Grant Program
  http://www.water.ca.gov/irwm/grants/sgwp/index.cfm

# 4 WATER SOURCES AND USE

## Water Supply Sources

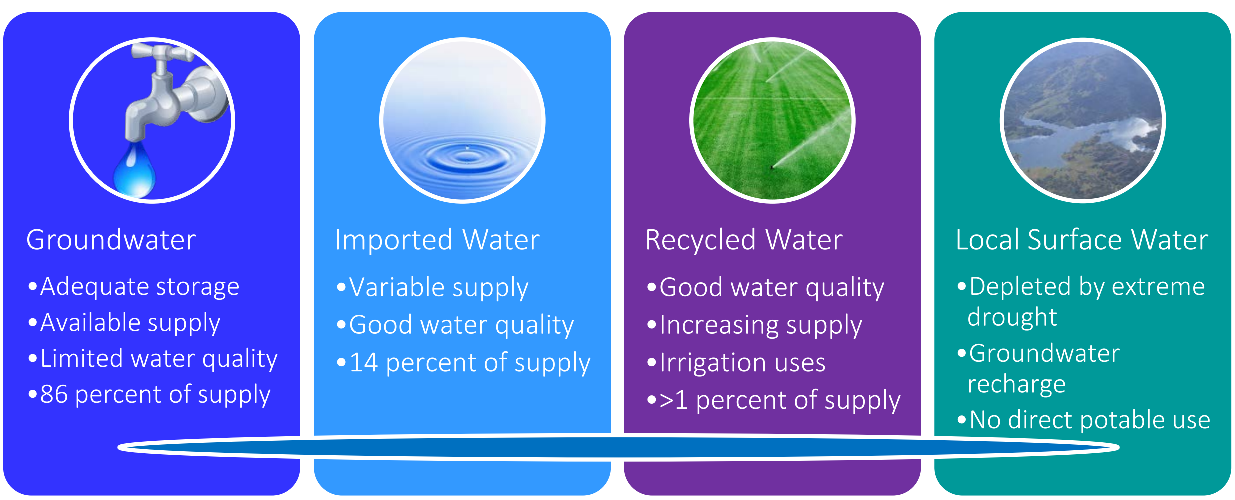
San Benito County has four major sources of water supply for municipal, rural, and agricultural land uses. These are summarized below; for more data and graphs see Appendix E.

- **Local Groundwater.** Groundwater is withdrawn from the basin by private irrigation and domestic wells and by public water supply retailers. The District does not directly produce or sell groundwater, but is active in groundwater management throughout San Benito County. This report focuses on the southern part of the Gilroy-Hollister groundwater basin (DWR Basin 3-3) and reports data on eight District defined subbasins.

- **Imported Water.** The District also purchases Central Valley Project (CVP) water from the U. S. Bureau of Reclamation (USBR). The District has a 40-year contract (extending to 2027) for a maximum of 8,250 AFY of M&I water and 35,550 AFY of agricultural water.

- **Recycled Water.** Recycled water is in the initial phases of development as a source of irrigation water and is presently used to irrigate Brigantino Park. Recycled water use was only 101 AF in WY 2015 but is expected to increase in the near future. This source is generally reliable during droughts.

- **Local Surface Water.** Surface water is not used directly for potable or irrigation use in the basin, but creek percolation is a significant source of groundwater recharge. The District owns and operates two reservoirs: Hernandez and Paicines (see Appendix C, Figure C-1). There were no storage releases from either reservoir during 2015, the second year in a row.



## Available Imported Water

The District distributes CVP water to agricultural and M&I customers in Zone 6. In USBR contract year 2015 (March 2015 - February 2016), water allocations were reduced by USBR to 0 percent of the contract for agriculture and 25 percent of the contract for M&I. These are the lowest allocations since imported water has been available. Table 2 shows the contract entitlements and recent allocations (SLDMWA 2015). Note that USBR contract years are March through February, so water year 2015 overlapped two contract years.

The District renegotiated their shortage policy with USBR in 2015. Now the District will receive the allocated percent of their full M&I contract (8,250 AFY), even in dry years. In past years if the allocation was decreased due to water shortage (an allocation of 75 percent or less), the District received the allocated percent of their historic use. In 2014 for example, the historic use was 5,556 AFY. In Water Year 2015, the District is allocated 25 percent of their full contract (8,250 AFY). This could increase the M&I amount allocated in shortage years.

**Table 2. CVP Entitlements and Allocations, USBR Contract Years 2014-2015**

March 2014 - February 2015

| | Shortage Year Adjustments | % Allocation | Allocation Volume (af) |
|---|---|---|---|
| Agriculture | 38,244 | 0% | 0 |
| M&I | 8,250 | 50% | 4,125 |
| **TOTAL** | **43,800** | | **4,125** |

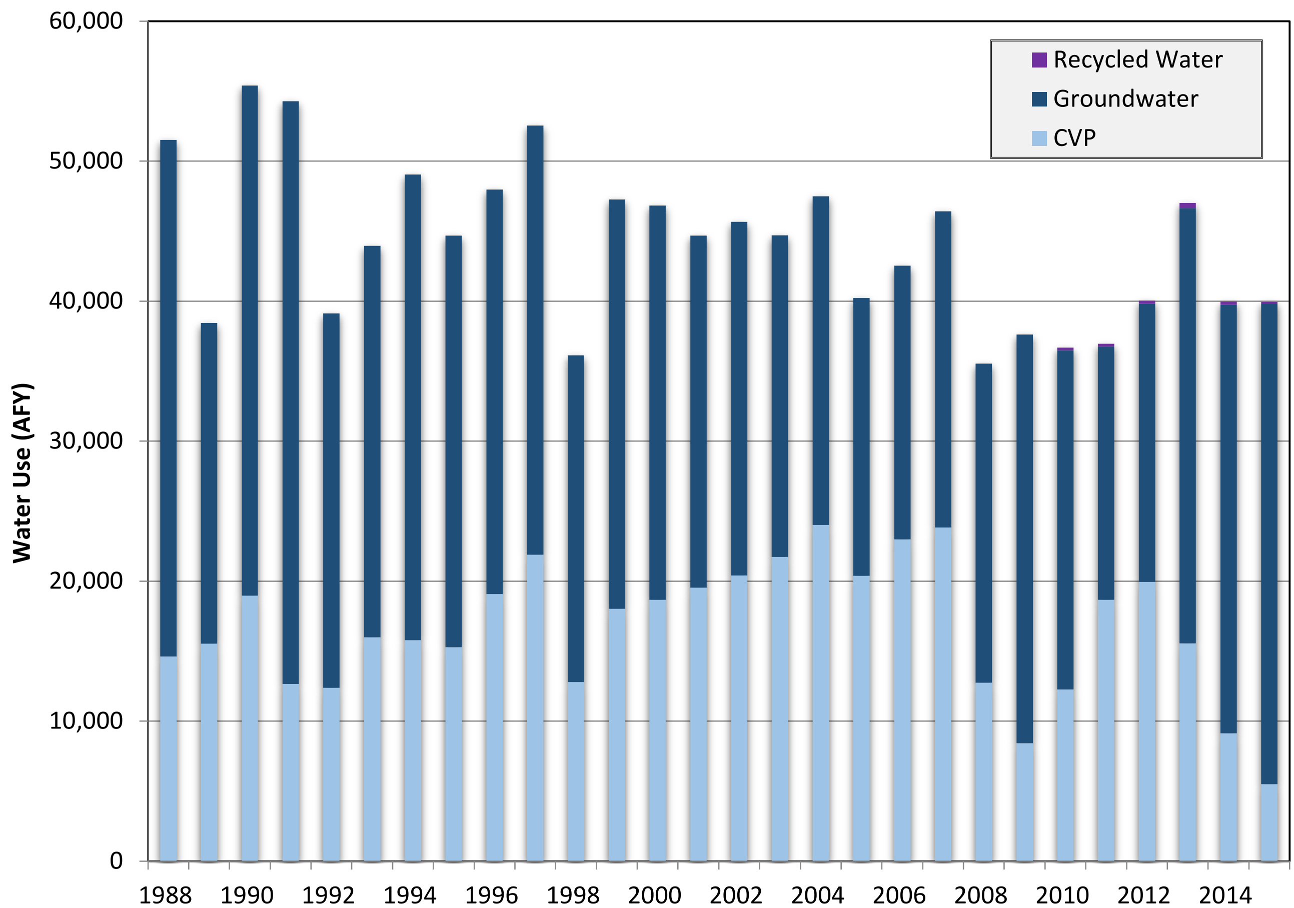
March 2015 - February 2016

| | Shortage Year Adjustments | % Allocation | Allocation Volume (af) |
|---|---|---|---|
| Agriculture | 38,244 | 0% | 0 |
| M&I | 8,250 | 25% | 2,063 |
| **TOTAL** | **43,800** | | **2,063** |

## Water Use

In 2015, total water use was very similar to 2014 water use, almost 40,000 AF. **Figure 6** shows the total water use from 1988 through 2015. As shown in the graph, groundwater use increased over last year, from 77 percent in 2014 to 86 percent of supply in 2015. Figure 4 also shows that water demand has declined over the last eight years (with the exception of 2013). Rainfall has been below normal for most years since 2008, and water conservation and drought awareness have had an effect on water use. While water conservation measures could be nearing saturation in the District, the positive effect should be noted during a particularly severe drought.

**Figure 6. Total Water Use by Source 1988-2015 (AFY)**



## Distribution of Demand by Source and Use

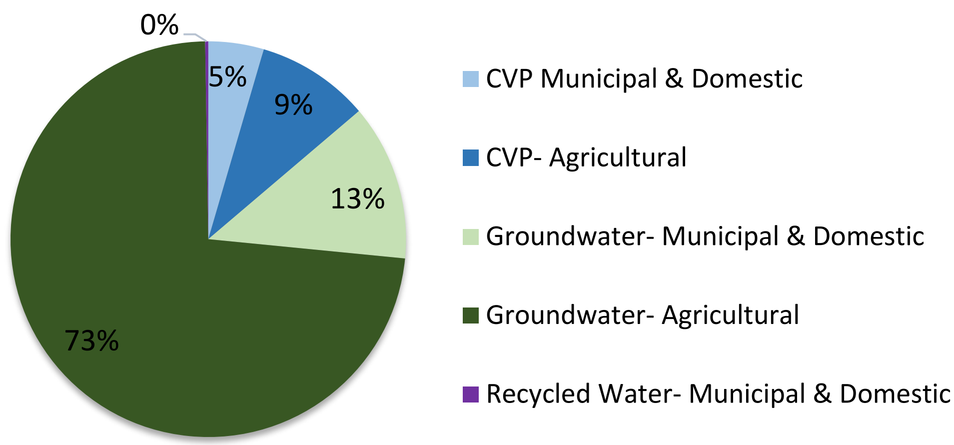
This year saw a continued decline in the availability of CVP water. The volume of CVP imported into the basin was the lowest since 1988, when imports began. Because of this shortage, groundwater pumping increased to meet demand. Table 3 shows the total water deliveries from CVP, groundwater, and recycled water sources.

**Table 3. Total Water Deliveries for Water Year 2015 (AF)**

| | CVP | | Groundwater | | Recycled Water | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 | 2014 | 2015 |
| Agriculture | 7,545 | 3,697 | 21,189 | 29,229 | - | - | 28,734 | 32,926 |
| M&I | 1,599 | 1,810 | 9,403 | 5,099 | 262 | 101 | 11,263 | 7,010 |
| **TOTAL** | **9,144** | **5,507** | **30,592** | **34,327** | **262** | **101** | **39,997** | **39,935** |

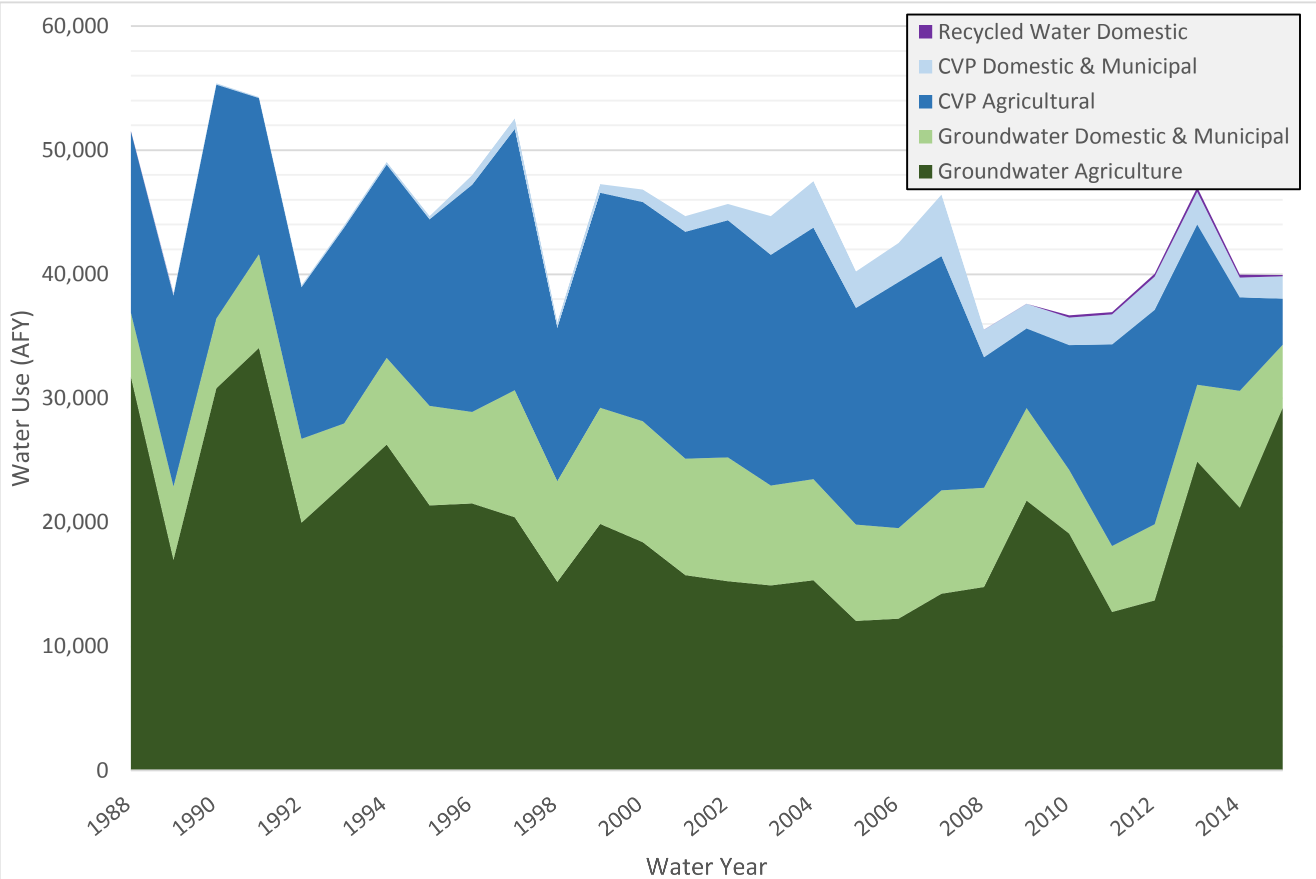
In 2015, groundwater represented 86 percent of total supply, mostly due to increases in groundwater pumping for agricultural use. Groundwater for M&I use decreased due to water conservation from the cities in the region. **Figure 7** shows the distribution of total supply by water supply source and user type. Because the largest volume of groundwater serves agricultural users, the increased groundwater use causes widely distributed declines in groundwater (as opposed to a focused drawdown in a local area). This is discussed in detail in Section 5.

**Figure 7. Water demand by source and use, 2015**




For the third year in a row, agricultural water users offset the low CVP allocation with higher groundwater pumping. **Figure 8** shows the shows historical total water use by water source and water use in the Zone 6 area.

**Figure 8. Water demand by source and use 1988-2015**




Agricultural use has represented most of water use, ranging from 71 to 90 percent of total demand. In 2015, this sector represented 83 percent of demand. Groundwater for agriculture use is the highest water use/water source combination in most years, averaging 45 percent of total demand from 1988 through 2015. However over the past 20 years CVP water for agriculture use exceeded groundwater agricultural use half of the time. In 2015, groundwater use for agriculture exceeded the use of CVP water by a factor of almost eight, the largest contribution since imports began in 1988.

Municipal and domestic use decreased in water year 2015, in a large part due to the mandatory water conservation. Sunnyslope and Hollister have decreased municipal water demand by 36 and 24 percent, respectively since 2013 in response to mandated conservation. In the past, the use of CVP water for direct M&I use was usually limited by the available treatment capacity of the Lessalt treatment plant. This year the plant was expanded but total CVP water for M&I was limited by CVP allocation and a short period of downtime required to upgrade the plant. In 2015, Lessalt served 1,364 AF, higher than 2014, but below the ten year average.

**Table 4. Zone 6 Water Use in Water Year 2015 (AF)**

| Subbasin | CVP Water | | Groundwater | | Recycled Water |
|---|---|---|---|---|---|
| | Agriculture | Domestic & Municipal | Agriculture | Domestic & Municipal | Domestic & Municipal |
| Bolsa South East | 20 | 0 | 2,396 | 5 | 0 |
| Hollister East | 2,130 | 1,438 | 6,334 | 896 | 0 |
| Hollister West | 115 | 33 | 2,636 | 2,094 | 101 |
| Pacheco | 534 | 21 | 4,124 | 155 | 0 |
| San Juan | 843 | 131 | 12,280 | 459 | 0 |
| Tres Pinos | 54 | 187 | 1,459 | 1,489 | 0 |
| **TOTAL** | **3,697** | **1,810** | **29,229** | **5,099** | **101** |

**Figure 9. Water Use by Subbasin 2015.**

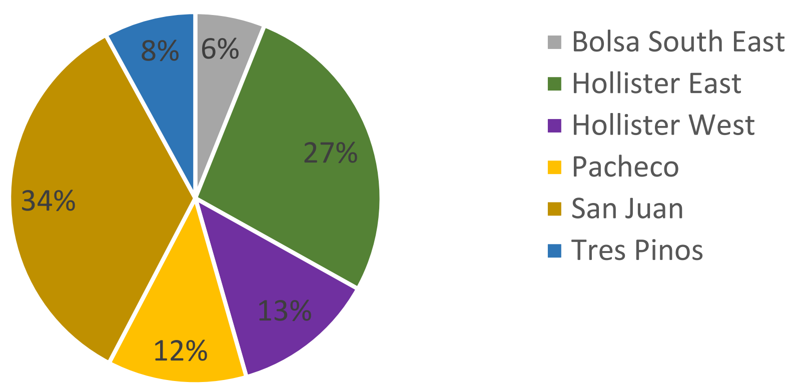



Table 4 shows Zone 6 water use by subbasin, user category, and water type for 2015. Zone 6 includes the Bolsa Southeast, Pacheco, Hollister East, Hollister West, Tres Pinos, and San Juan subbasins. **Figure 9** shows the relative use by subbasin. San Juan represents the largest portion of water use, 34 percent of the demand, most of which is for agriculture. Continued reliance on groundwater in areas that have had significant groundwater declines during the current drought is a potential problem (especially in San Juan and Hollister West). Managed recovery may be necessary to restore the groundwater reserves in these areas.

# 5 GROUNDWATER LEVELS

In October 2015, groundwater levels continued to decline in areas of the basin that rely heavily on groundwater, specifically in the Bolsa, San Juan, Hollister West, Bolsa SE, and Tres Pinos subbasins. These subbasins have now sustained three successive years of prolonged drought and limited CVP imports. Groundwater elevation declines during drought do not constitute overdraft; nevertheless, the continued reduced supplies of imported water in tandem with increased groundwater demands are a warning of potential groundwater overdraft.

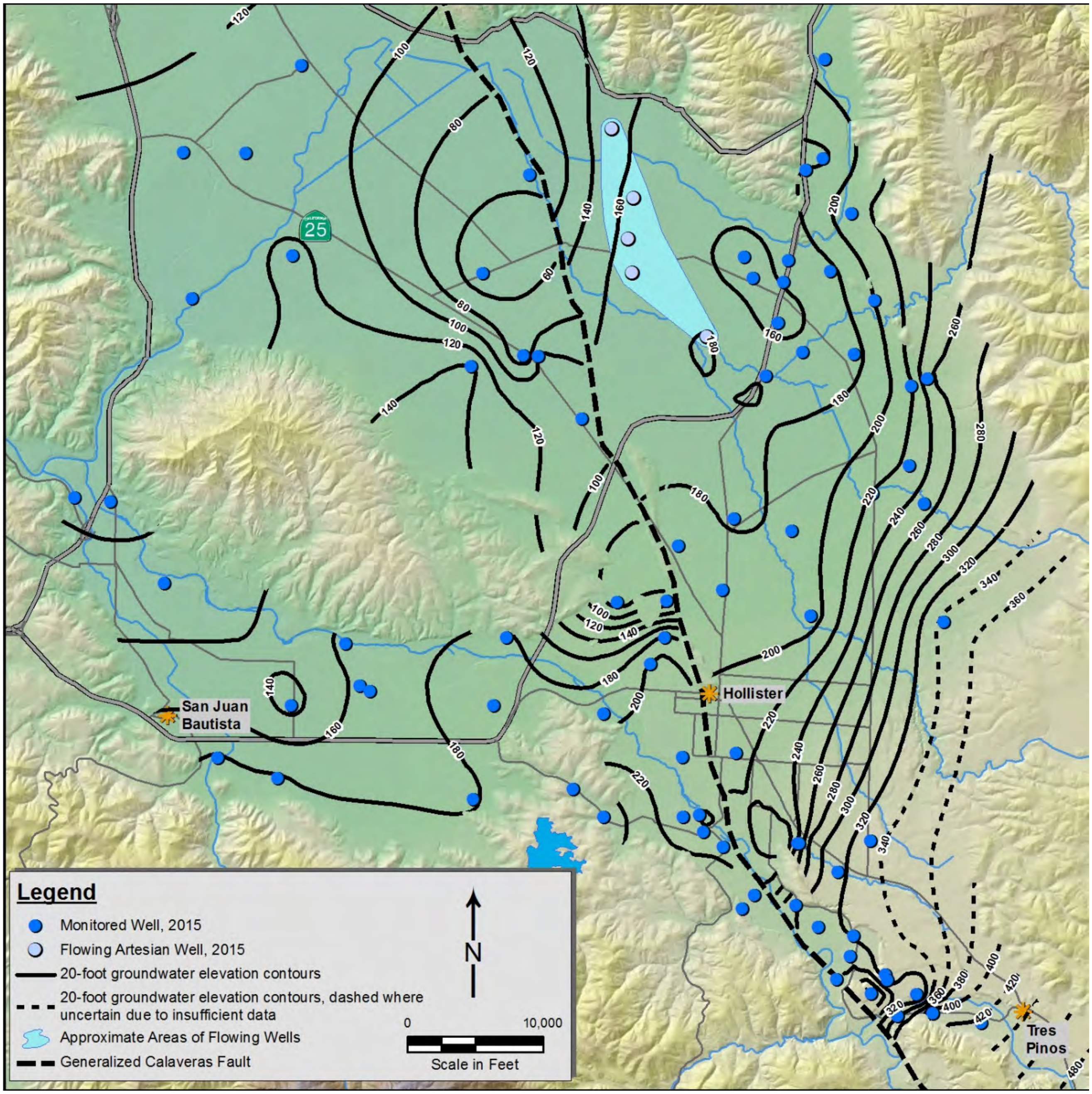
As indicated in the water use section, growers and other water users are relying on groundwater to compensate for reduced CVP allocations. It appears that sufficient storage remains in the basin to accommodate additional dry conditions with limited imported water availability. However, if drought conditions persist, avoidance of significant impacts will require delivery of alternative supplies to sensitive areas or more rigorous water demand management.

The District should continue to manage groundwater resources for substantial and rapid recovery in wet years, recognizing that most years are average to dry and wet years are less frequent. Fortunately, lower groundwater elevations represent increased potential for capturing water from runoff and add it to groundwater stored in the basin. This presents opportunities to maximize recharge from precipitation events, streamflow, and reservoir releases when water is available. However, recharge from precipitation and streamflow in and of itself may not provide sufficient recharge for recovery in the subbasins that have been most affected by the last several years of dry conditions and increased groundwater use. Therefore, management actions that have direct benefit to San Juan and the other affected subbasins should be considered. Additional information on groundwater elevations (including profiles of basin cross sections and depth to water contours) are included in Appendix C.

## Groundwater Elevations

Groundwater elevation data were examined from 86 wells in the District's quarterly groundwater elevation monitoring program. October groundwater elevation data are used for preparing groundwater elevation contour maps. Groundwater elevations in the fall, including those shown in **Figure 10**, are assumed to represent the lowest levels for the water year. The groundwater elevation contouring methods incorporate the effects of the Calaveras Fault on water levels by splitting the area into eastern and western portions and then generating contours for each. The resulting contours are then evaluated for consistency and reasonableness and any necessary refinements are made. The contours indicate a general flow from southeast to northwest. Additional groundwater level data are presented in Appendix C, including maps, summary tables, and water level data.

**Figure 10. Groundwater Elevations, October 2015**




The relative changes in groundwater elevations from October 2014 to October 2015 are shown on **Figure 11.** The map was prepared by calculating and contouring the differences between mapped groundwater elevations for the two periods. The accuracy of this map was checked by examining water level changes in individual wells that were monitored in the fall quarter (October) of both years. **Figure 12** shows the cumulative drawdown over the current drought (2011-2015. White the reduced water levels are uneven, average levels in most subbasins have decreased; San Juan subbasin water levels have decreased 28 feet since 2011.

**Figure 11. Change in Groundwater Elevations 2014-2015**

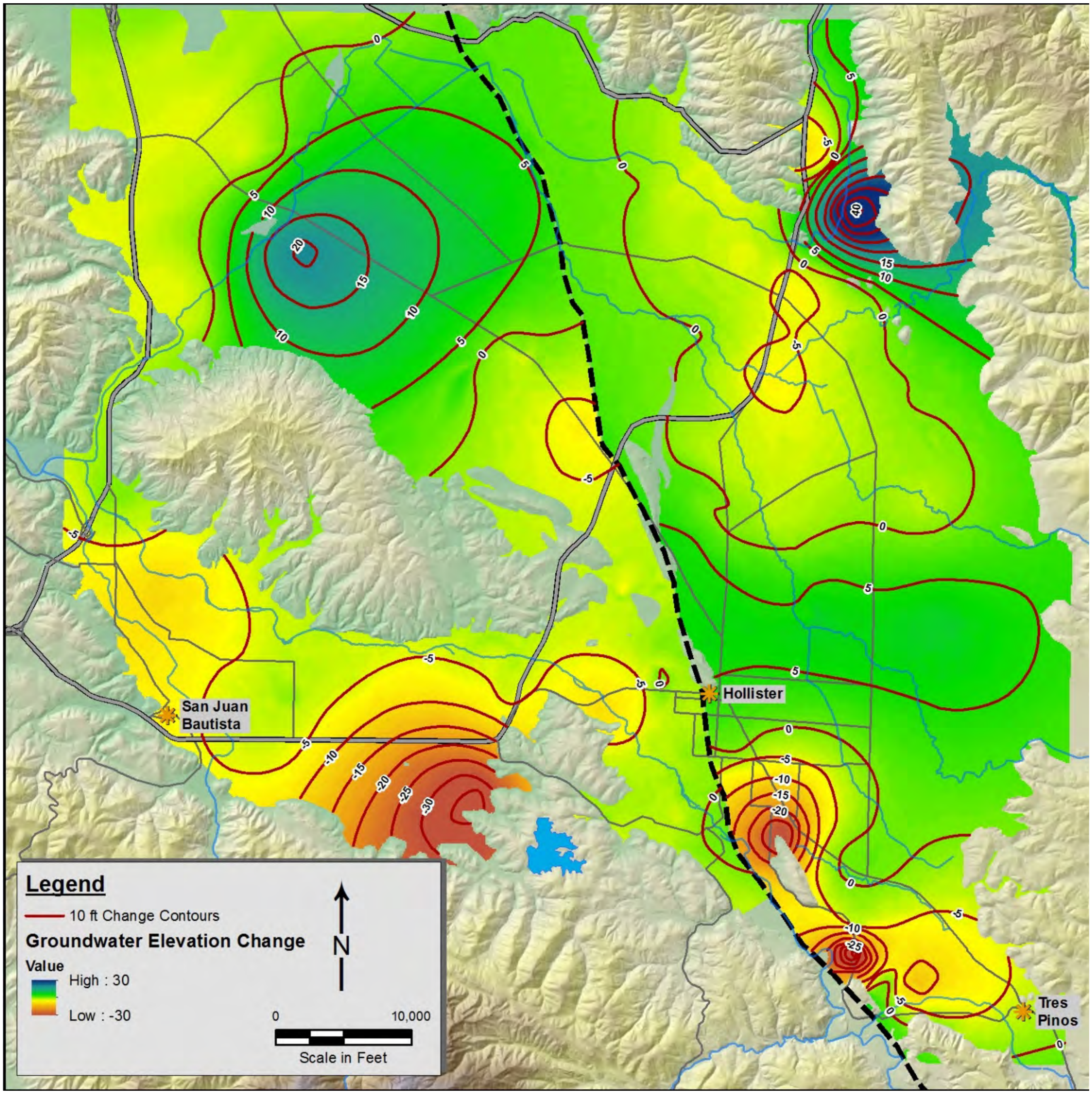
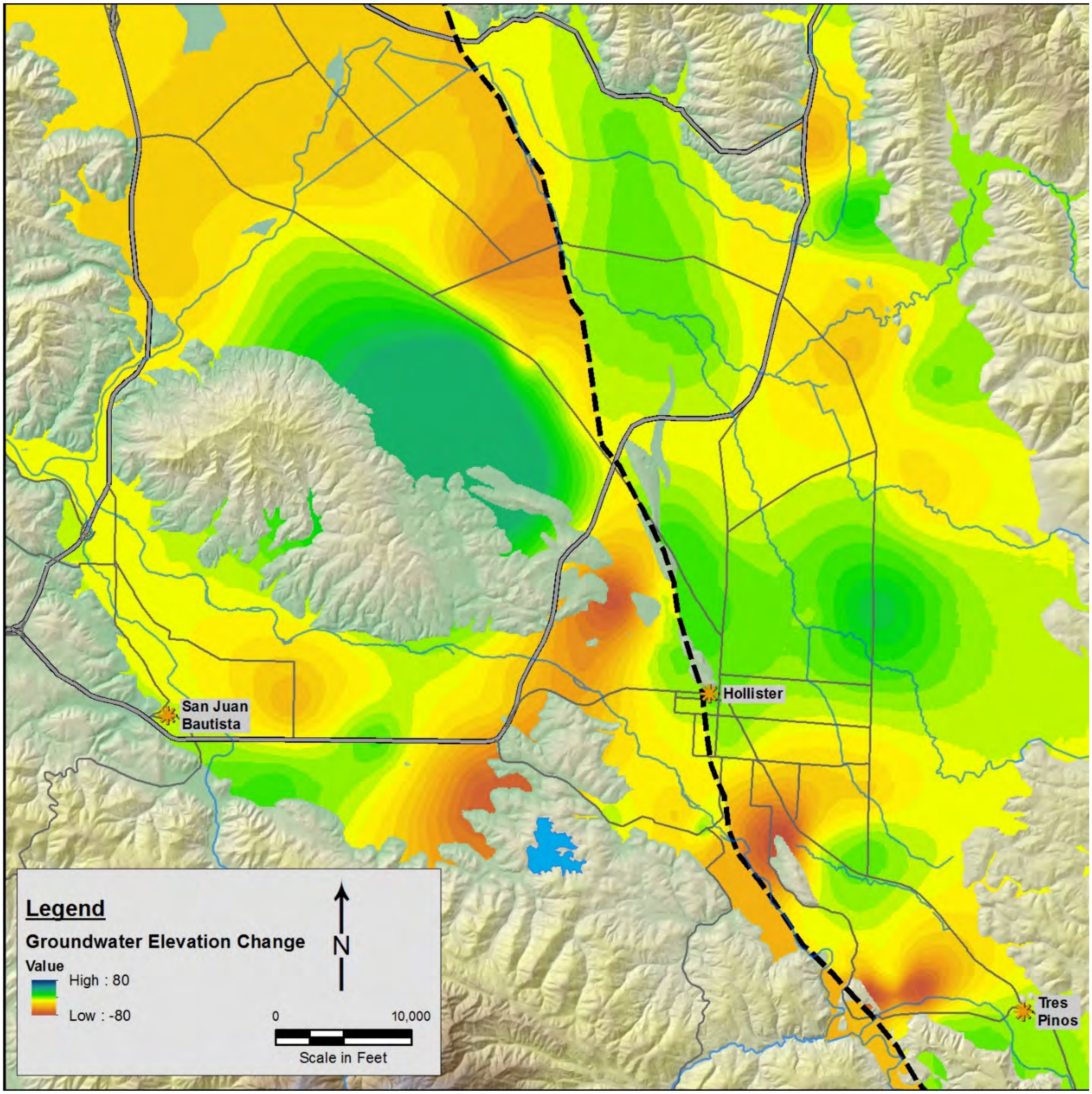


**Figure 12. Cumulative Change in Groundwater Elevations 2011-2015**

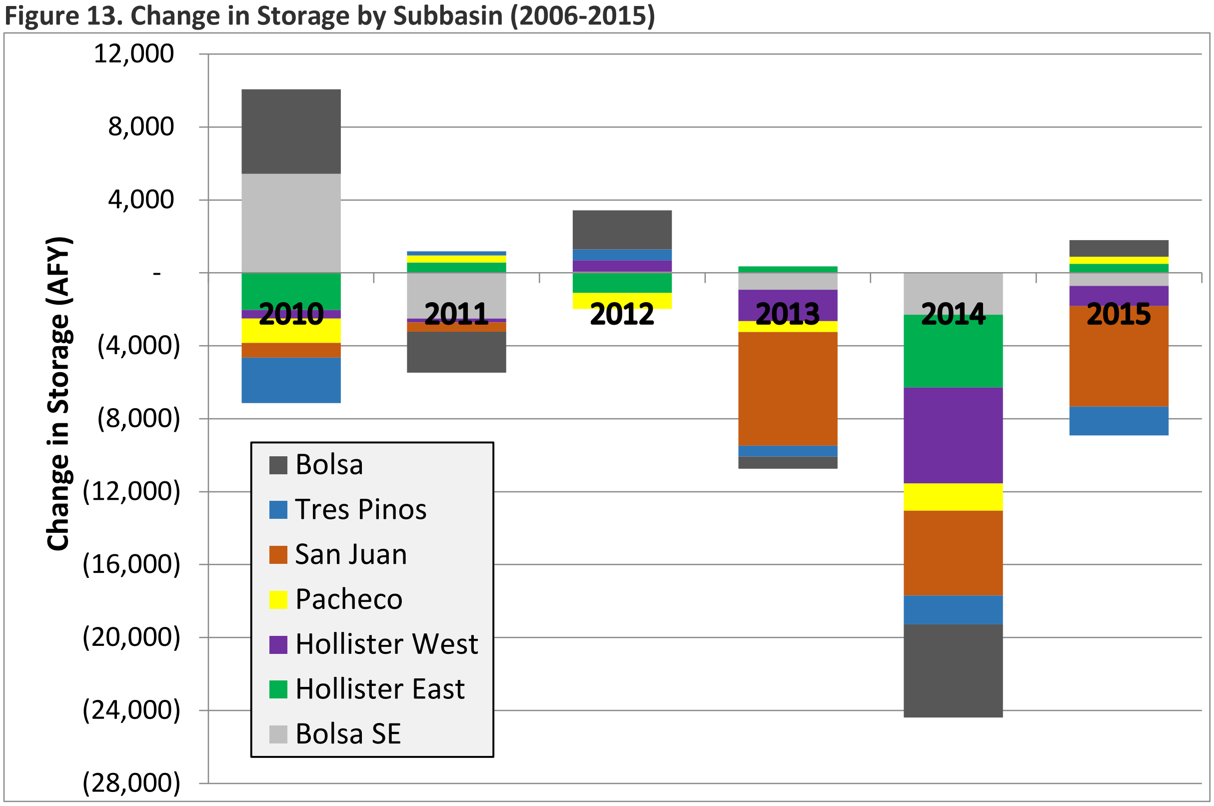


## Change in Storage

Groundwater elevation changes from October 2014 to October 2015 were used to determine the change in storage, which is the net volume of water added to or removed from the basin over the water year. The change in storage was calculated using the change in groundwater elevations (feet) and multiplying by the total area (acres) to determine the total bulk volume of change. This bulk volume of change is then multiplied by the average storativity of the subbasin to represent the amount of water that a given volume of aquifer will produce. The storativity values for each subbasin were derived from a numerical model of the basin developed by Yates and Zhang (2001).

The total change in groundwater storage for Zone 6 was a decrease of 8,040 AF, while the total change for the basin, including the Bolsa subbasin, was a decrease of 7,125 AF. These large decreases in storage, while expected, are significant. This marks the third year of significant decreased storage in Hollister West and San Juan. Since the current drought began in 2011, average subbasin water levels have decreased by 24 and 28 feet, in Hollister West and San Juan, respectively. **Figure 13** illustrates the change in storage by subbasin for the past six years.

**Figure 13. Change in Storage by Subbasin (2006-2015)**



## Hydrographs

Long term changes in groundwater elevations in the basin are illustrated in the composite hydrographs. These composite hydrographs are generated by averaging elevations from key wells from each subbasin for each monitoring event. The key well locations are shown on **Figure 14.** It should be noted that these subbasin hydrographs represent average conditions in each subbasin and illustrate long-term trends, but do not show localized variations in groundwater elevations. Overall, groundwater elevations do not indicate overdraft conditions as of 2015.

Water levels in most subbasins have shown a decrease over the multiple year drought consistent with increased pumping and decreased storage. **Figures 14 through 18** shows the composite hydrographs along with drought conditions (shading) and key changes to the basin management. Droughts are defined as periods with annual precipitation significantly below (less than two thirds of the long term average for a multiple year drought and less than 50 percent of the long term average for a single year drought.

Review of the hydrographs shows that long term trends of the subbasin are similar to each other and reflect drought conditions and the management activities pursued by the District.

The hydrographs begin in 1976, just before the dry year of 1977. At that time the basin relied solely on groundwater and water levels were at or near their historical lows. In 1987, the District began receiving water imported from CVP. In all subbasins, including the Bolsa that does not directly receive CVP water, water levels subsequently began to rise. A multiple year drought from 1988 through 1992 slowed the increase in water levels. In some subbasins, there was a marked decline in water levels due to reduced imported water and reduced recharge from surface water. From 1994-2004, managed recharge of CVP water along water ways (e.g., San Benito River) exceeded 1,000 AFY and the result was significant recovery in most subbasins. With water levels rising and recovery complete, recharge was reduced to low maintenance levels. Finally, in response to the latest multiple year drought (2012-2015) water levels have again declined. Given the history of the basin, recovery can be accelerated with targeted management actions in the areas with the most need, given availability of replenishment water (for in-lieu or direct recharge) and, where direct recharge is practiced, accessibility to recharge sites.

**Figure 14. Locations of Key Wells Used in Hydrographs**

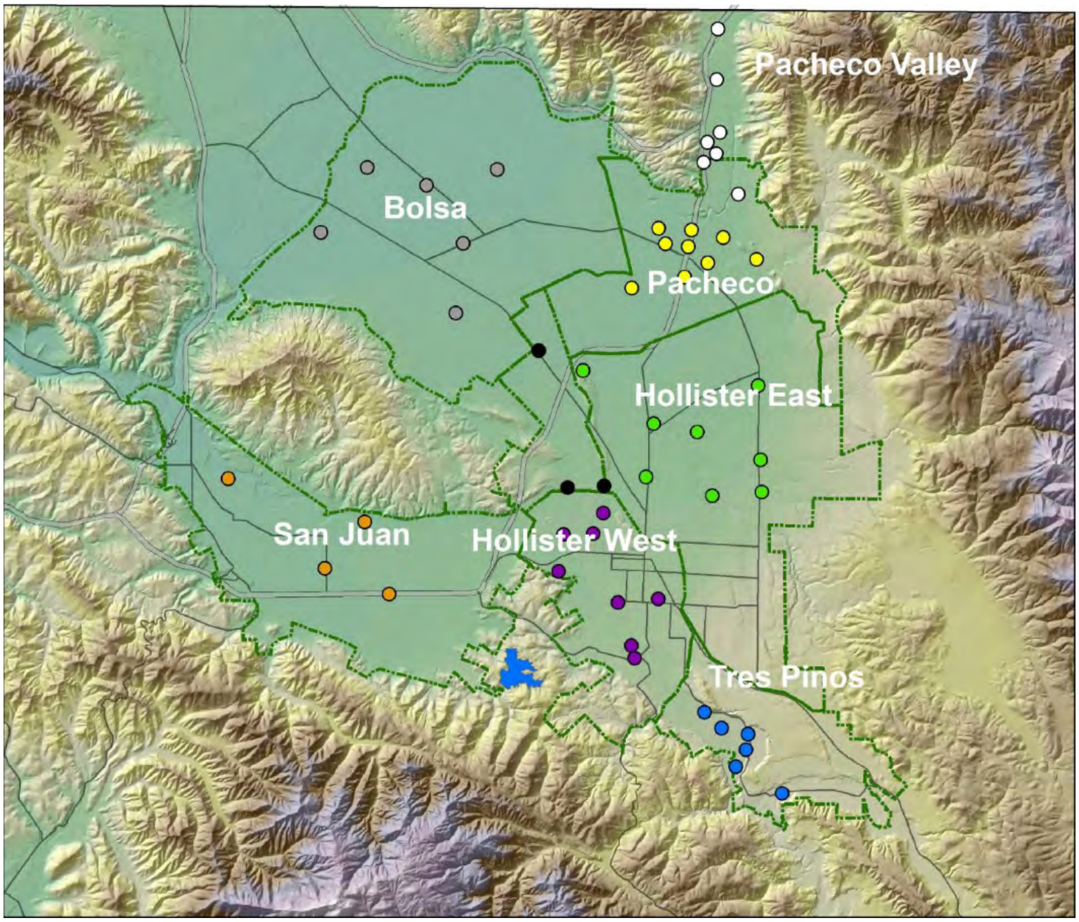


**Figure 15. Composite Hydrographs (Pacheco Creek and Pacheco)**

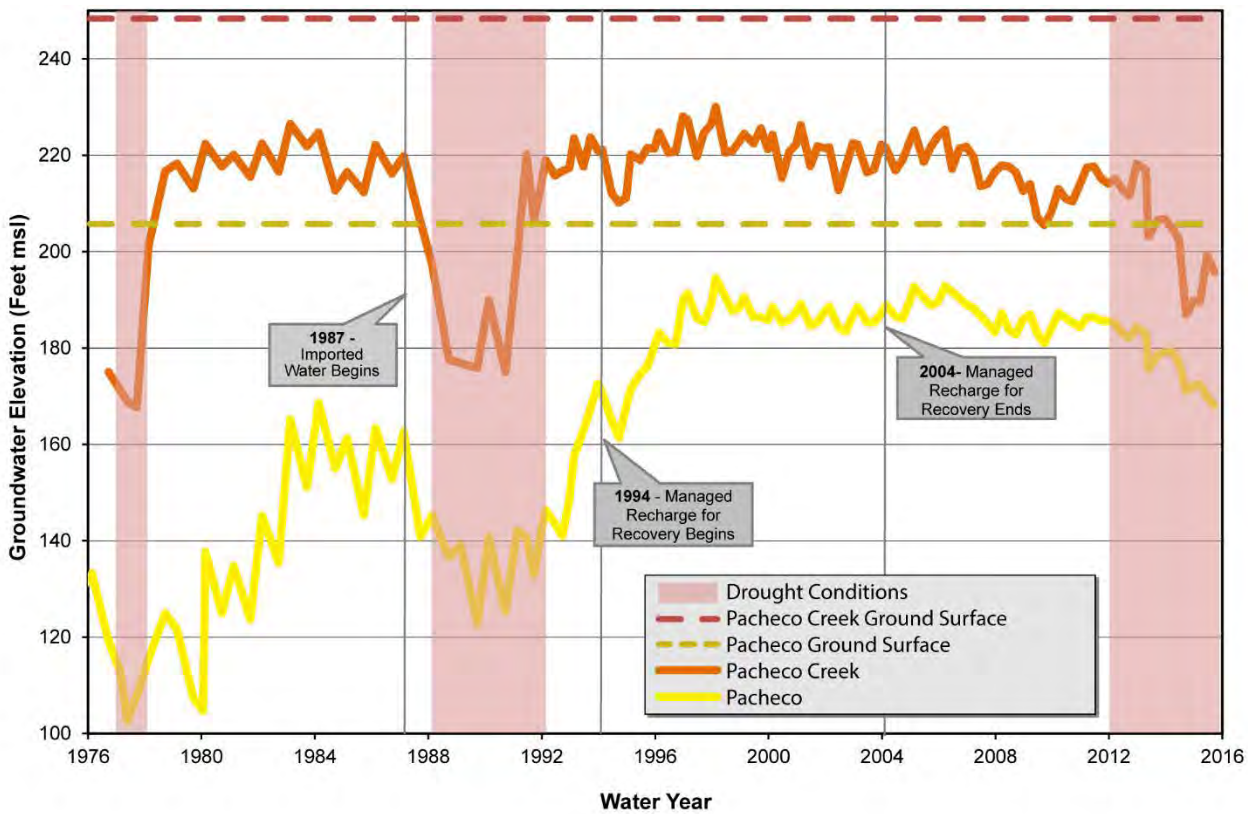



**Figure 16. Composite Hydrographs (Bolsa and Bolsa SE)**

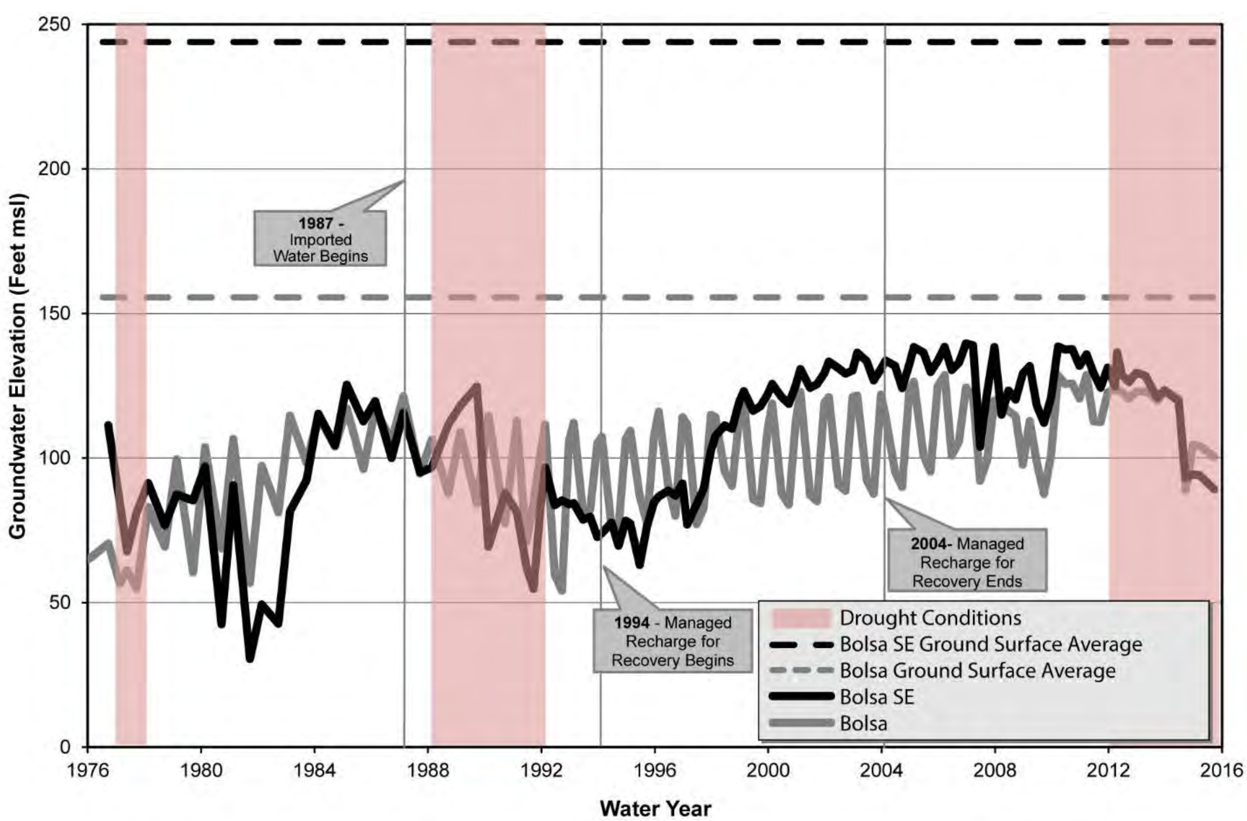


**Figure 17. Composite Hydrographs (Hollister East and San Juan)**

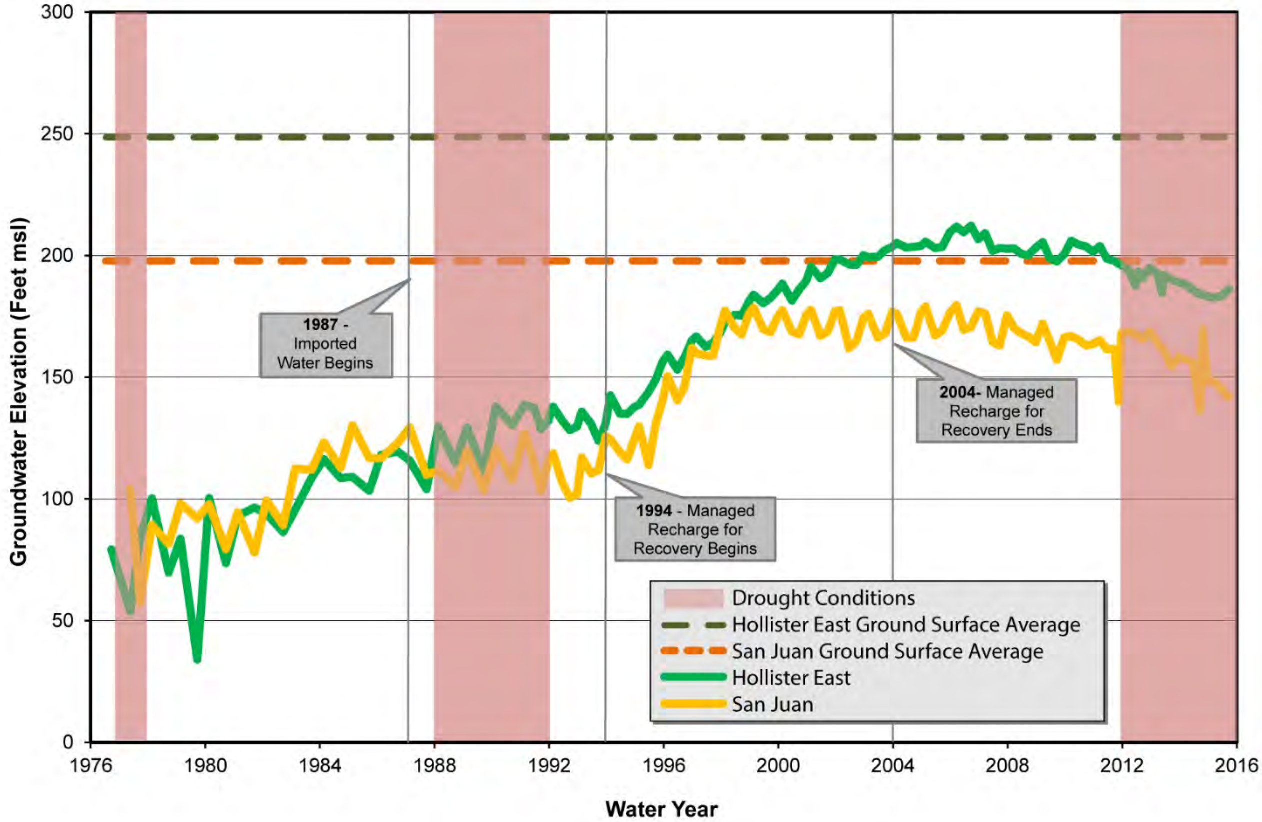
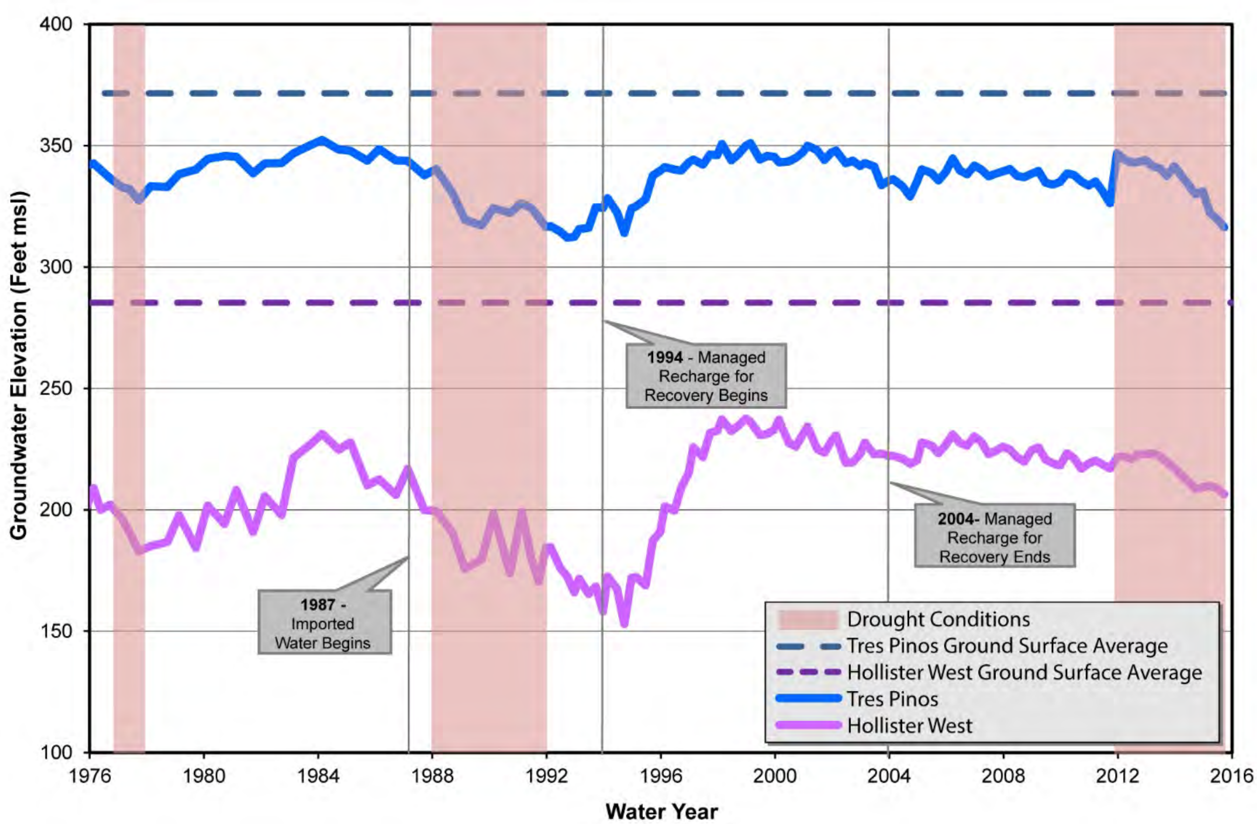



**Figure 18. Composite Hydrographs (Tres Pinos and Hollister West)**



# 6 FINANCIAL INFORMATION

The District derives its operating revenue from charges levied on landowners and water users. Non-operating revenue is derived from property taxes, interest, standby and availability charges, and grants. Zone 6 charges relating to the importation and distribution of CVP water are the focus of this section.

Table 5 (on the following page) summarizes District charges for Zone 6 water users. These include a standby and availability charge, groundwater charge, and charges for CVP water including water service charges and power charges. The standby and availability charge is a uniform per-acre charge assessed on all parcels with access to CVP water (an active or idle turnout from the distribution system). The groundwater charge reflects costs associated with groundwater monitoring and management, including the cost of purchasing CVP water and power charges associated with percolation.  The per-acre-foot charge is determined by dividing these costs by the volume of groundwater usage. Groundwater charges are adjusted annually in March.

CVP rates include the cost of service, restoration fund payment, charges for maintenance of San Luis Delta Mendota Water Authority facilities, and others fees (the breakdown is found in Appendix F).

The District has also calculated the groundwater charge for the next USBR water year (March 2016-February 2017). The detailed calculation is shown in Appendix F and the District recommends $4.95 for agricultural use in Zone 6 and a groundwater charge of $24.95 is recommended for M&I use in Zone 6.

Assuming that the District becomes a GSA and prepares a GSP, compliance with SGMA will entail increased costs for operation and maintenance in areas beyond Zone 6; the District should explore the financial measures to support SGMA compliance equably across the managed subbasins.

**Table 5. Charges for Zone 6 Water Users, March 2015 - February 2016**

| Charge | Unit | Agricultural | | | Municipal & Industrial |
|---|---|---|---|---|---|
| | | Non-Full Cost | Full Cost (1a) | Full Cost (1b) | |
| Standby and Availability | $/acre | $6.00 | $6.00 | $6.00 | $6.00 |
| Groundwater | $/acre-foot | $3.95 | $3.95 | $3.95 | $23.25 |
| CVP (Blue Valve) | | | | | |
| Water charge (3) | $/acre-foot | $179.00 | $315.00 | $326.00 | $247.00 |
| Power charge | | | | | |
| Subsystem 2 | $/acre-foot | $ 42.75 | $42.75 | $42.75 | $42.75 |
| Subsystem 6H | $/acre-foot | $ 31.05 | $31.05 | $31.05 | $31.05 |
| Subsystem 9L | $/acre-foot | $ 45.70 | $45.70 | $45.70 | $45.70 |
| Subsystem 9H | $/acre-foot | $ 97.15 | $97.15 | $97.15 | $97.15 |
| All other subsystems | $/acre-foot | $ 23.80 | $23.80 | $23.80 | $23.80 |

1 Full-cost rates for agricultural users apply to landholders that have exceeded his/her or its non full-cost entitlement. There are two full-cost rates:

a. Section 202(3) - the lower full-cost rate, which applies to qualified recipients leasing in excess of their 960-acre entitlement, limited recipients that received Reclamation irrigation water on or before October 1, 1981, and extended recordable contracts.

b. Section 205(a)(3) - the higher full-cost rate, which applies to prior law recipients leasing in excess of their applicable non full-cost entitlement, and limited recipients that did not receive Reclamation irrigation water on or before October 1, 1981. See Section 202(3) or 205(a)(3) of RRA Rules and Regulations for further non full-cost definitions.

2 For parcels 10 acres or smaller in size the water charge is $29.85 and $20.60 monthly for agriculture and M&I respectively. Monthly charges include annual minimum quantity (Agricultural at 2 acre-feet per year and M&I at 1 acre-foot per year), with water use above the annual minimum charged at applicable Agricultural or Non-Agricultural water rate.

The District has also calculated the groundwater charge for the next USBR water year (March 2016-February 2017). The detailed calculation is shown in Appendix F and the District recommends $4.95 for agricultural use in Zone 6 and a groundwater charge of $24.95 is recommended for M&I use in Zone 6.

# 7 OUTLOOK

## El Niño

The next water year is expected to be an El Niño year, with strong evidence that precipitation will be above normal for Northern California. According to the National Weather Service (NWS), precipitation in water year 2016 is expected to be average for the winter months and above average for the critical spring months. Previous El Niño years include water years 1958, 1966-7, 1973, 1983-84, and 1998. The average Hollister precipitation in these El Niño years was 22 inches, 174 percent of normal. While an El Niño year brings more precipitation, the increased volume and intensity may lead to relatively more runoff and less recharge to the groundwater basins.

## Drought Relief?

Increased rainfall this year alone is unlikely to end the drought. The Association of California Water Agencies (ACWA) has prepared an infographic to highlight what is needed to end the drought, which is provided in Appendix G. The main elements to end California's drought are:

- **Snowpack**- this winter's snowpack would need to return to at least average or above — about 39 inches of snow water content on April 1.
- **Temperatures** - Storms must be cold enough to support significant snowpack in the Sierra.
- **Rainfall** - Based on past drought-busting years, precipitation would need to be about 120% of average in key Northern California watersheds.
- **Reservoirs** - Key reservoirs are about a third of their capacity or less. Above-normal rain and runoff in Northern California would be needed for storage levels to recover this winter.
- **Groundwater** – Water level recovery will be a multi-year process that depends on how subbasins are recharged and how much groundwater continues to be pumped.
- **Water for Farm and Communities Restored** – Lifting of emergency conservation measures and a resumption of deliveries similar to prior non-drought periods will be a sign of drought recovery.

## CVP Deliveries

The annual allocation of CVP water remains uncertain. In past years, San Luis & Delta Mendota Water Authority (SLDMWA) has forecasted CVP allocation for the next year. As of November 2015 they have not released a projection, due in part to the repayment of water to the State Water Project and uncertainty with short term water availability. Many factors affect the allocation, including environmental considerations in the Delta, seniority of CVP water rights on water ways, reduced snowpack due to climate change, debt to the State Water Project System and other factors. The District must continue to use their existing tools (and continue to develop new management tools) to ensure a reliable water supply in spite of variable CVP allocations.

## Groundwater

In 2015, groundwater storage was reduced significantly in parts of the basin due to increased groundwater use. Current groundwater storage is sufficient to accommodate water demand in the short term with negative water budgets, and the capacity for groundwater recovery in subsequent wet years is sufficient to balance moderate increases in groundwater pumping without causing long-term overdraft. However, persistence of drought and reduced CVP supply entail a real risk of overdraft.

# 8 RECOMMENDATIONS

The water supply outlook for 2016 is mixed. While precipitation is expected to be above average, the state's and the basin's water resources need to be replenished. The District should move forward with its plans and projects to ensure a more sustainable water supply system that includes a portfolio of sources.

**Basin Boundary Revisions.** It is recommended the District work closely with Santa Clara Valley Water District and Pajaro Valley Water Management Agency to ensure that boundaries are resolved for compliance with SGMA. No modification of the southern basin boundary is recommended at this time; management (including monitoring, reporting, and financing) can be addressed internally by the District. New internal management areas may be defined to allow flexibility in the level of reporting and management based on priority.

**Groundwater Sustainability.** It is recommended the District assume the responsibilities of a Groundwater Sustainability Agency and prepare a groundwater sustainability plan for the subbasins of the Gilroy-Hollister Basin in San Benito County. The District should cooperate with Santa Clara Valley Water District and Pajaro Valley Water Management Agency on adjustments of subbasin boundaries to support sustainable management. If portions of a basin or subbasin overlap neighboring jurisdictions, the District should start working with the respective agency toward collaborative preparation of a GSP.

**Groundwater Use.** Without reliable CVP imports, some subbasins like San Juan continue to pump groundwater from storage and groundwater levels continue to decline. Direct management measures should be taken in areas that have critically low groundwater levels and high use, particularly San Juan and Hollister West.

**Groundwater Charges.** Based on the methodology used since 2006, the groundwater charge for the USBR contract year (March 2016-February 2017) is recommended to be $4.95 for agricultural use in Zone 6 and a groundwater charge of $24.95 is recommended for M&I use in Zone 6.

G**roundwater Production and Replenishment.** District percolation operations helped reverse historical overdraft and then accumulated a substantial water supply reserve. The District currently manages groundwater storage and surface water to minimize excessively high or low water levels on a temporal and geographic basis. In 2015, it is recommended—insofar as possible—that storage in Hernandez Reservoir be replenished as much as possible. Percolation of available local water supplies should be focused on portions of the basin with groundwater level decline, like San Juan and Hollister West. Both of these subbasins are along San Benito River and would benefit from increased reservoir releases.

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# A REPORTING REQUIREMENTS AND SPECIAL TOPICS

The San Benito County Water District Act (1953) is codified in California Water Code Appendix 70. Section 70-7.6 authorizes the District Board of Directors to require the District to prepare an annual groundwater report; this report addresses groundwater conditions of the District and its zones of benefit for the water year, which begins October 1 of the preceding calendar year and ends September 30 of the current calendar year. The Board has consistently ordered preparation of Annual Reports, and the reports have included the contents specified Section 70-7.6:

- An estimate of the annual overdraft for the current water year and for the ensuing water year
- Information for the consideration of the Board in its determination of the annual overdraft and accumulated overdraft as of September 30 of the current year
- A report as to the total production of water from the groundwater supplies of the District and its zones as of September 30 of the current year
- Information for the consideration of the Board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the District and its zones
- The amount of water the District is obligated to purchase during the ensuing water year
- A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the District and its zones during the ensuing water year
- A recommendation as to whether or not a groundwater charge should be levied in any zone(s) of the District in the ensuing water year and if so, a rate per acre-foot for all water other than agricultural water for such zone(s)
- Any other information the Board requires.
- The full text of Appendix 70, Section 70-7.6 through 7.8 is enclosed at the end of this appendix.
- Each water year a special topic is identified for further consideration. These topics have included water quality, salt loading, shallow wells, and others. Additional analyses and documentation provided in previous annual reports are summarized in the following table.

**Table A-1. Special Topics in Previous Annual Reports**

| Water Year | Additional Analyses and Reporting |
|---|---|
| 2000 | Methodology to calculate water supply benefits of Zone 3 and 6 operations |
| 2001 | Preliminary salt balance |
| 2002 | Investigation of individual salt loading sources |
| 2003 | Documentation of nitrate in supply wells, drains, monitor wells, San Juan Creek |
| 2004 | Documentation of depth to groundwater in shallow wells |
| 2005 | Tabulation of waste discharger permit conditions and recent water quality monitoring results |
| 2006 | Rate study |
| 2007 | Water quality update |
| 2008 | Water budget update |
| 2009 | Water demand and supply |
| 2010 | Water quality update |
| 2011 | Water budget update |
| 2012 | Land use update |
| 2013 | Water quality update |
| 2014 | Water balance update and Groundwater Sustainability |
| 2015 | Groundwater Sustainability – Basin Boundaries and GSAs |

**Water Code Appendix 70 Excerpts**

**Section 70-7.6. Groundwater; investigation and report: recommendations San Benito County**

Sec. 7.6. the board by resolution require the district to annually prepare an investigation and report on groundwater conditions of the district and the zones thereof, for the period from October 1 of the preceding calendar year through September 30 of the current year and on activities of the district for protection and augmentation of the water supplies of the district and the zones thereof. The investigation and report shall include all of the following information:

(a) Information for the consideration of the board in its determination of the annual overdraft.

(b) Information for the consideration of the board in its determination of the accumulated overdraft as of September 30 of the current calendar year.

(c) A report as to the total production of water from the groundwater supplies of the district and the zones thereof as of September 30 of the current calendar year.

(d) An estimate of the annual overdraft for the current water year and for the ensuing water year.

(e) Information for the consideration of the board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the district and the zones thereof for the ensuing water year.

(f) The amount of water the district is obligated to purchase during the ensuing water year.

(g) A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the district and the zones thereof the ensuing water year.

(h) A recommendation as to whether or not a groundwater charge should be levied in any zone or zones of the district during the ensuing year.

(i) If any groundwater charge is recommended, a proposal of a rate per acre-foot for agricultural water and a rate per acre-foot for all water other than agricultural water for such zone or zones.

(j) Any other information the board requires.

(Added by Stats. 1965,c. 1798,p.4167, 7. Amended by Stats.1967,c.934, 5, eff. July27,1967; Stats. 1983, c. 402, 1; Stats. 1998, c. 219 (A.B.2135), 1.)

**Section 70-7.7. Receipt of report; notice of hearing; contents; hearing**

Sec. 7.7. (a) On the third Monday in December of each year, the groundwater report shall be delivered to the clerk of the board in writing. The clerk shall publish, pursuant to Section 6061 of the Government Code, a notice of the receipt of the report and of a public hearing to be held on the second Monday of January of the following year in a newspaper of general circulation printed and published within the district, at least 10 days prior to the date at which the public hearing regarding the groundwater report shall be held. The notice shall include, but is not limited to, an invitation to all operators of water producing facilities within the district to call at the offices of the district to examine the groundwater report.

(b) The board shall hold, on the second Monday of January of each year, a public hearing, at which time any operator of a water-producing facility within the district, or any person interested in the condition of the groundwater supplies or the surface water supplies of the district, may in person, or by representative, appear and submit evidence concerning the groundwater conditions and the surface water supplies of the district. Appearances also may be made supporting or protesting the written groundwater report, including, but not limited to, the engineer's recommended groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4167, 8. Amended by Stats. 1983, c. 02,2; Stats. 1998, c. 219 (A.B.2135,2.)

**Section 70-7.8. Determination of groundwater charge; establishment of rates; zones; maximum charge; clerical errors**

Sec. 7.8. (a) Prior to the end of the water year in which a hearing is held pursuant to subdivision (b) of Section 7.7, the board shall hold a public hearing, noticed pursuant to Section 6061 of the government Code, to determine if a groundwater charge should be levied, it shall levy, assess, and affix such a charge or charges against all persons operating groundwater- producing facilities within the zone or zones during the ensuing water year. The charge shall be computed at fixed and uniform rate per acre-foot for agricultural water, and at a fixed and uniform rate per acre-foot for all water other than agricultural water. Different rates may be established in different zones. However, in each zone, the rate for agricultural water shall be fixed and uniform and the rate for water other than agricultural water shall be fixed and uniform. The rate for agricultural water shall not exceed one-third of the rate for all water other than agricultural water.

(b) The groundwater charge in any year shall not exceed the costs reasonably borne by the district in the period of the charge in providing the water supply service authorized by this act in the district or a zone or zones thereof.

(c) Any groundwater charge levied pursuant to this section shall be in addition to any general tax or assessment levied within the district or any zone or zones thereof.

(d) Clerical errors occurring or appearing in the name of any person or in the description of the water-producing facility where the production of water there from is otherwise properly charged, or in the making or extension of any charge upon the records which do not affect the substantial rights of the assesse or assesses, shall not invalidate the groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4168, 9. Amended by Stats. 1983, c. 402, 3; Stats.1983, c. 402, 3; Stats. 1998, c. 219 (A.B.2135), 3.)

# B CLIMATE DATA

## List of Tables and Figures

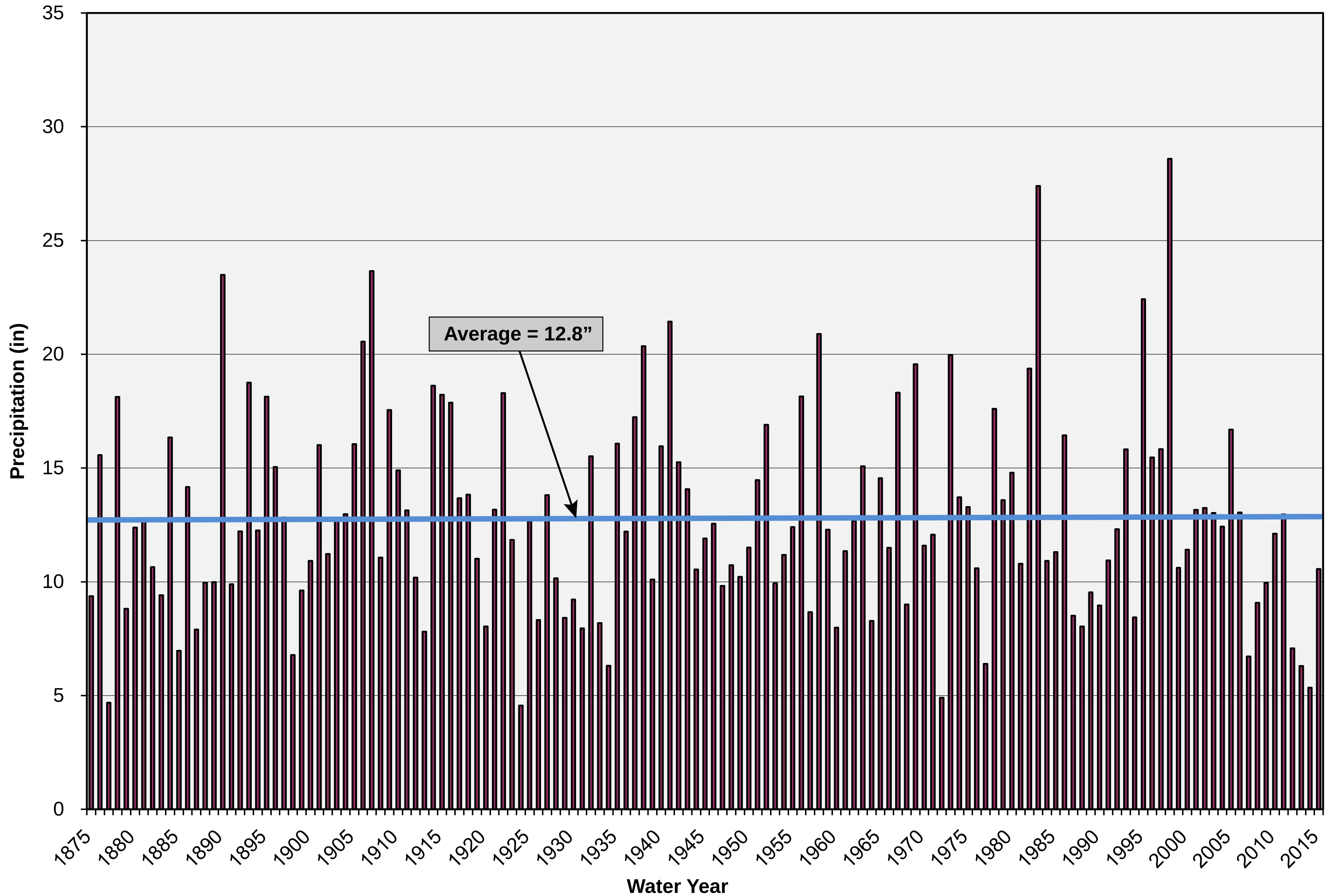
**Table B-1a. Monthly Precipitation at the SBCWD CIMIS Station (inches)**

| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.1 | 0 | 2.2 | 4.4 | 4.5 | 1.6 | 1.3 | 1.3 | 0 | 0 | 0 | 0 | 15.5 | 119% |
| 1997 | 1.0 | 3.2 | 4.3 | 6.8 | 0.2 | 0.1 | 0.2 | 0 | 0.1 | 0 | 0 | 0 | 15.9 | 122% |
| 1998 | 0.2 | 3.8 | 2.6 | 4.9 | 9.1 | 2.7 | 2.3 | 2.4 | 0.1 | 0 | 0 | 0.1 | 28.1 | 216% |
| 1999 | 0.5 | 1.9 | 0.8 | 2.5 | 2.5 | 1.5 | 0.7 | 0.1 | 0.1 | 0 | 0 | 0 | 10.6 | 81% |
| 2000 | 0.1 | 1.0 | 0.1 | 4.1 | 4.5 | 0.7 | 0.4 | 0.5 | 0.1 | 0 | 0 | 0 | 11.5 | 88% |
| 2001 | 3.5 | 0.8 | 0.2 | 2.9 | 2.8 | 0.6 | 2.2 | 0 | 0 | 0 | 0 | 0 | 13.1 | 100% |
| 2002 | 0.7 | 11.5 | 11.9 | 0.7 | 1.2 | 1.6 | 0.4 | 0.3 | 0 | 0 | 0 | 0 | 28.1 | 216% |
| 2003 | 0.0 | 1.7 | 5.0 | 0.8 | 1.4 | 1.1 | 3.1 | 0.1 | 0 | 0 | 0.1 | 0 | 13.1 | 101% |
| 2004 | 0.2 | 0.6 | 5.3 | 1.3 | 4.2 | 0.6 | 0.3 | 0.1 | 0 | 0 | 0 | 0 | 12.5 | 96% |
| 2005 | 2.0 | 0.5 | 3.5 | 2.5 | 2.9 | 3.4 | 0.8 | 0.6 | 0.4 | 0 | 0 | 0 | 16.7 | 128% |
| 2006 | 0.1 | 0.3 | 3.1 | 1.5 | 1.0 | 5.0 | 1.7 | 0.4 | 0 | 0 | 0 | 0 | 13.0 | 100% |
| 2007 | 0.2 | 0.7 | 1.7 | 0.6 | 2.2 | 0.3 | 0.6 | 0 | 0 | 0 | 0 | 0.4 | 6.7 | 52% |
| 2008 | 0.7 | 0.7 | 0.9 | 4.6 | 2.1 | 0.1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 9.1 | 70% |
| 2009 | 0.3 | 1.1 | 1.9 | 0.4 | 3.7 | 1.8 | 0.2 | 0.5 | 0 | 0 | 0 | 0.2 | 10.0 | 76% |
| 2010 | 0.5 | 0 | 1.3 | 2.3 | 2.2 | 1.7 | 3.4 | 0.6 | 0 | 0 | 0 | 0 | 12.1 | 93% |
| 2011 | 0.7 | 1.9 | 2.6 | 1.6 | 2.6 | 2.3 | 0.2 | 0.8 | 0 | 0 | 0 | 0 | 13.0 | 99% |
| 2012 | 0.7 | 1.0 | 0.1 | 0.8 | 0.5 | 2.3 | 1.4 | 0.3 | 0 | 0 | 0 | 0 | 7.1 | 54% |
| 2013 | 0.0 | 2.2 | 1.2 | 1.4 | 0.6 | 0.5 | 0.3 | 0.0 | 0 | 0 | 0 | 0 | 6.3 | 48% |
| 2014 | 0.1 | 0.4 | 0.2 | 0.2 | 1.9 | 1.6 | 0.9 | 0.0 | 0 | 0 | 0 | 0 | 5.4 | 41% |
| 2015 | 1.6 | 0.5 | 5.8 | 0.0 | 1.2 | 0.2 | 0.2 | 0.9 | 0.0 | 0.0 | 0.1 | 0.1 | 10.6 | 82% |
| AVG | 0.7 | 1.7 | 2.7 | 2.2 | 2.6 | 1.5 | 1.0 | 0.4 | 0.1 | 0.0 | 0.0 | 0.1 | 12.9 | 100% |

**Table B-1b. Reference Evapotranspiration at the SBCWD CIMIS Station (inches)**

| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 3.9 | 2.2 | 1.2 | 1.5 | 1.9 | 3.7 | 5.1 | 6.1 | 6.7 | 7.4 | 6.7 | 4.7 | 51.0 | 105% |
| 1997 | 3.8 | 1.8 | 1.4 | 1.4 | 2.5 | 4.3 | 5.8 | 7.5 | 7.1 | 7.2 | 6.7 | 5.7 | 55.2 | 113% |
| 1998 | 3.9 | 1.8 | 1.5 | 1.3 | 1.4 | 2.8 | 4.3 | 4.5 | 5.3 | 6.9 | 6.8 | 4.7 | 45.2 | 93% |
| 1999 | 3.5 | 1.7 | 1.5 | 1.5 | 1.8 | 3.0 | 4.7 | 5.8 | 6.7 | 6.9 | 5.9 | 4.7 | 47.8 | 98% |
| 2000 | 4.0 | 2.0 | 1.9 | 1.2 | 1.6 | 3.7 | 5.1 | 6.0 | 6.7 | 6.7 | 6.2 | 4.7 | 50.0 | 103% |
| 2001 | 2.9 | 1.7 | 1.5 | 1.5 | 1.8 | 3.1 | 3.9 | 6.2 | 6.5 | 6.0 | 6.2 | 4.8 | 46.0 | 94% |
| 2002 | 3.5 | 1.9 | 1.2 | 1.5 | 2.3 | 3.7 | 4.2 | 6.4 | 7.1 | 7.2 | 6.1 | 5.4 | 50.5 | 104% |
| 2003 | 3.6 | 1.9 | 1.3 | 1.6 | 1.8 | 3.9 | 3.8 | 6.0 | 6.5 | 7.3 | 6.2 | 5.1 | 48.8 | 100% |
| 2004 | 4.1 | 1.7 | 1.2 | 1.3 | 1.7 | 4.0 | 5.2 | 6.4 | 6.7 | 6.6 | 6.0 | 5.3 | 50.3 | 103% |
| 2005 | 3.1 | 1.7 | 1.4 | 1.3 | 1.7 | 3.0 | 4.4 | 5.7 | 6.4 | 6.9 | 6.1 | 4.6 | 46.2 | 95% |
| 2006 | 3.6 | 2.0 | 1.2 | 1.4 | 2.2 | 2.4 | 3.0 | 5.5 | 6.4 | 7.0 | 5.6 | 4.4 | 44.7 | 92% |
| 2007 | 3.3 | 1.7 | 1.4 | 1.8 | 1.8 | 4.1 | 4.8 | 6.3 | 6.9 | 6.8 | 6.5 | 4.7 | 49.8 | 102% |
| 2008 | 3.5 | 2.2 | 1.4 | 1.3 | 2.0 | 3.8 | 5.2 | 6.0 | 6.9 | 6.7 | 6.3 | 5.0 | 50.2 | 103% |
| 2009 | 3.8 | 1.9 | 1.4 | 1.7 | 1.7 | 3.5 | 4.8 | 5.5 | 6.3 | 7.1 | 6.3 | 5.3 | 49.3 | 101% |
| 2010 | 3.5 | 2.2 | 1.7 | 1.3 | 1.8 | 3.5 | 3.9 | 5.4 | 6.7 | 6.3 | 5.9 | 5.0 | 47.0 | 96% |
| 2011 | 3.0 | 1.9 | 1.1 | 1.6 | 2.1 | 2.7 | 4.4 | 5.3 | 6.0 | 6.6 | 5.7 | 4.6 | 45.0 | 92% |
| 2012 | 3.3 | 1.9 | 1.8 | 1.8 | 2.5 | 3.3 | 4.4 | 6.4 | 6.8 | 6.6 | 6.0 | 4.6 | 49.5 | 101% |
| 2013 | 3.3 | 1.8 | 1.2 | 1.5 | 2.1 | 3.7 | 5.4 | 6.3 | 6.4 | 6.5 | 6.0 | 4.8 | 48.8 | 100% |
| 2014 | 3.5 | 2.0 | 1.8 | 2.1 | 1.9 | 3.6 | 4.9 | 6.8 | 6.6 | 6.4 | 6.0 | 4.7 | 50.4 | 103% |
| 2015 | 3.9 | 1.9 | 1.5 | 1.8 | 2.2 | 4.1 | 5.1 | 5.0 | 6.4 | 6.5 | 6.5 | 5.3 | 50.2 | 103% |
| AVG | 3.5 | 1.9 | 1.4 | 1.5 | 1.9 | 3.5 | 4.6 | 6.0 | 6.6 | 6.8 | 6.2 | 4.9 | 48.7 | 100% |

Note: The averages are for the available period of record, starting in 1875 for precipitation and 1995 for reference evapotranspiration.




December 2015

TODD GROUNDWATER

**Figure B-1**
**Annual Precipitation in Hollister (1875 - 2015)**

# C HYDROLOGICAL DATA

## List of Tables and Figures

**Table C-1. Miscellaneous Streamflow Measurements during Water Year 2015**

| | Streamflow Measurement Site | Flow (cfs) | | | | |
|---|---|---|---|---|---|---|
| | | Oct-14 | Jan-15 | Apr-15 | Jul-15 | Oct-15 |
| 1 | Tres Pinos Cr - Southside Road Bridge | 0 | 0 | 0 | 0 | 0 |
| 2 | San Benito River - KT Road Bridge | 0 | 0 | 0 | 0 | 0 |
| 3 | San Benito River - Hospital Road | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| 4 | San Benito River - Cienega Road | 0 | 0 | 0 | 0 | 0 |
| 5 | San Benito River - Nash Road | 0 | 0 | 0 | 0 | 0 |
| 6 | San Benito River - old Highway 156 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| 7 | San Benito River - near Flint Road | 0 | 0 | 0 | 0 | 0 |
| 8 | San Benito River - near Mitchell Road | 0 | 0 | 0 | 0 | 0 |
| 9 | San Benito River - upstream of Bixby Road | 0 | 0 | 0 | 0 | 0 |
| 10 | San Benito River - Y Road | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| 11 | San Juan Creek - San Juan-Hollister Road | 0 | 0 | 0 | 0 | 0 |
| 12 | San Juan Creek - Highway 156 | 0 | 0 | 0 | 0 | 0 |
| 13 | San Juan Creek - Anzar Road | 0 | 0 | 0 | 0 | 0 |
| 14 | San Juan Creek - 2000 ft downstream of HWY 101 | | | | | |
| | | | | | | |
| 15 | Pacheco Creek - Walnut Avenue | 0 | 0 | 0 | 0 | 0 |
| 16 | Pacheco Creek - Highway 156 | 0 | 0 | 0 | 0 | 0 |
| 17 | Pacheco Creek - Lovers Lane | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| 18 | Arroyo de las Viboras - Hawkins Ranch driveway | 0 | 0 | 0 | 0 | 0 |
| 19 | Arroyo de las Viboras - Fairview Road | 0 | 0 | 0 | 0 | 0 |
| 26 | Arroyo Dos Picachos - Lone Tree Road | 0 | 0 | 0 | 0 | 0 |
| 20 | Arroyo Dos Picachos - Fallon Road | 0 | 0 | 0 | 0 | 0 |
| 21 | Arroyo Dos Picachos - Aquistapace Road | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| 22 | Santa Ana Creek - Fairview Road | 0 | 0 | 0 | 0 | 0 |
| 23 | Santa Ana Creek - Fallon Road | 0 | 0 | 0 | 0 | 0 |
| 24 | Tequisquita Slough - San Felipe Road | 0 | 0 | 0 | 0 | 0 |
| 25 | Millers Canal - 2000 ft downstream of San Felipe Lake | Locked Out | Locked Out | Locked Out | Locked Out | Locked Out |
| | | | | | | |
| 27 | Pajaro River - above Millers Canal | | | | | |
| 28 | Pajaro River - Highway 25 | | | | | |
| 29 | Pajaro River - below Carnadero Cr | | | | | |
| 30 | Carnadero Cr - above Pajaro River | | | | | |

Notes:

See Figure C-3 for numbered site locations

~ = streamflow estimated visually or by relatively inaccurate methods (e.g., width x depth x estimated centerline surface velocity)

Sites were monitored within days in the cited month;
Most sites along any individual stream were measured on the same day.

**Table C-2. Groundwater Elevations October 2014 through October 2015**

| Well Number | Well Depth (feet) | Depth to Top of Screens (feet) | Ground Surface Elevation (feet MSL) | Subbasin | Key Well | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Oct-14 | Jan-15 | Apr-15 | Jul-15 | Oct-15 |
| **Bolsa SE** | | | | | | | | | | |
| 12-5-09M1 | 240 | 105 | 207 | BSE | * | 121.56 | 122.24 | 120.87 | | 114.64 |
| 12-5-21Q1 | 500 | 0 | 260 | BSE | * | 70.58 | 71.35 | 70.72 | | 67.64 |
| 12-5-22N1 | 372 | 250 | 265 | BSE | * | 86.9 | 89.4 | 90.32 | | 85.15 |
| **Hollister East** | | | | | | | | | | |
| 12-5-14N1 | 0 | 0 | 229 | HE | * | 178.85 | 177.87 | 177.54 | 176.61 | 176.87 |
| 12-5-22C1 | 237 | 102 | 236 | HE | | 186.27 | 186.64 | 187.68 | 187.35 | 192.87 |
| 12-5-22J2 | 355 | 120 | 250 | HE | * | 188.62 | 188.75 | 189.32 | 188.84 | 194.64 |
| 12-5-23A20 | 862 | 178 | 239 | HE | * | 187.87 | 186.62 | | 187.64 | 185.32 |
| 12-5-24N1 | 300 | 182 | 270 | HE | * | 180.54 | 179.87 | 181.26 | 180.54 | 188.12 |
| 12-6-07P1 | 147 | 0 | 266 | HE | | 225.86 | 226.32 | 227.26 | 225.35 | 224.2 |
| 12-6-18G1 | 198 | 70 | 303 | HE | | 252.54 | | 266.88 | 265.52 | 248.91 |
| 12-6-30E1 | 0 | 0 | 375 | HE | | 341.19 | 341.12 | 342.04 | 340.9 | 349.02 |
| 13-6-07D2 | 0 | 0 | 500 | HE | | 334.62 | 334.22 | 334.71 | 334.12 | 335.02 |
| ROSSI 1 | 0 | 0 | 0 | HE | | 223.62 | 222.88 | 223.74 | 221.15 | 222.43 |
| 2317 | 0 | 0 | 299.5 | HEN | | 227.64 | 227.62 | 227.32 | 226.97 | 232.86 |
| **Hollister West** | | | | | | | | | | |
| 12-5-27E1 | 175 | 0 | 270 | HW | * | 190.88 | 193.68 | 194.51 | 198.64 | 190.54 |
| 12-5-28J1 | 220 | 0 | 276 | HW | * | 206.92 | 205.88 | 206.14 | 204.25 | 203.59 |
| 12-5-33E2 | 121 | 81 | 266 | HW | * | 201.05 | 199.64 | 200.32 | 197.25 | 191.32 |
| 12-5-34P1 | 195 | 153 | 294 | HW | * | 204.24 | 205.24 | 204.24 | 203.35 | 202.57 |
| 12-5-35N2 | 612 | 288 | 305 | HW | * | 215.75 | 216.76 | 217.54 | 217.15 | 215.87 |
| 13-5-03L1 | 126 | 0 | 303 | HW | * | 224.54 | 225.63 | 226.64 | 224.61 | 223.86 |
| 13-5-04B | 0 | 0 | 285 | HW | | 207.76 | 209.39 | 210.71 | 207.05 | 204.82 |
| 13-5-10B1 | 0 | 0 | 305 | HW | * | 216.86 | 218.75 | 219.15 | 218.02 | 217.59 |
| 13-5-11E1 | 0 | 0 | 309 | HW | | 255.49 | 261.63 | 266.62 | 244.21 | 243.61 |
| San Justo 4 (INDART) | 0 | 0 | 318 | HW | | 256.68 | 257.32 | 257.76 | 256.64 | 254.54 |
| San Justo 6 (ROSE) | 0 | 0 | 338 | HW | | 232.62 | 230.64 | 234.22 | 233.35 | 231.86 |
| **Pacheco** | | | | | | | | | | |
| 11-5-26N2 | 232 | 95 | 198 | P | * | 155.28 | 156.86 | 155.68 | 153.42 | 150.62 |
| 11-5-26R3 | 225 | 65 | 208 | P | * | 169.49 | 170.83 | 171.02 | 168.54 | 166.77 |
| 11-5-35C1 | 180 | 0 | 198 | P | * | 158.49 | 159.88 | 158.63 | 155.64 | 155.88 |
| 11-5-35G1 | 230 | 0 | 206 | P | * | 168.23 | 170.55 | 170.79 | 165.81 | 161.35 |
| 11-5-35Q3 | 0 | 0 | 203 | P | * | 157 | 157.02 | 158.64 | 155.52 | 152.44 |
| 11-5-36C1 | 98 | 0 | 223 | P | * | 176.1 | 176.87 | 178.63 | 175.63 | 174.64 |
| 11-6-31M2 | 188 | 155 | 284 | P | * | 201.36 | 203.24 | 203.43 | 201.64 | 200.59 |
| 12-5-01G2 | 300 | 0 | 215 | P | | 174.32 | 174.52 | 174.15 | 173.77 | 172.42 |
| 12-5-02H5 | 128 | 42 | 210 | P | | 170.5 | 170.34 | 170.89 | 170.54 | 165.67 |
| 12-5-02L2 | 170 | 0 | 202 | P | | 186.04 | 185.94 | 186.57 | 181.76 | 179.87 |
| 12-5-03B1 | 128 | 100 | 182 | P | * | 182 | 182 | 182 | 182 | 182 |
| 12-6-06K1 | 260 | 16 | 260 | P | | 260 | 260 | 260 | 259.99 | 259.99 |
| 12-6-06L4 | 235 | 50 | 248 | P | | 212.88 | 211.87 | 214.56 | 211.88 | 212.9 |

Table C-2. Groundwater Elevations October 2014 through October 2015

| Well Number | Well Depth (feet) | Depth to Top of Screens (feet) | Ground Surface Elevation (feet MSL) | Subbasin | Key Well | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Oct-14 | Jan-15 | Apr-15 | Jul-15 | Oct-15 |
| **San Juan** | | | | | | | | | | |
| 12-4-17L20 | 0 | 0 | 140 | SJ | | 113.63 | 111.68 | 110.99 | | 113.64 |
| 12-4-18J1 | 0 | 0 | 150 | SJ | | 120.79 | 121.57 | 120.85 | | 116.74 |
| 12-4-21M1 | 250 | 0 | 170 | SJ | * | 137.2 | 138.82 | 137.87 | | 126.59 |
| 12-4-26G1 | 876 | 240 | 210 | SJ | * | 169.62 | 170.22 | 169.88 | | 165.88 |
| 12-4-34H1 | 387 | 120 | 199 | SJ | * | 135.16 | 136.65 | 136.75 | | 132.74 |
| 12-4-35A1 | 325 | 110 | 216 | SJ | | 168.12 | 169.45 | 170.61 | | 163.87 |
| 12-4-36D2 | 0 | 0 | 219 | SJ | | 177.88 | 177.62 | 177.92 | | 171.82 |
| 12-5-30H1 | 240 | 0 | 250 | SJ | | 189.42 | 188.88 | 189.02 | | 186.82 |
| 12-5-31H1 | 0 | 0 | 248 | SJ | | 192.11 | 190.64 | 191.88 | | 187.84 |
| 13-4-03H1 | 312 | 168 | 206.25 | SJ | | 188.24 | 188.44 | 188.87 | | 182.85 |
| 13-4-4A3 | 0 | 0 | 210 | SJ | | 187.64 | 188.63 | 189.54 | | 182.82 |
| RIDER BERRY | 0 | 0 | 241.5 | SJ | | 215.13 | 184.14 | | | 175.04 |
| **Tres Pinos** | | | | | | | | | | |
| 13-5-11Q1 | 178 | 61 | 324 | TP | | 235.51 | 236.64 | 236.53 | 234.39 | 231.61 |
| 13-5-12D4 | 0 | 0 | 360 | TP | | 240 | 243 | 231 | 244 | 198 |
| 13-5-12K1 | 0 | 0 | 440 | TP | | 314 | 316 | 316 | 316 | 314 |
| 13-5-12N20 | 352 | 301 | 332 | TP | * | 308.83 | 310.24 | 309.27 | 306.12 | 300.54 |
| 13-5-13F1 | 134 | 30 | 348 | TP | * | 319.88 | 320.61 | 318.64 | 315.54 | 311.12 |
| 13-5-13H1 | 252 | 112 | 400 | TP | * | 327.64 | 328.57 | 327.24 | 325.79 | 322.52 |
| 13-5-13J2 | 180 | 0 | 375 | TP | * | 355.75 | 356.24 | 305.62 | 304.26 | 302.88 |
| 13-5-13Q1 | 185 | 44 | 360 | TP | * | 316.22 | 318.61 | 317.72 | 315.36 | 312.83 |
| 13-5-14C1 | 0 | 0 | 365 | TP | | 261.01 | 262.64 | 263.13 | 254.77 | 252.52 |
| 13-6-19J1 | 340 | 128 | 450 | TP | | 416.72 | 418.11 | 419.35 | 416.21 | 413.89 |
| 13-6-19K1 | 211 | 0 | 422 | TP | * | 351.23 | 353.45 | 355.71 | 351.9 | 348.54 |
| 13-6-20K1 | 0 | 0 | 440 | TP | | 426.73 | 427.34 | 425.86 | 424.44 | 422.14 |
| LEMOS (Ridgemark) | 0 | 0 | 522 | TP | | 339.26 | 340.14 | 341.55 | 340.76 | 338.26 |
| POSEY (Ridgemark) | 0 | 0 | 521 | TP | | 330.42 | 332.22 | 333.15 | 332.14 | 331.46 |
| **Bolsa** | | | | | | | | | | |
| 11-4-34A1 | 100 | 0 | 142 | B | * | | 132.43 | 131.9 | | 124.72 |
| 11-5-20N1 | 300 | 0 | 150 | B | * | 86.32 | 92.62 | 93.68 | | 87.64 |
| 11-5-21E2 | 220 | 100 | 155 | B | | 155 | 155 | 155 | 155 | 155 |
| 11-5-28B1 | 198 | 125 | 168 | B | | 168 | 168 | 168 | 168 | 168 |
| 11-5-28P4 | 140 | 80 | 165 | B | | 165 | 165 | 165 | 165 | 165 |
| 11-5-31F1 | 515 | 312 | 159 | B | * | 36.3 | 46.54 | 45.17 | | 43.64 |
| 11-5-33B1 | 125 | 0 | 169 | B | | 169 | 169 | 169 | 169 | 169 |
| 12-5-05G1 | 500 | 150 | 175 | B | | 102.99 | 106.35 | 105.66 | | 103.24 |
| 12-5-05M1 | 0 | 0 | 175 | B | | 63.89 | 64.15 | 65.12 | | 59.82 |
| 12-5-06L1 | 0 | 0 | 177 | B | * | 144.15 | 146.52 | 145.77 | | 145.74 |

Table C-2. Groundwater Elevations October 2014 through October 2015

| Well Number | Well Depth (feet) | Depth to Top of Screens (feet) | Ground Surface Elevation (feet MSL) | Subbasin | Key Well | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Oct-14 | Jan-15 | Apr-15 | Jul-15 | Oct-15 |
| **Paicines** | | | | | | | | | | |
| OAK HILL RANCH 1 | 0 | 0 | 745 | Paicines | | 656.73 | | 656.64 | | 653.79 |
| RFP Vineyard 3 (FRANCHIONI) | 0 | 0 | 706.67 | Paicines | | 645.63 | | 645.21 | | 641.72 |
| RIDGEMARK 5 | 0 | 0 | 668 | Paicines | | 638.64 | | 637.51 | | 630.88 |
| RIDGEMARK 7 | 0 | 0 | 692 | Paicines | | 560.74 | | 594.87 | | 588.26 |
| SCHIELDS 4 (vineyard) | 0 | 0 | 682 | Paicines | | 628.38 | | 631.39 | | 627.35 |
| **Pacheco Creek** | | | | | | | | | | |
| 11-5-13D1 | 125 | 0 | 258 | PC | * | 205.57 | 214.19 | 213.71 | 211.62 | 209.51 |
| 11-5-23R2 | 118 | 43 | 230 | PC | * | 187 | 189.12 | 188.71 | 183.63 | 181.61 |
| 11-5-24L1 | 70 | 0 | 234 | PC | * | 183.3 | 183.92 | 183.82 | 181.56 | 174.76 |
| 11-5-25G1 | 225 | 0 | 244.33 | PC | * | 171.95 | 171.57 | 172.48 | 219.97 | 217.15 |
| **Tres Pinos Creek Valley** | | | | | | | | | | |
| 1536 | 0 | 0 | 0 | TCPV | | 289 | 291 | 290 | 289 | 280 |
| DONATI 2 | 0 | 0 | 696 | TPCV | | 641.35 | | 643.86 | | 637.72 |
| GRANITE ROCK WELL 1 | 0 | 0 | 0 | TPCV | | 300.47 | 301.22 | 293.64 | 283.89 | 282.54 |
| GRANITE ROCK WELL 2 | 0 | 0 | 0 | TPCV | | 328.54 | 327.98 | 318.71 | 308 | 306.72 |
| WILDLIFE CENTER 5 | 0 | 0 | 766 | TPCV | | 699.72 | | 695.86 | | 688.74 |
| **Llagas** | | | | | | | | | | |
| 11S04E02D008 | 0 | 0 | 229 | SCVWD | | 123.23 | 146.4 | 132.675 | 107.2733 | 123.56 |
| 11S04E02N001 | 0 | 0 | 174.9 | SCVWD | | 125.53 | 143.27 | 126.875 | 94.055 | 119.87 |
| 11S04E03J002 | 0 | 0 | 196 | SCVWD | | 123.15 | 146.38 | 126.985 | 98.5 | 120.42 |
| 11S04E08K002 | 0 | 0 | 178.1 | SCVWD | | 128.72 | 147.2 | 145.11 | 125.615 | 127.1 |
| 11S04E10D004 | 0 | 0 | 169.9 | SCVWD | | 124.22 | 146.42 | 136.3 | 112.2967 | 121.765 |
| 11S04E15J002 | 0 | 0 | 144 | SCVWD | | 111.33 | 139.55 | 126.93 | 97.28667 | 112.25 |
| 11S04E17N004 | 0 | 0 | 180.1 | SCVWD | | 123.9 | 146.05 | 145.505 | 129.8833 | |
| 11S04E21P003 | 0 | 0 | 154.9 | SCVWD | | 118.68 | 139.89 | 130.02 | | 113.98 |
| 11S04E22N001 | 0 | 0 | 149.9 | SCVWD | | 114.75 | 136.29 | 124.645 | 104.09 | 109.82 |
| 11S04E32R002 | 0 | 0 | 140.1 | SCVWD | | 105.51 | 129.95 | 120.41 | 100.4767 | 102.02 |

**Table C-3. Groundwater Change Attributes**

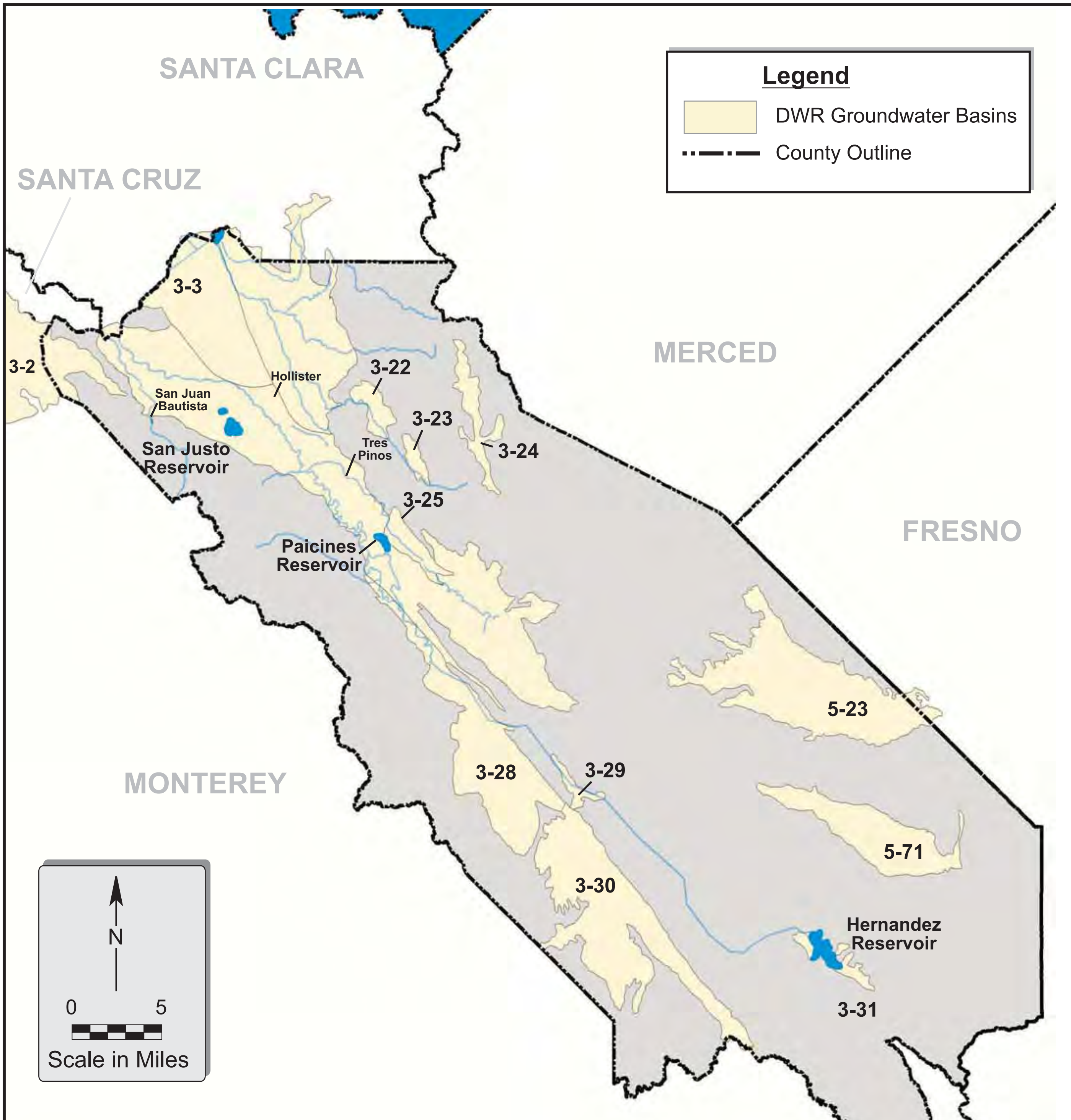
| Subbasin | Subbasin Area (Acres) | Average Storativity |
|---|---|---|
| San Juan | 11,708 | 0.05 |
| Hollister West | 6,050 | 0.05 |
| Tres Pinos | 4,725 | 0.05 |
| Pacheco | 6,743 | 0.03 |
| Northern Hollister East | 10,686 | 0.03 |
| Southern Hollister East | 5,175 | 0.03 |
| Bolsa SE | 2,691 | 0.08 |
| Bolsa | 20,003 | 0.01 |

**Table C-4. Groundwater Change in Elevation 2006-2015 (feet)**

| | Average Change in Groundwater Elevation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Subbasin | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| San Juan | 0.87 | (4.49) | 0.29 | (0.75) | (1.39) | (0.89) | - | (10.66) | (7.95) | (9.45) |
| Hollister West | 3.13 | (1.69) | 3.31 | (1.43) | (1.58) | (0.66) | 2.12 | (5.72) | (17.41) | (3.60) |
| Tres Pinos | 2.47 | (2.34) | 0.72 | 8.10 | (10.52) | 0.97 | 2.54 | (2.48) | (6.66) | (6.68) |
| Pacheco | 1.93 | (4.41) | (1.36) | 8.10 | (6.60) | 1.92 | (4.36) | (2.95) | (7.37) | 1.92 |
| Northern Hollister East | 3.64 | (6.51) | (4.21) | 10.15 | (8.73) | 2.72 | (2.36) | 1.65 | (9.10) | 0.76 |
| Southern Hollister East | 3.26 | (1.46) | 5.45 | 9.39 | 4.93 | (1.94) | (2.18) | (1.14) | (6.87) | 1.61 |
| Bolsa SE | 1.55 | (6.78) | 11.51 | (24.80) | 25.29 | (11.65) | 0.25 | (4.27) | (10.68) | (3.34) |
| Bolsa | 6.79 | (3.30) | 8.97 | (16.86) | 23.15 | (11.19) | 10.72 | (3.37) | (25.56) | 4.57 |

**Table C-5. Groundwater Change in Storage 2006-2015 (acre-feet)**

| | Average Change in Groundwater Storage (AF) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Subbasin | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| San Juan | 510 | (2,626) | 168 | (437) | (811) | (523) | - | (6,239) | (4,653) | (5,530) |
| Hollister West | 947 | (510) | 1,001 | (431) | (477) | (198) | 640 | (1,730) | (5,267) | (1,090) |
| Tres Pinos | 584 | (553) | 169 | 1,913 | (2,485) | 228 | 601 | (586) | (1,574) | (1,579) |
| Pacheco | 391 | (892) | (275) | 1,639 | (1,335) | 389 | (882) | (597) | (1,490) | 388 |
| Northern Hollister East | 1,167 | (2,087) | (1,350) | 3,253 | (2,798) | 870 | (757) | 528 | (2,918) | 242 |
| Southern Hollister East | 506 | (227) | 846 | 1,457 | 766 | (301) | (339) | (177) | (1,067) | 250 |
| Bolsa SE | 333 | (1,458) | 2,478 | (5,338) | 5,443 | (2,508) | 53 | (918) | (2,300) | (719) |
| Bolsa | 1,358 | (659) | 1,794 | (3,372) | 4,631 | (2,239) | 2,144 | (674) | (5,112) | 915 |




## DWR Groundwater Basins

3-2 Pajaro Valley
3-3 Gilroy Hollister Valley
- 3-3.02 Bolsa Area
- 3-3.03 Hollister Area
- 3-3.04 San Juan Bautista Area

3-22 Santa Ana Valley
3-23 Upper Santa Ana Valley
3-24 Quien Sabe Valley
3-25 Tres Pinos Valley
3-28 San Benito River Valley
3-29 Dry Lake Valley
3-30 Bitter Water Valley
3-31 Hernandez Valley
5-23 Panoche Valley
5-71 Vallecitos Valley

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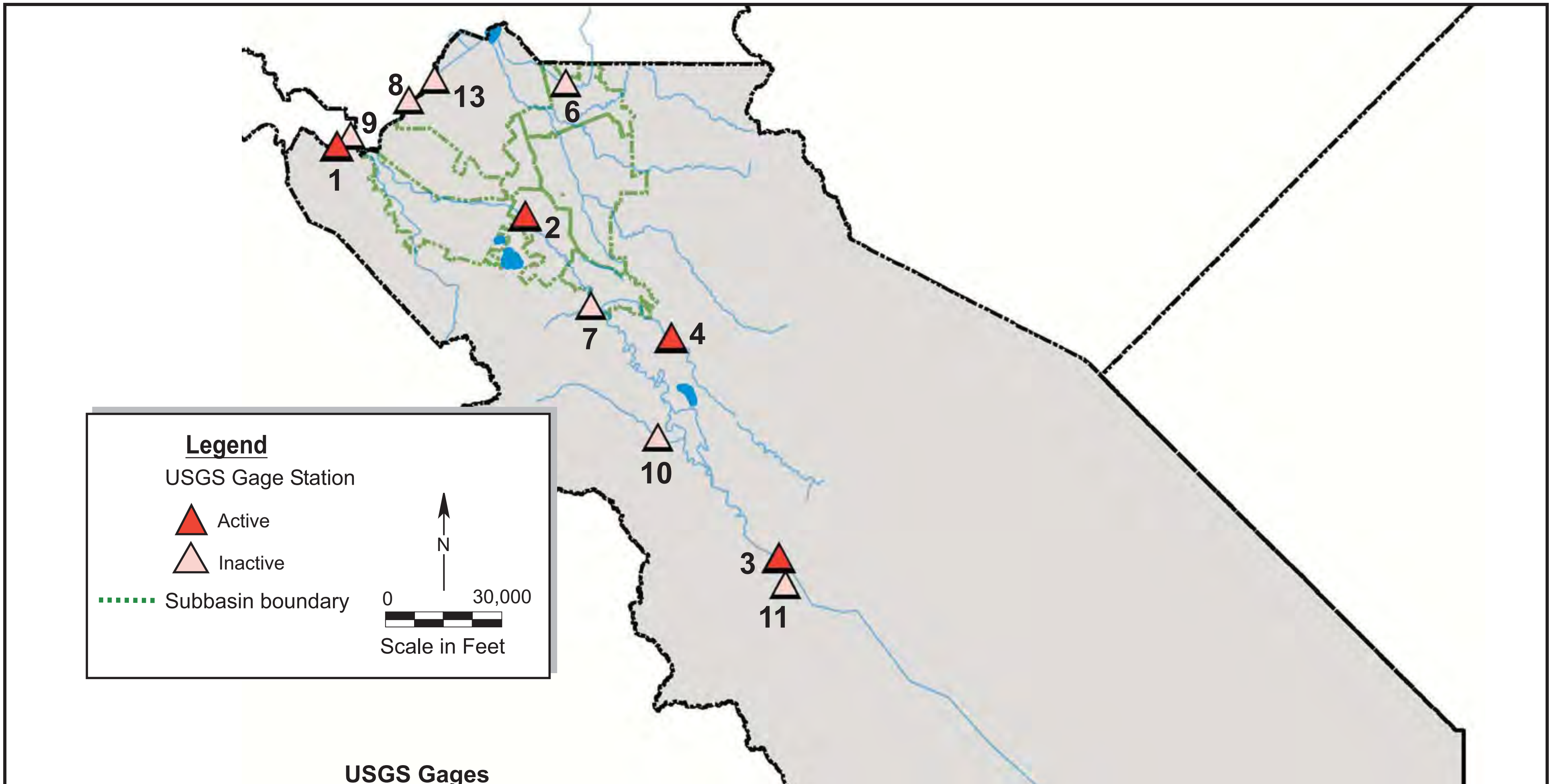
**Figure C-1**
**Groundwater Basins in San Benito County**




**USGS Gages**

| Site ID | USGS Number | Site Name | Period of Record | |
|---|---|---|---|---|
| 1 | 11159000 | PAJARO R A CHITTENDEN CA | 10/1/1939 | Active |
| 2 | 11158600 | SAN BENITO R A HWY 156 NR HOLLISTER CA | 10/1/1970 | Active |
| 3 | 11156500 | SAN BENITO R NR WILLOW CREEK SCHOOL CA | 10/1/1939 | Active |
| 4 | 11157500 | TRES PINOS C NR TRES PINOS CA* | 12/8/1922 | Active |
| 5 | 11154700 | CLEAR C NR IDRIA CA | 10/1/1993 | Active |
| 6 | 11153040 | PACHECO C A DUNNEVILLE CA | 10/1/1981 | 9/30/1985 |
| 7 | 11158500 | SAN BENITO R NR HOLLISTER CA | 10/1/1949 | 9/30/1983 |
| 8 | 11153700 | PAJARO R NR GILROY CA | 3/1/1959 | 9/30/1982 |
| 9 | 11158900 | PESCADERO C NR CHITTENDEN CA | 9/11/1970 | 9/30/1981 |
| 10 | 11156700 | PESCADERO C NR PAICINES CA | 7/1/1959 | 10/7/1970 |
| 11 | 11156450 | WILLOW C TRIB NR SAN BENITO CA | 7/1/1964 | 9/30/1969 |
| 12 | 11156000 | SAN BENITO R BL M C NR HERNANDEZ CA | 10/1/1949 | 9/30/1963 |
| 13 | 11154500 | PAJARO R A SARGENT CA | 10/1/1940 | 9/30/1941 |

* WY 2006 data for gage height only

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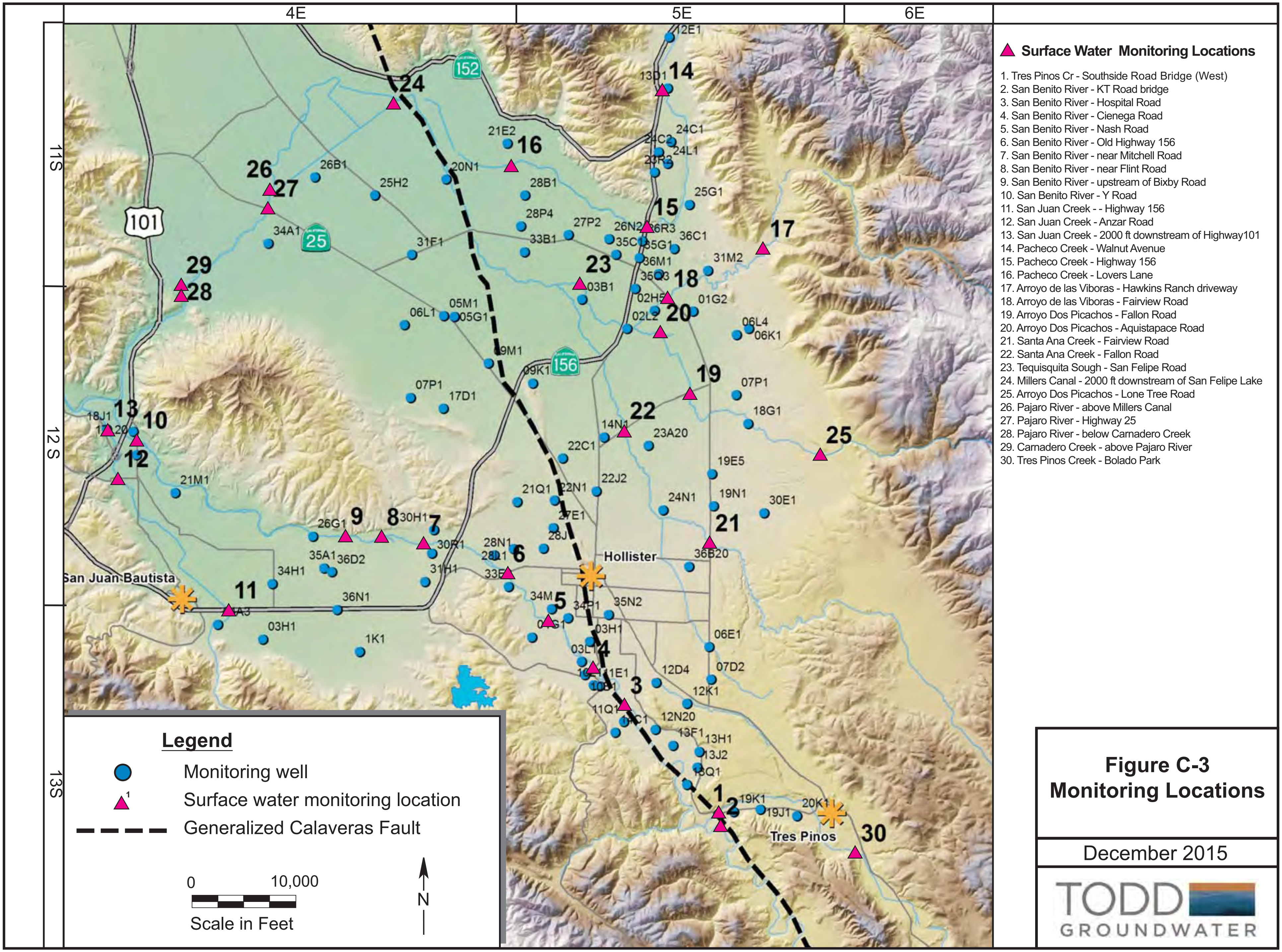
**Figure C-2**
**Location of Streamflow Stations**


4E
5E
6E
11S
12 S
13S
Surface Water Monitoring Locations
1. Tres Pinos Cr - Southside Road Bridge (West)
2. San Benito River - KT Road bridge
3. San Benito River - Hospital Road
4. San Benito River - Cienega Road
5. San Benito River - Nash Road
6. San Benito River - Old Highway 156
7. San Benito River - near Mitchell Road
8. San Benito River - near Flint Road
9. San Benito River - upstream of Bixby Road
10. San Benito River - Y Road
11. San Juan Creek - - Highway 156
12. San Juan Creek - Anzar Road
13. San Juan Creek - 2000 ft downstream of Highway101
14. Pacheco Creek - Walnut Avenue
15. Pacheco Creek - Highway 156
16. Pacheco Creek - Lovers Lane
17. Arroyo de las Viboras - Hawkins Ranch driveway
18. Arroyo de las Viboras - Fairview Road
19. Arroyo Dos Picachos - Fallon Road
20. Arroyo Dos Picachos - Aquistapace Road
21. Santa Ana Creek - Fairview Road
22. Santa Ana Creek - Fallon Road
23. Tequisquita Sough - San Felipe Road
24. Millers Canal - 2000 ft downstream of San Felipe Lake
25. Arroyo Dos Picachos - Lone Tree Road
26. Pajaro River - above Millers Canal
27. Pajaro River - Highway 25
28. Pajaro River - below Carnadero Creek
29. Carnadero Creek - above Pajaro River
30. Tres Pinos Creek - Bolado Park
152
101
25
156
San Juan Bautista
Hollister
Tres Pinos
Legend
Monitoring well
Surface water monitoring location
Generalized Calaveras Fault
0
10,000
Scale in Feet
N
Figure C-3
Monitoring Locations
December 2015
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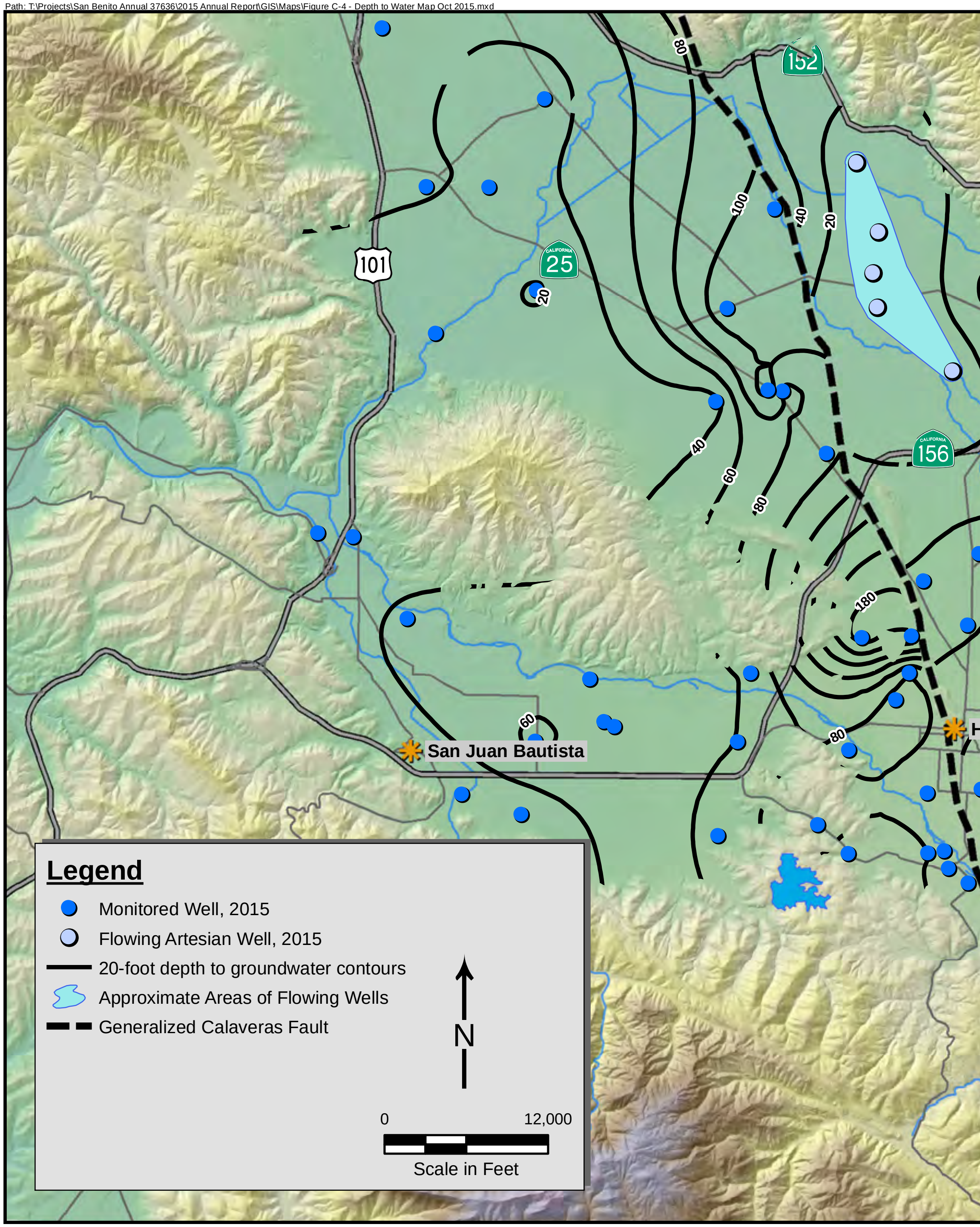


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**Figure C-4**
**Depth to Groundwater**
**October 2015**

Path: T:\Projects\San Benito Annual 37636\2015 Annual Report\GIS\Maps\Figure C-5 - Groundwater Elevation Map Oct 2014.mxd

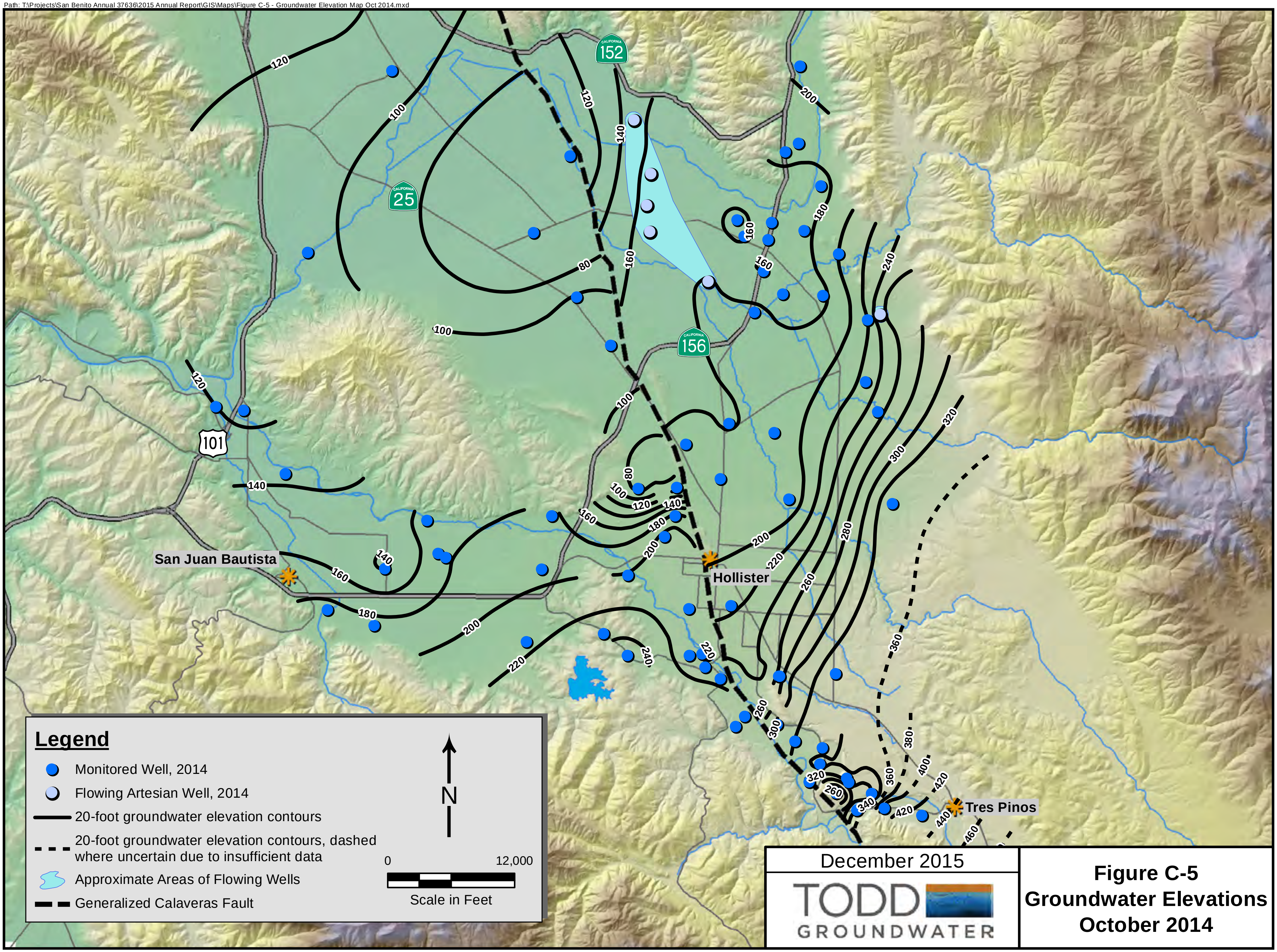
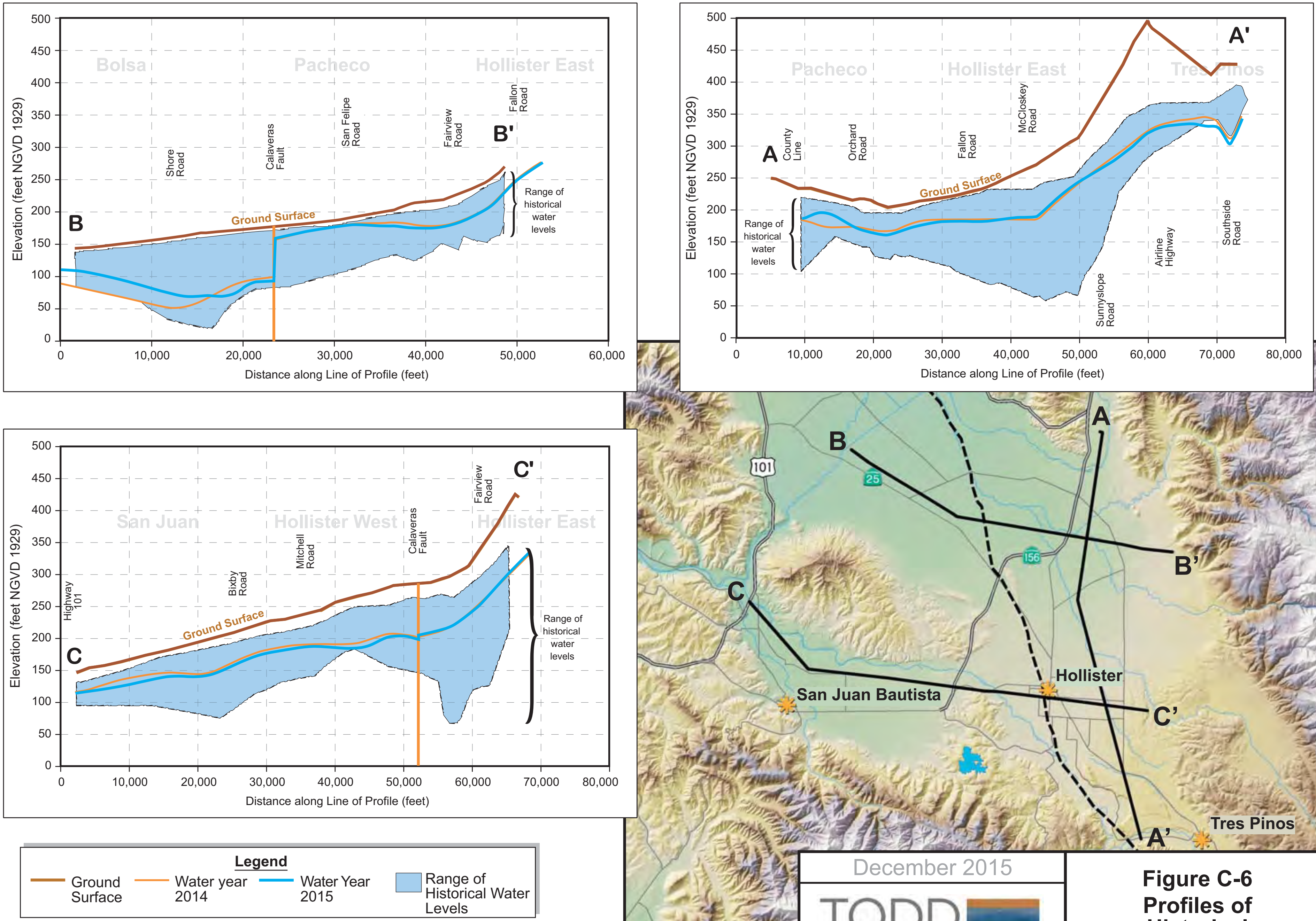



**Figure C-5**
**Groundwater Elevations**
**October 2014**




December 2015

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**Figure C-6**
**Profiles of Historical Groundwater Levels**

# D PERCOLATION DATA

## List of Tables and Figures

**Table D-1. Reservoir Water Budgets for Water Year 2015 (acre-feet)**

| | Hernandez | Paicines | San Justo |
|---|---|---|---|
| **Inflows** | | | |
| Rainfall | 7 | 6 | 146 |
| San Benito River | 338 | 0 | n.a. |
| Hernandez-Paicines transfer | n.a. | 0 | n.a. |
| San Felipe Project | n.a. | n.a. | 3,110 |
| **Total Inflows** | **345** | **6** | **3,255** |
| **Outflows** | | | |
| Hernandez spills | 0 | n.a. | n.a. |
| Hernandez-Paicines transfer | 0 | 0 | n.a. |
| Tres Pinos Creek percolation releases | n.a. | 0 | n.a. |
| San Benito River percolation releases | 0 | n.a. | n.a. |
| CVP Deliveries | n.a. | n.a. | 3,205 |
| Evaporation and seepage | 376 | 6 | 1,049 |
| **Total Outflows** | **376** | **6** | **4,253** |
| **Storage Change** | | | |
| Reservoir capacity | 17,200 | 2,870 | 10,308 |
| Maximum storage | 338 | 0 | 6,694 |
| Minimum storage | 323 | 0 | 3,206 |
| **Net water year storage change** | **-30** | **0** | **-997** |
| **Unaccounted for Water** | **0** | **0** | **1** |

**Table D-2. Historical Reservoir Releases (AFY)**

| WY | Hernandez | Paicines | TOTAL |
|---|---|---|---|
| 1996 | 13,535 | 6,139 | 19,674 |
| 1997 | 3,573 | 2,269 | 5,842 |
| 1998 | 26,302 | 450 | 26,752 |
| 1999 | 12,084 | 1,293 | 13,377 |
| 2000 | 13,246 | 2,326 | 15,572 |
| 2001 | 12,919 | 3,583 | 16,502 |
| 2002 | 9,698 | 310 | 10,008 |
| 2003 | 5,434 | - | 5,434 |
| 2004 | 3,336 | - | 3,336 |
| 2005 | 19,914 | 677 | 20,591 |
| 2006 | 14,112 | 196 | 14,308 |
| 2007 | 12,022 | 1,254 | 13,276 |
| 2008 | 7,646 | 495 | 8,141 |
| 2009 | 4,883 | - | 4,883 |
| 2010 | 8,484 | 4,147 | 12,631 |
| 2011 | 9,757 | 2,397 | 12,154 |
| 2012 | 6,341 | 1,321 | 7,662 |
| 2013 | 3,963 | 677 | 4,640 |
| 2014 | - | - | - |
| 2015 | - | - | - |
| **AVG** | **9,362** | **1,377** | **10,739** |

**Table D-3. Historical Percolation of CVP Water (AFY)**

| Water Year | Pacheco Creek | Arroyo de las Viboras | | | Arroyo Dos Picachos | | | Santa Ana Creek | | | | Tres Pinos Creek | San Benito River | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Road | Creek 1 | Creek 2 | Fallon Road | Jarvis Lane | Creek | John Smith Road | Maranatha Road | Airline Highway | Ridgemar k | | | |
| 1994 | 232 | 136 | 515 | 0 | 0 | 550 | 209 | 0 | 0 | 0 | 0 | 85 | 158 | **1,885** |
| 1995 | 444 | 238 | 770 | 2 | 0 | 654 | 622 | 73 | 0 | 0 | 0 | 809 | 2,734 | **6,345** |
| 1996 | 0 | 494 | 989 | 832 | 67 | 235 | 708 | 531 | 197 | 134 | 25 | 21 | 6,097 | **10,330** |
| 1997 | 0 | 447 | 601 | 1,981 | 77 | 0 | 200 | 17 | 353 | 286 | 29 | 1,477 | 5,619 | **11,087** |
| 1998 | 0 | 132 | 109 | 403 | 0 | 0 | 0 | 65 | 0 | 158 | 74 | 518 | 1,084 | **2,543** |
| 1999 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 256 | 48 | 141 | 10 | 452 | 413 | **1,322** |
| 2000 | 1 | 0 | 0 | 6 | 0 | 0 | 3 | 236 | 21 | 240 | 12 | 285 | 938 | **1,740** |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 161 | 17 | 186 | 1 | 703 | 1,041 | **2,110** |
| 2002 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 78 | 2 | 143 | 0 | 426 | 470 | **1,122** |
| 2003 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 119 | 9 | 172 | 0 | 163 | 605 | **1,074** |
| 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 83 | 0 | 0 | 0 | 1 | 882 | **1,018** |
| 2005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 527 | **527** |
| 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 156 | 0 | 0 | 0 | 1 | 451 | **614** |
| 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 216 | **304** |
| 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | **6** |
| 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2014 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2015 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |

**Table D-4. Percolation of Municipal Wastewater during Water Year 2015**

| | Pond Area[1] (acres) | Effluent Discharge (acre-feet) | Evaporation[2] (acre-feet) | Percolation (acre-feet) |
|---|---|---|---|---|
| Hollister - domestic* | 92.9 | 2,082 | 266 | 1,816 |
| Hollister - industrial* | 39.0 | 456 | 112 | 344 |
| Ridgemark Estates I & II | 7.2 | 182 | 21 | 161 |
| Tres Pinos[3] | 1.8 | 26 | 5 | 21 |
| Total | 141 | 2,746 | 404 | 2,342 |

Notes:

1. Hollister pond areas are from Dickson and Kenneth D. Schmidt and Associates (1999) and include treatment ponds in addition to percolation ponds at the domestic wastewater treatment plant. Assumes 80% of total pond area in use at any time (Rose, pers. comm.). These areas should be updated as operations change.
2. Average evaporation less precip = 43 inches (56 in/yr evaporation (DWR Bulletin 73-79) less 13 in/yr precip (CIMIS)
3. Values for Tres Pinos were based on WY 2008 values, as current data was not available

The San Juan Bautista plant is not included because the unnamed tributary of San Juan Creek that receives its effluent usually gains flow along the affected reach and is on the southwest side of the San Andreas Fault. These conditions prevent the effluent from recharging the San Juan Subbasin.

**Table D-5. Historical Percolation of Municipal Wastewater (AFY)**

| | Hollister Reclamation Plant - Domestic | Hollister - industrial | Ridgemark Estates I & II | Tres Pinos | TOTAL |
|---|---|---|---|---|---|
| 1994 | 1,775 | 665 | 155 | 5 | 2,600 |
| 1995 | 1,935 | 610 | 180 | 10 | 2,735 |
| 1996 | 2,020 | 689 | 207 | 14 | 2,930 |
| 1997 | 1,965 | 909 | 201 | 17 | 3,092 |
| 1998 | 2,490 | 518 | 231 | 17 | 3,256 |
| 1999 | 1,693 | 1,476 | 156 | 12 | 3,337 |
| 2000 | 2,110 | 1,136 | 293 | 24 | 3,563 |
| 2001 | 1,742 | 1,078 | 303 | 24 | 3,147 |
| 2002 | 1,884 | 1,545 | 283 | 24 | 3,736 |
| 2003 | 2,009 | 1,432 | 279 | 24 | 3,744 |
| 2004 | 1,787 | 1,536 | 268 | 21 | 3,612 |
| 2005 | 1,891 | 1,323 | 227 | 26 | 3,468 |
| 2006 | 1,797 | 1,211 | 216 | 33 | 3,257 |
| 2007 | 1,740 | 1,228 | 139 | 19 | 3,126 |
| 2008 | 1,580 | 1,257 | 139 | 19 | 2,996 |
| 2009 | 1,976 | 428 | 172 | 19 | 2,594 |
| 2010 | 1,922 | 37 | 172 | 19 | 2,150 |
| 2011 | 1,807 | 466 | 183 | 19 | 2,476 |
| 2012 | 1,740 | 605 | 177 | 19 | 2,541 |
| 2013* | 889 | 332 | 188 | 21 | 1,430 |
| 2014 | 1,552 | 86 | 179 | 21 | 1,838 |
| 2015 | 1,816 | 344 | 161 | 21 | 2,342 |

* Hollister WW data for 2013 updated with new data

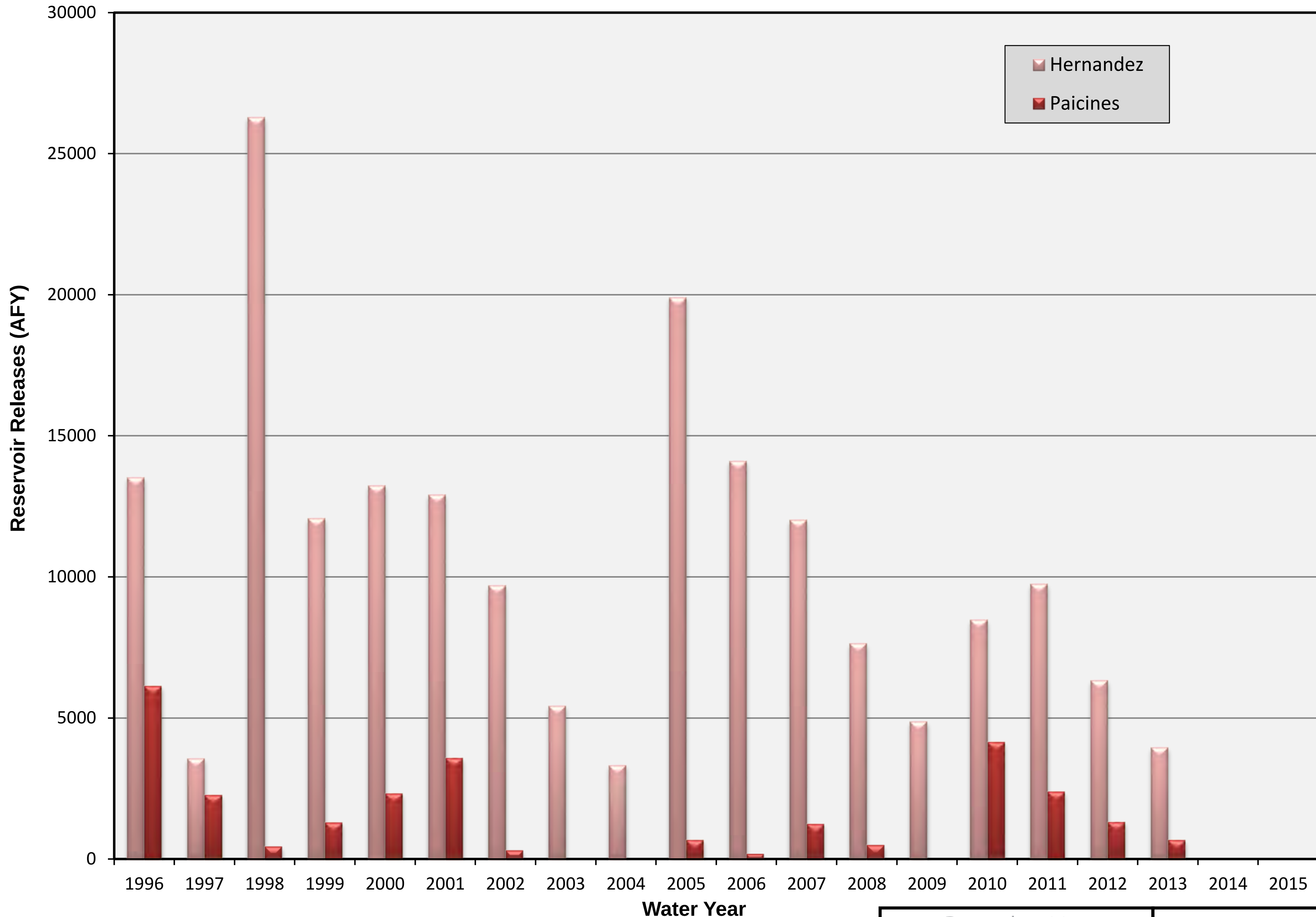


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**Figure D-1**
**Reservoir Releases for Percolation**

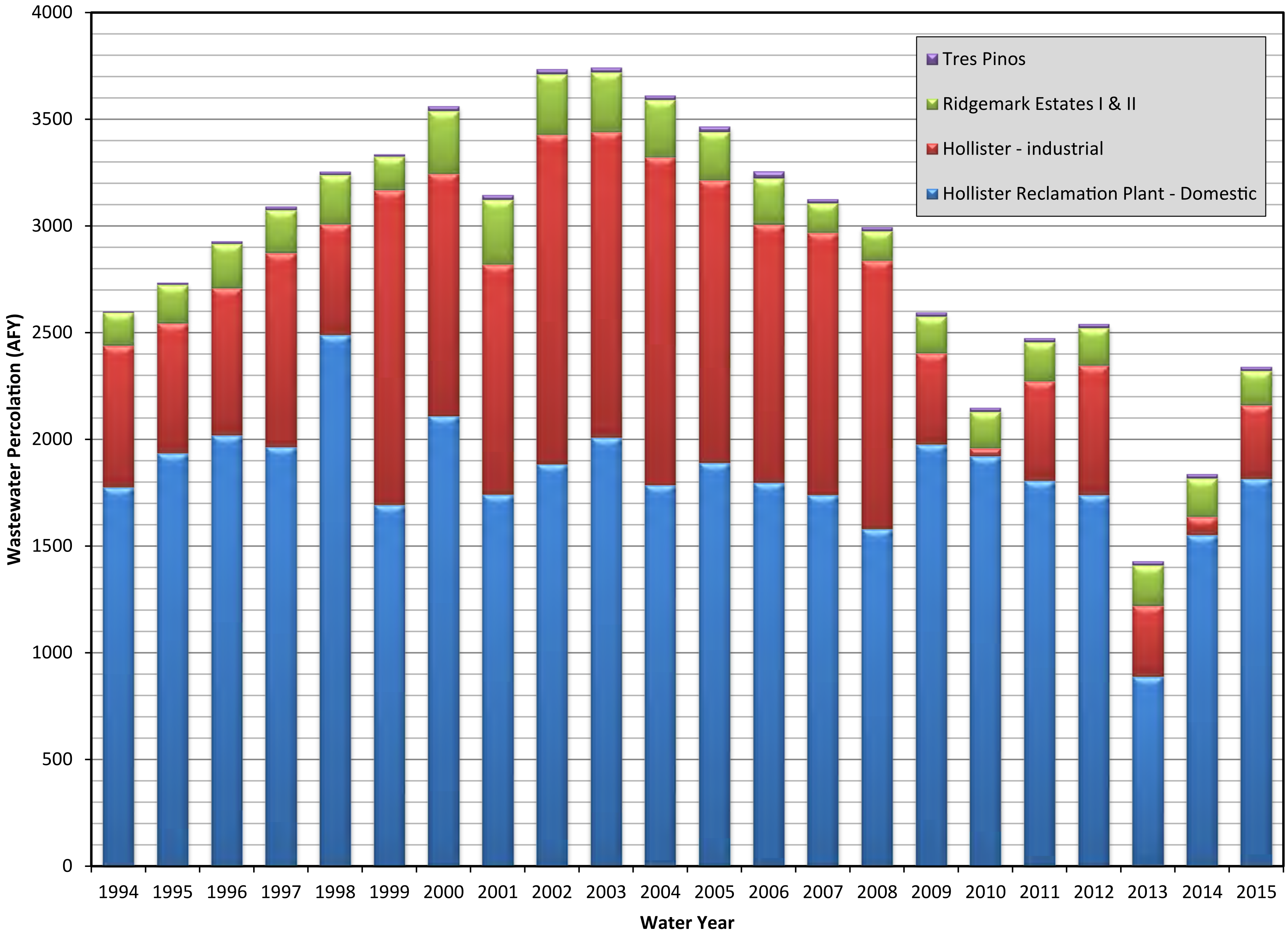


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**Figure D-2**
**Wastewater Percolation by Facility**

# E WATER USE DATA

List of Tables and Figures

**Table E-1. Recent CVP Allocation and Use**

| | Municipal and Industrial (M&I) CVP | | | | Agricultural CVP | | | |
|---|---|---|---|---|---|---|---|---|
| Water Year | Percent of Contract Allocation | Percent of Historic Average | Contract Amount Used (AF) | Contract Amount Used (%) | Percent of Contract Allocation | Percent of Contract and M&I Adjustment[1] | Contract Amount Used (AF) | Contract Amount Used (%) |
| | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | |
| **2006** | 100% | | 3,152 | 38% | 100% | | 19,840 | 56% |
| **2007** | 100% | | 4,969 | 60% | 40% | | 18,865 | 53% |
| **2008** | 37% | 75% | 2,232 | 27% | 40% | 45% | 10,514 | 30% |
| **2009** | 29% | 60% | 1,978 | 24% | 10% | 11% | 6,439 | 18% |
| **2010** | 37% | 75% | 2,197 | 27% | 45% | 50% | 10,061 | 28% |
| **2011** | 100% | | 2,433 | 29% | 80% | | 16,234 | 46% |
| **2012** | 51% | 75% | 2,683 | 33% | 40% | 40% | 17,267 | 49% |
| **2013** | 47% | 70% | 2,652 | 32% | 20% | 22% | 12,914 | 36% |
| **2014** | 34% | 50% | 1,599 | 29% | 0% | 0% | 7,545 | 21% |
| **2015** | 25% | 25% | 1,810 | 22% | 0% | 0% | 3,697 | 10% |

Notes:

[1] If the M&I allocation is 75 percent or less, the difference between the M&I contract amount and M&I allocation is added to the agricultural contract amount. The agricultural percentage is multiplied by that sum to obtain the agricultural allocation.

**Table E-2. Historical Water Use by Subbasin and Water Source (AFY)**

| Subbasin | Pacheco | | Bolsa Southeast | | San Juan | | Hollister West | | Hollister East | | Tres Pinos | | Total Zone 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source | GW | CVP | GW | CVP | GW | CVP | GW | CVP | GW | CVP | GW | CVP | GW | CVP | RW |
| 1993 | 2,251 | 3,210 | 3,474 | 533 | 9,278 | 4,300 | 7,213 | 90 | 3,744 | 7,275 | 5,658 | 224 | 31,618 | 15,633 | - |
| 1994 | 3,748 | 3,394 | 3,467 | 602 | 10,859 | 3,836 | 7,327 | 87 | 5,475 | 6,808 | 5,294 | 263 | 36,169 | 14,990 | - |
| 1995 | 2,756 | 3,474 | 2,855 | 720 | 9,328 | 4,554 | 7,092 | 460 | 3,428 | 6,647 | 4,475 | 275 | 29,935 | 16,130 | - |
| 1996 | 2,533 | 3,500 | 2,682 | 782 | 8,726 | 5,187 | 5,717 | 679 | 3,396 | 8,267 | 3,695 | 408 | 26,748 | 18,823 | - |
| 1997 | 2,209 | 4,205 | 2,755 | 997 | 9,587 | 6,191 | 7,602 | 907 | 3,534 | 8,284 | 4,620 | 466 | 30,307 | 21,048 | - |
| 1998 | 2,035 | 2,165 | 1,561 | 361 | 6,963 | 4,099 | 4,991 | 591 | 4,037 | 5,291 | 3,751 | 289 | 23,338 | 12,796 | - |
| 1999 | 2,553 | 3,219 | 2,453 | 433 | 9,312 | 5,990 | 7,013 | 726 | 3,701 | 7,279 | 4,199 | 391 | 29,231 | 18,038 | - |
| 2000 | 2,270 | 3,256 | 2,418 | 355 | 8,681 | 6,372 | 7,590 | 869 | 3,108 | 7,279 | 4,006 | 542 | 28,073 | 18,673 | - |
| 2001 | 1,848 | 3,443 | 2,126 | 411 | 7,977 | 7,232 | 7,377 | 685 | 2,213 | 7,010 | 3,599 | 621 | 25,140 | 19,402 | - |
| 2002 | 2,322 | 3,840 | 2,193 | 497 | 7,571 | 7,242 | 6,577 | 706 | 2,588 | 7,390 | 3,994 | 737 | 25,244 | 20,411 | - |
| 2003 | 2,425 | 3,277 | 2,175 | 493 | 7,434 | 7,127 | 6,222 | 720 | 1,897 | 9,329 | 2,805 | 788 | 22,958 | 21,734 | - |
| 2004 | 2,461 | 3,607 | 2,405 | 740 | 8,121 | 7,357 | 4,971 | 614 | 2,321 | 10,726 | 3,204 | 966 | 23,484 | 24,010 | - |
| 2005 | 1,320 | 3,106 | 1,849 | 514 | 6,608 | 6,245 | 5,084 | 680 | 2,586 | 9,198 | 2,378 | 642 | 19,825 | 20,384 | - |
| 2006 | 1,208 | 3,495 | 1,864 | 661 | 6,741 | 7,200 | 4,633 | 579 | 2,555 | 10,253 | 2,537 | 803 | 19,538 | 22,992 | - |
| 2007 | 1,034 | 3,832 | 2,005 | 572 | 7,658 | 6,160 | 5,118 | 553 | 3,867 | 10,194 | 2,908 | 804 | 22,590 | 22,115 | - |
| 2008 | 1,900 | 1,568 | 2,014 | 333 | 7,796 | 3,160 | 4,375 | 399 | 3,962 | 6,792 | 2,743 | 493 | 22,789 | 12,745 | - |
| 2009 | 3,370 | 1,257 | 2,082 | 179 | 11,956 | 1,605 | 4,186 | 19 | 4,733 | 4,697 | 2,871 | 447 | 29,199 | 8,204 | - |
| 2010 | 2,553 | 1,771 | 1,897 | 207 | 9,561 | 3,452 | 4,081 | 10 | 4,460 | 6,056 | 1,686 | 488 | 24,238 | 11,984 | 151 |
| 2011 | 1,992 | 2,420 | 2,781 | 229 | 4,987 | 5,623 | 3,940 | 394 | 1,947 | 9,575 | 2,454 | 427 | 18,102 | 18,667 | 183 |
| 2012 | 3,723 | 2,652 | 1,556 | 288 | 5,782 | 5,976 | 4,298 | 549 | 2,004 | 9,917 | 2,492 | 568 | 19,855 | 19,949 | 230 |
| 2013* | 4,157 | 1,976 | 2,348 | 292 | 11,044 | 4,134 | 5,656 | 374 | 5,430 | 8,224 | 2,452 | 565 | 31,087 | 15,566 | 357 |
| 2014 | 3,303 | 1,020 | 2,157 | 32 | 10,018 | 1,984 | 7,227 | 233 | 4,872 | 5,490 | 3,014 | 384 | 30,592 | 9,144 | 262 |
| 2015 | 4,279 | 555 | 2,401 | 20 | 12,739 | 975 | 4,730 | 148 | 7,230 | 3,568 | 2,948 | 241 | 34,327 | 5,507 | 101 |
| AVG 03-15 | 2,594 | 2,349 | 2,118 | 351 | 8,496 | 4,692 | 4,963 | 406 | 3,682 | 8,002 | 2,653 | 586 | 24,506 | 16,385 | 99 |

GW = groundwater, CVP = Central Valley Project, RW = recycled water

* Hollister RW data updated for 2013 based on new data

**Table E-3. Recent Water Use by Subbasin and User Type, not including recycled water (AFY)**

| SUBBASIN | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Agriculture** | | | | | | | | | | | |
| Bolsa SE | 2,352 | 2,517 | 2,570 | 2,334 | 2,252 | 2,103 | 3,004 | 1,837 | 2,635 | 2,180 | 2,417 |
| Hollister East | 8,543 | 9,526 | 10,685 | 8,012 | 6,860 | 8,315 | 9,067 | 9,453 | 10,832 | 8,151 | 8,464 |
| Hollister West | 2,128 | 1,936 | 2,145 | 1,509 | 1,708 | 1,888 | 2,190 | 2,228 | 3,324 | 2,584 | 2,750 |
| Pacheco | 4,190 | 4,469 | 4,573 | 3,220 | 4,304 | 4,242 | 4,279 | 6,148 | 5,990 | 4,121 | 4,658 |
| San Juan | 11,496 | 12,622 | 12,185 | 9,581 | 12,397 | 11,960 | 10,009 | 10,964 | 14,376 | 11,183 | 13,123 |
| Tres Pinos | 800 | 1,004 | 954 | 655 | 670 | 640 | 471 | 641 | 652 | 514 | 1,513 |
| TOTAL | 29,509 | 32,074 | 33,112 | 25,310 | 28,192 | 29,148 | 29,020 | 30,980 | 37,810 | 28,734 | 32,926 |
| **M&I** | | | | | | | | | | | |
| Bolsa SE | 12 | 8 | 7 | 13 | 9 | 0 | 6 | 6 | 4 | 9 | 5 |
| Hollister East | 3,241 | 3,280 | 3,203 | 2,742 | 2,570 | 2,201 | 2,455 | 2,469 | 2,822 | 2,211 | 2,334 |
| Hollister West | 3,636 | 3,168 | 3,361 | 3,265 | 2,710 | 2,477 | 2,144 | 2,619 | 2,705 | 4,876 | 2,128 |
| Pacheco | 235 | 234 | 293 | 248 | 323 | 83 | 133 | 227 | 144 | 203 | 176 |
| San Juan | 1,356 | 1,320 | 1,640 | 1,375 | 1,164 | 1,053 | 601 | 793 | 803 | 820 | 590 |
| Tres Pinos | 2,220 | 2,336 | 2,748 | 2,581 | 2,648 | 3,048 | 2,410 | 2,710 | 2,365 | 2,884 | 1,676 |
| TOTAL | 10,700 | 10,345 | 11,252 | 10,225 | 9,424 | 8,862 | 7,749 | 8,825 | 8,843 | 11,002 | 6,909 |

**Table E-4. Historical Water Use by User Type (AFY)**

| WY | Agricultural | Municipal, and Industrial | Total | % Ag |
|---|---|---|---|---|
| 1988 | 45,366 | 5,152 | 50,518 | 90% |
| 1989 | 32,387 | 6,047 | 38,434 | 84% |
| 1990 | 49,663 | 5,725 | 55,388 | 90% |
| 1991 | 46,640 | 7,631 | 54,271 | 86% |
| 1992 | 32,210 | 6,912 | 39,122 | 82% |
| 1993 | 38,878 | 5,066 | 43,944 | 88% |
| 1994 | 41,854 | 7,186 | 49,040 | 85% |
| 1995 | 36,399 | 8,272 | 44,671 | 81% |
| 1996 | 39,575 | 8,338 | 47,913 | 83% |
| 1997 | 41,482 | 11,117 | 52,599 | 79% |
| 1998 | 27,526 | 8,650 | 36,176 | 76% |
| 1999 | 37,203 | 10,110 | 47,313 | 79% |
| 2000 | 36,062 | 10,811 | 46,873 | 77% |
| 2001 | 34,035 | 10,687 | 44,722 | 76% |
| 2002 | 34,354 | 11,347 | 45,701 | 75% |
| 2003 | 33,533 | 11,206 | 44,739 | 75% |
| 2004 | 35,597 | 11,944 | 47,541 | 75% |
| 2005 | 29,509 | 10,700 | 40,209 | 73% |
| 2006 | 32,074 | 10,345 | 42,419 | 76% |
| 2007 | 33,112 | 11,252 | 44,364 | 75% |
| 2008 | 25,310 | 10,225 | 35,535 | 71% |
| 2009 | 28,192 | 9,424 | 37,616 | 75% |
| 2010 | 29,148 | 8,862 | 38,010 | 77% |
| 2011 | 29,020 | 7,749 | 36,769 | 79% |
| 2012 | 31,270 | 8,825 | 40,095 | 78% |
| 2013 | 37,810 | 8,843 | 46,653 | 81% |
| 2014 | 28,734 | 11,226 | 39,960 | 72% |
| 2015 | 32,926 | 7,010 | 39,935 | 82% |
| AVERAGE | **34,995** | **8,952** | **43,947** | **79%** |

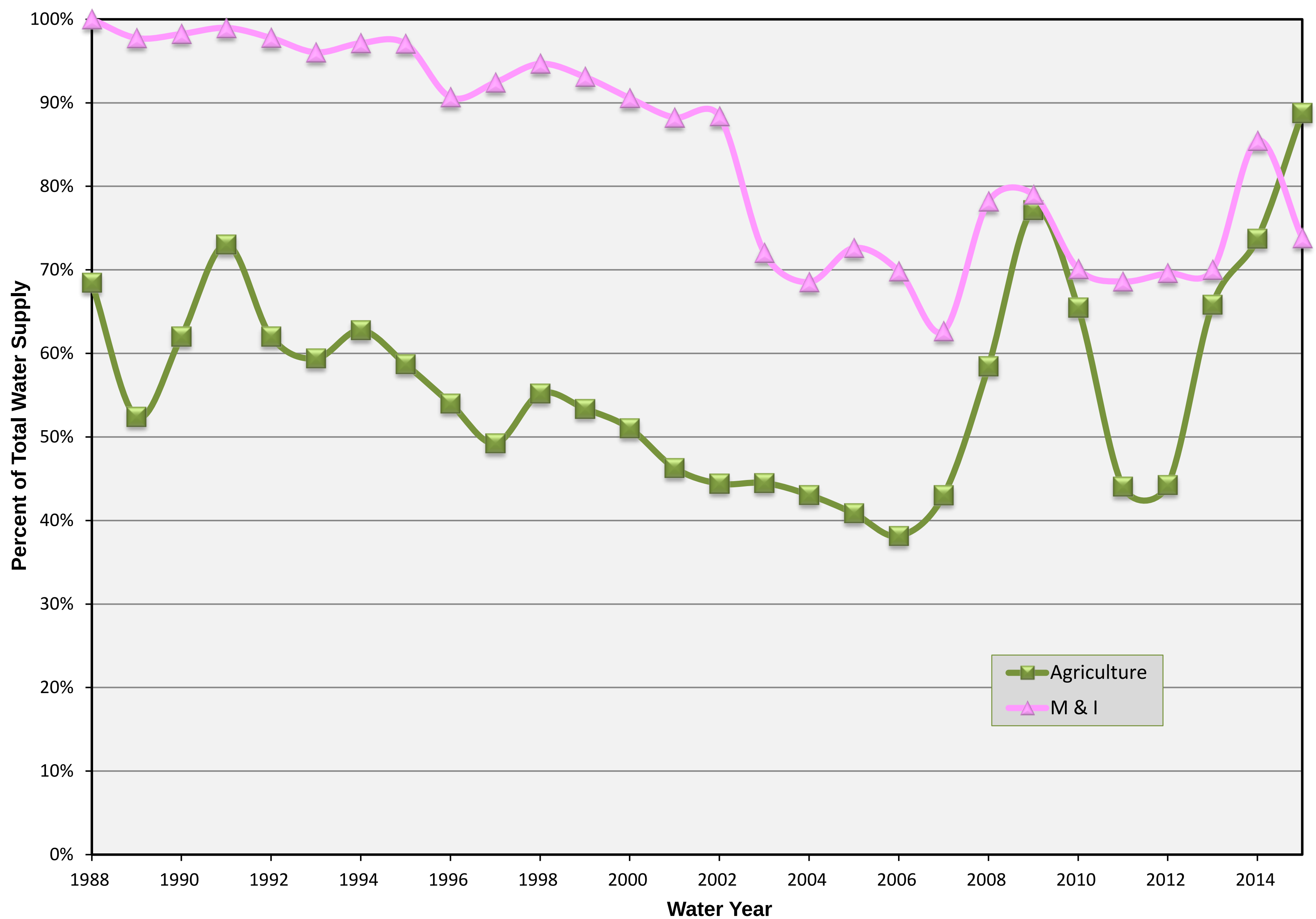
**Table E-5. Municipal Water Use by Purveyor for Water Year 2015(AF)**

| | WY 2015 | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Groundwater | | | | | | | | | | | | | |
| Sunnyslope CWD | **1,348** | 188 | 108 | 114 | 48 | 39 | 65 | 114 | 118 | 122 | 137 | 154 | 142 |
| City of Hollister | **1,960** | 310 | 222 | 110 | 96 | 70 | 124 | 138 | 141 | 169 | 194 | 224 | 162 |
| City of Hollister - Cienega Wells | **114** | 11 | 9 | 10 | 10 | 9 | 9 | 10 | 9 | 9 | 9 | 9 | 9 |
| San Juan Bautista | **225** | 22 | 16 | 13 | 12 | 15 | 18 | 19 | 18 | 19 | 26 | 23 | 24 |
| Tres Pinos CWD | **49** | 4 | 4 | 3 | 3 | 3 | 2 | 3 | 4 | 5 | 5 | 4 | 8 |
| **Groundwater Subtotal** | **3,696** | **535** | **358** | **251** | **168** | **135** | **220** | **283** | **291** | **324** | **372** | **415** | **344** |
| CVP Imported Water | | | | | | | | | | | | | |
| Lessalt Treatment Plant | **1,364** | 0 | 0 | 36 | 144 | 160 | 179 | 141 | 157 | 139 | 144 | 143 | 121 |
| **Imported Water Subtotal** | **1,364** | **-** | **-** | **36** | **144** | **160** | **179** | **141** | **157** | **139** | **144** | **143** | **121** |
| Municipal Total | | | | | | | | | | | | | |
| **Municipal Water Supply Total** | **5,060** | **535** | **358** | **287** | **312** | **295** | **399** | **425** | **448** | **462** | **515** | **558** | **465** |

**Table E-6. Historical Municipal Water Use by Purveyor (AFY)**

| WY | Sunnyslope CWD - GW | City of Hollister - GW | City of Hollister - Cienega Wells[1] | San Juan Bautista | Tres Pinos CWD | Lessalt Treatment Plant | Undivided Total | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 1988 | | | | | | 0 | 5,152 | **5,152** |
| 1989 | | | | | | 0 | 6,047 | **6,047** |
| 1990 | | | | | | 0 | 5,725 | **5,725** |
| 1991 | | | | | | 0 | 7,631 | **7,631** |
| 1992 | | | | | | 0 | 6,912 | **6,912** |
| 1993 | | | | | | 0 | 5,066 | **5,066** |
| 1994 | | | | | | 0 | 7,186 | **7,186** |
| 1995 | 2,167 | 2,446 | | | | 0 | | **4,613** |
| 1996 | 2,139 | 3,386 | | | | 0 | | **5,525** |
| 1997 | 2,638 | 3,848 | | | | 0 | | **6,486** |
| 1998 | 2,357 | 3,441 | | | | 0 | | **5,798** |
| 1999 | 2,820 | 3,558 | | | | 0 | | **6,378** |
| 2000 | 3,214 | 4,021 | | | | 0 | | **7,235** |
| 2001 | 3,290 | 3,851 | | | | 0 | | **7,141** |
| 2002 | 3,256 | 4,120 | | | | 21 | | **7,398** |
| 2003 | 2,053 | 2,754 | | | | 2,494 | | **7,302** |
| 2004 | 2,426 | 2,828 | | | | 2,101 | | **7,356** |
| 2005 | 1,959 | 3,147 | 123 | 247 | 49 | 1,843 | | **7,368** |
| 2006 | 1,907 | 2,801 | 123 | 150 | 49 | 1,900 | | **6,930** |
| 2007 | 2,413 | 2,758 | 123 | 47 | 49 | 1,719 | | **7,108** |
| 2008 | 2,294 | 2,746 | 123 | 417 | 47 | 1,323 | | **6,949** |
| 2009 | 2,251 | 2,503 | 123 | 373 | 47 | 1,212 | | **6,509** |
| 2010 | 1,861 | 2,194 | 108 | 308 | 47 | 1,344 | | **5,861** |
| 2011 | 2,225 | 1,651 | 80 | 292 | 47 | 1,593 | | **5,887** |
| 2012 | 2,360 | 1,761 | 130 | 267 | 45 | 1,657 | | **6,219** |
| 2013 | 1,655 | 2,655 | 120 | 281 | 46 | 1,648 | | **6,405** |
| 2014 | 2,134 | 2,646 | 114 | 285 | 49 | 979 | | **6,207** |
| 2015 | 1,348 | 1,960 | 114 | 225 | 49 | 1,364 | | **5,060** |

1. Data from Hollister Cienega Wells for 2005-2008 was estimated to be the same as WY 2009
Cells with no data indicate that the information is unavailable, while years with no use are shown explicitly as 0's.




December 2015

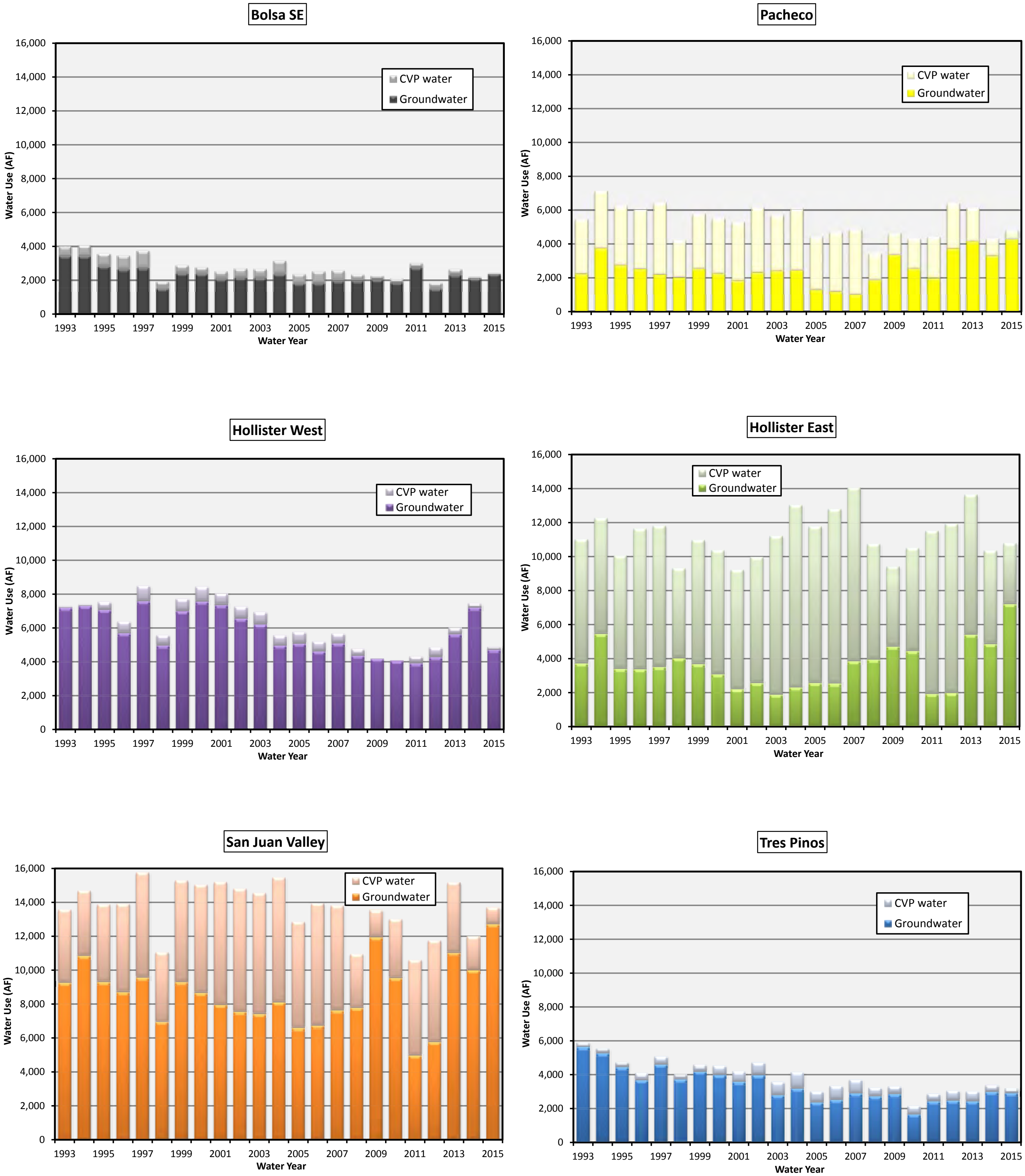
TODD GROUNDWATER

**Figure E-1**
**Groundwater Percentage of Total Water Use**


December 2015

TODD GROUNDWATER

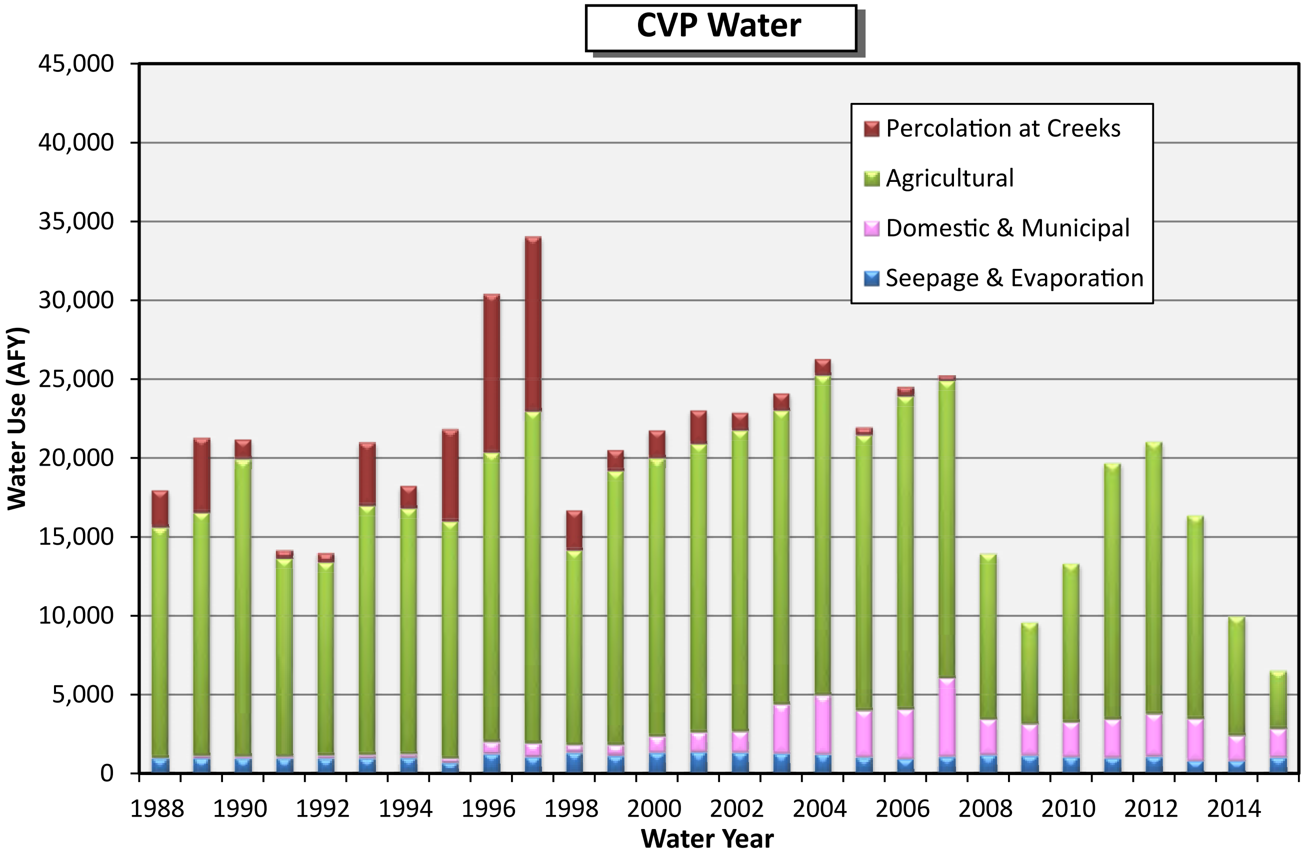
**Figure E-2**
**Water Use in Zone 6 by User Category**

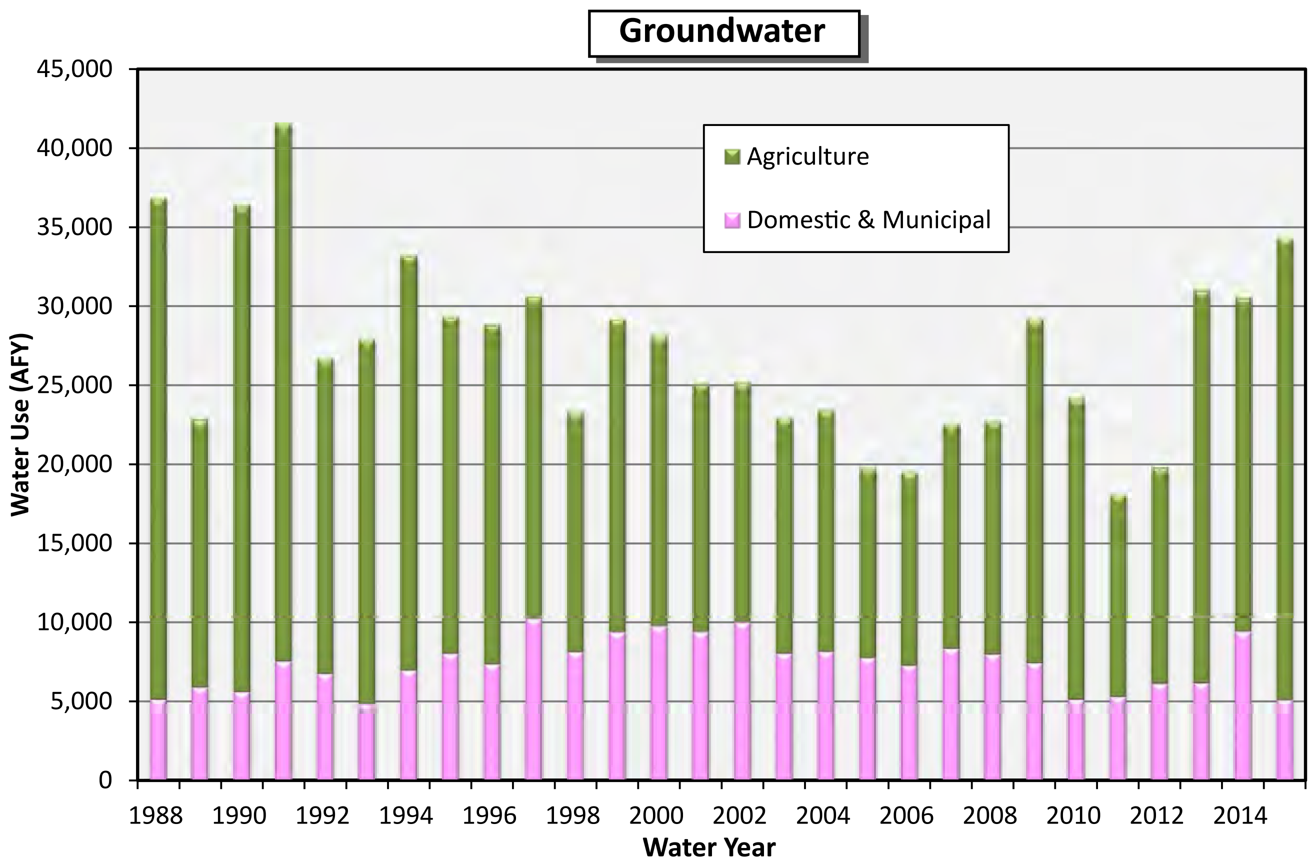



December 2015

TODD GROUNDWATER

**Figure E-3**
**Total Subbasin Water Use by Water Type**

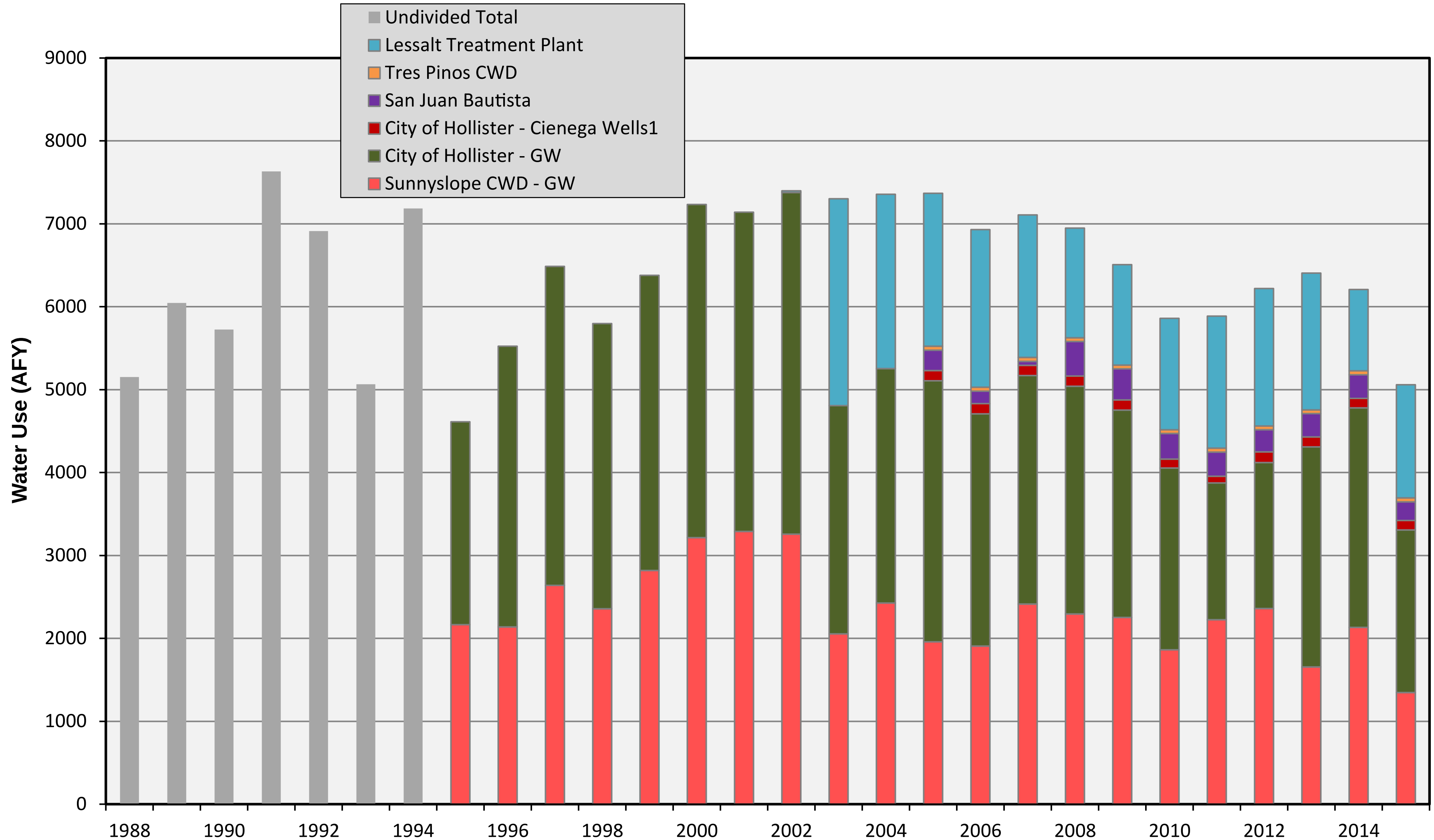



December 2015

TODD GROUNDWATER

**Figure E-4**
**Annual Total of CVP and Groundwater by Use**




December 2015

TODD GROUNDWATER

**Figure E-5**
**Municipal Water Use by Purveyor**

# F RATES AND CHARGES

## List of Tables and Figures

**Table F-1. Historical and Current San Benito County Water District CVP (Blue Valve) Water Rates (dollars/af)**

| USBR Water Year | Standby & Availability Charge (dollars/acre) | Water Charge | | Power Charge | | | | | Groundwater Charge (dollars/af) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agricultural | Municipal & Industrial | Distribution Subsystem | | | | | Agricultural | Municipal & Industrial | |
| | | | | 2 | 6H | 9L | 9H | Others | | | |
| 1987 | $8.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | |
| 1988 | $2.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | |
| 1991 | $4.00 | $38.00 | $110.00 | | | | | | $6.25 | $22.00 | |
| 1992 | $4.00 | $45.00 | $120.00 | | | | | | $2.00 | $10.00 | |
| 1994 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $5.00 | |
| 1995 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $15.75 | First 100 af |
| | | | | | | | | | | $36.70 | Next 500 af |
| | | | | | | | | | | $54.60 | Over 600 af |
| 1996 | $6.00 | $75.00 | $150.00 | | | | | | $1.50 | $33.00 | |
| 1997 | $6.00 | $75.00 | $157.00 | | | | | | $1.50 | $33.00 | |
| 1998 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $33.00 | |
| 2000 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $11.50 | |
| 2001 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $25.00 | |
| 2004 | $6.00 | $75.00 | $150.00 | $24.30 | $46.75 | $25.05 | $53.70 | $15.25 | $1.50 | $10.00 | |
| 2005 | $6.00 | $80.00 | $150.00 | $26.15 | $49.40 | $35.00 | $66.90 | $17.10 | $1.50 | $21.50 | |
| 2006 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | |
| 2007 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | |
| 2008 | $6.00 | $100.00 | $170.00 | $17.25 | $19.40 | $32.60 | $62.75 | $14.85 | $1.50 | $21.50 | |
| 2009 | $6.00 | $115.00 | $180.00 | $17.50 | $20.25 | $42.55 | $74.85 | $16.30 | $2.50 | $22.50 | |
| 2010 | $6.00 | $135.00 | $200.00 | $22.00 | $27.30 | $49.75 | $84.35 | $21.75 | $2.50 | $22.50 | |
| 2011 | $6.00 | $155.00 | $220.00 | $22.70 | $28.15 | $51.25 | $86.90 | $22.40 | $2.50 | $22.50 | |
| 2012 | $6.00 | $170.00 | $235.00 | $23.35 | $29.00 | $52.80 | $89.50 | $23.10 | $2.50 | $22.50 | |
| 2013 | $6.00 | $170.00 | $235.00 | $40.30 | $29.25 | $43.05 | $91.55 | $22.40 | $3.25 | $23.25 | |
| 2014 | $6.00 | $170.00 | $238.00 | $41.55 | $30.15 | $44.35 | $94.30 | $23.10 | $3.60 | $23.25 | |
| 2015 | $6.00 | $179.00 | $247.00 | $42.75 | $31.05 | $45.70 | $97.15 | $23.80 | $3.95 | $23.25 | |

Notes:

af = acre-feet.
n.c. = no classification.
n.i. = not implemented
All rates effective March 1 through following February.

**Table F-2. Recent US Bureau of Reclamation Charges per Acre-Foot for CVP Water**

| | Irrigation[1] | | | | | | Municipal & Industrial | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| User Category and Cost Item | Cost of service (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] | Cost of service[2] (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] |
| 1994 | $71.68 | $6.20 | n.a. | | $77.88 | $17.21 | $165.67 | $12.40 | n.a. | | $178.07 | $85.86 |
| 1995 | $66.47 | $6.35 | n.a. | | $72.82 | $17.21 | $132.90 | $12.69 | n.a. | | $145.59 | $85.86 |
| 1996 | $65.63 | $6.53 | n.a. | | $72.16 | $27.46 | $127.40 | $13.06 | n.a. | | $140.46 | $85.86 |
| 1997 | $69.57 | $6.70 | n.a. | | $76.27 | $27.46 | $143.27 | $13.39 | n.a. | | $156.66 | $85.86 |
| 1998 | $61.58 | $6.88 | $5.00 | | $73.46 | $27.46 | $130.88 | $13.76 | $5.00 | | $149.64 | $85.86 |
| 1999 | $60.30 | $6.98 | $2.73 | | $70.01 | $27.46 | $127.91 | $13.96 | $2.73 | | $144.60 | $85.86 |
| 2000 | $64.24 | $7.10 | $6.43 | | $77.77 | $27.46 | $129.59 | $14.20 | $6.43 | | $150.22 | $85.86 |
| 2001 | $69.50 | $7.28 | $2.65 | | $79.43 | $27.46 | $129.40 | $14.56 | $4.15 | | $148.11 | $85.86 |
| 2002 | $68.71 | $7.54 | $6.61 | | $82.86 | $24.30 | $130.32 | $15.08 | $6.61 | | $152.01 | $79.13 |
| 2003 | $72.20 | $7.69 | $5.46 | | $85.35 | $24.30 | $129.07 | $15.38 | $5.46 | | $149.91 | $79.13 |
| 2004 | $74.52 | $7.82 | $6.61 | | $88.95 | $24.30 | $134.86 | $15.64 | $6.61 | | $157.11 | $79.13 |
| 2005 | $77.10 | $7.93 | $7.99 | | $93.02 | $24.30 | $132.01 | $15.87 | $7.99 | | $155.87 | $79.13 |
| 2006 | $91.13 | $8.24 | $9.31 | | $108.68 | $30.93 | $214.41 | $16.49 | $9.31 | | $240.21 | $77.12 |
| 2007 | $93.53 | $8.58 | $9.99 | $0.11 | $112.21 | $30.93 | $215.32 | $17.15 | $9.99 | $0.11 | $242.46 | $80.08 |
| 2008[6] | $28.12 | $8.79 | $10.95 | $0.07 | $47.93 | $30.93 | $33.34 | $17.57 | $10.95 | $0.07 | $61.68 | $33.34 |
| 2009 | $30.20 | $9.06 | $11.49 | $0.07 | $50.82 | $30.20 | $32.77 | $18.12 | $11.49 | $0.07 | $62.45 | $32.77 |
| 2010 | $33.27 | $9.11 | $11.91 | $0.11 | $54.40 | $33.27 | $36.11 | $18.23 | $11.91 | $0.11 | $66.36 | $36.11 |
| 2011 | $38.92 | $9.29 | $9.51 | $0.05 | $57.77 | $38.92 | $42.58 | $18.59 | $9.51 | $0.05 | $70.73 | $42.58 |
| 2012 | $39.71 | $9.39 | $15.20 | $0.05 | $64.35 | $39.71 | $37.95 | $18.78 | $15.20 | $0.05 | $71.98 | $37.95 |
| 2013 | $40.39 | $9.79 | $17.29 | $0.05 | $67.52 | $39.91 | $38.71 | $19.58 | $17.29 | $0.05 | $75.63 | $40.92 |
| 2014 | $46.87 | $9.99 | $28.81 | $0.23 | $85.90 | $46.87 | $29.70 | $19.98 | $28.81 | $0.23 | $78.72 | $29.70 |
| 2015 | $53.82 | $10.07 | $30.66 | $0.23 | $94.78 | $53.82 | $34.74 | $20.14 | $30.66 | $0.23 | $85.77 | $34.74 |

Notes:

(1) Total USBR rate given for non-full cost users only, as they represent the majority of water users.

(2) Cost-of-service for agricultural and municipal and industrial users includes a capital repayment rate and an operation and maintenance (O&M) rate. For municipal and industrial customers, cost-of-service also includes a deficit charge, which includes interest on unpaid O&M and interest on capital and on unpaid deficit.

(3) Restoration fund charges apply October 1 through September 30.

(4) Beginning in 1998, the San Luis-Delta Mendota Water Authority instituted this charge to "self-fund" costs associated with maintaining the Delta-Mendota Canal and certain other facilities, which were formerly funded directly by the Bureau of Reclamation. SLDMWA issues preliminary rates in December for the upcoming contract year (March-February). These rates are used for rate-setting purposes; actual rates may vary.

(5) The contract rate is the minimum rate CVP contractors are allowed to pay. To the extent that the contract rate does not cover interest plus actual operation and maintenance costs, a contractor deficit is accumulated that is charged interest at the current-year treasury borrowing rate.

(6) Per the amendatory contract with the USBR "out of basin" capital costs that were previously included in the cost of service are now under a separate repayment contract.

**Table F-3. 2016 Recommended Groundwater Revenue Requirement/Charges**

| REVENUE REQUIREMENTS | | | | | Rates [2] | |
|---|---|---|---|---|---|---|
| | Component | Rate ($/AF) | Quantity[1] (af) | Amount | Ag | M & I |
| Source of Supply | | | | | | |
| Ag | Source of Supply Costs | $9.42 | 18,544 | $ 174,677 | $ 9.42 | |
| M&I | Source of Supply Costs | $28.26 | 6,246 | $ 176,502 | | $ 28.26 |
| Percolation Costs | | | | | | |
| Ag | CVP Water Rate[3] | $297.49 | - | $ - | $ 3.49 | |
| M&I | CVP Water Rate[3] | $407.68 | - | $ - | | $ 7.75 |
| | | | | | | |
| Ag | Power Charge for Percolation | $0.00 | - | 0 | $ - | |
| M&I | Power Charge for Percolation | $0.00 | - | 0 | | $ - |
| **Calculated Total** | | | | | $ 9.42 | $ 28.26 |
| Previous Groundwater Charge (per acre foot) | | | | | $ 3.95 | $ 23.25 |
| | | | | | | |
| **CURRENT AND RECOMMENDED CHARGES (per acre foot)** | | | | | **$ 4.95** | **$ 24.25** |

1 Assumed Volumes
Percolation (based on average of last 3 years of recharge
Groundwater Usage (based on average of past 3 years)
2 Rates=Revenue Requirement/projected usage
3 CVP water rate basis for 2014-2015 water year

Note: Section 70-7.8 (a) of the District Act states that the agricultural rate shall not exceed one-third of the rates for all water other than agricultural water.

# G SUSTAINABILITY

## List of Attachments

from Association of California Water Agencies (ACWA)

- Drought Recovery Infographic

November 2015

Association of California Water Agencies
*Since 1910*
ACWA
Leadership • Advocacy • Information • Service

# WILL EL NIÑO END CALIFORNIA'S DROUGHT?

The stage is set for a strong El Niño event this winter, but experts say it is unlikely to erase California's four-year drought. While there is no single factor that will determine when the drought ends, here is a high-level look at factors the National Oceanic and Atmospheric Administration and the California Department of Water Resources will be watching for signs of improvement.

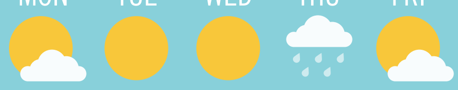
## KEY CALIFORNIA DROUGHT RECOVERY FACTORS

### SNOWPACK

California relies on gradual snowmelt from the Sierra Nevada to provide a major portion of its water supply. To make a dent in the drought, this winter's snowpack would need to return to at least average or above — about 39 inches of snow water content on April 1.

### TEMPERATURES

Storms must be cold enough to support significant snowpack in the Sierra. The average winter minimum temperature in the Sierra would need to drop by 6 degrees from last year's average — from 32.1 degrees to 26 degrees. The above-normal temperatures currently predicted for Northern California are not a good sign.

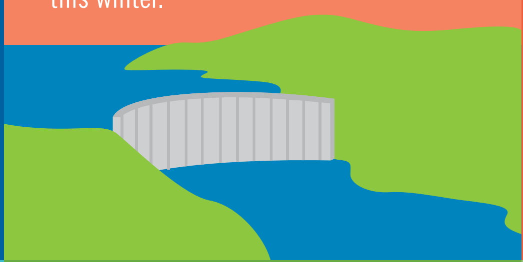



### RAINFALL

Based on past drought-busting years, precipitation would need to be about 120% of average — about 60 inches — in key Northern California watersheds.

### RESERVOIRS

Four years of drought have reduced the state's key reservoirs to about a third of their capacity or less. Above-normal rain and runoff in Northern California would be needed for storage levels to recover this winter.



### GROUNDWATER

Groundwater levels are down by as much as 100 feet in some areas. Experts say recovery will be a multi-year process that depends on how basins are recharged and how much groundwater continues to be pumped.

### WATER FOR FARMS AND COMMUNITIES

Surface water deliveries for farms were reduced by 8.7 million acre-feet in 2015. Urban areas also have seen reduced deliveries and have been subject to mandatory conservation. Restored water deliveries and lifting of emergency conservation measures will be a sign of drought recovery.

## KEY UNKNOWNS

### STRENGTH AND LOCATION OF STORMS

NOAA's latest outlook does not project where and when storms may occur. Heavy rain and even flooding in Southern California — without snow in Northern California — will not be enough to end the drought.

### MUDSLIDES AND DEBRIS

Torrential rainfall could trigger flooding, mudslides and debris flows — even during drought. Areas affected by recent wildfires are especially susceptible to mud and debris flow, with potentially big impacts on water supply sources.

### NEXT YEAR

Even if El Niño brings heavy rain and snowfall this winter, drought conditions may return next year. California may be facing a "new normal" of extreme droughts and floods due to climate change.

2016

# H LIST OF ACRONYMS

| | |
|---|---|
| AF | acre-foot |
| AFY | acre-foot per year |
| ag | agriculture |
| CASGEM | California Statewide Groundwater Elevation Monitoring |
| CDHSPH | California Department of Public Health |
| CEQA | California Environmental Quality Act |
| cfs | cubic feet per second |
| CIMIS | California Irrigation Management Information System |
| COC | Constituent Of Concern |
| CVP | Central Valley Project |
| District or SBCWD | San Benito County Water District |
| DWR | California Department of Water Resources |
| DWTP | Domestic Wastewater Treatment Plant |
| ET | evapotranspiration |
| ft | feet |
| gpd | gallons per day |
| GSA | Groundwater Sustainability Agency |
| GSP | Groundwater Sustainability Plan |
| gw | groundwater |
| IRWMP | Integrated Regional Water Management Plan |
| ITRC | Irrigation Training and Research Center, California Polytechnic State University |
| IWTP | Industrial Wastewater Treatment Plant |
| M&I | Municipal And Industrial |
| MGD | million gallons per day |
| OCR | Optical Character Recognition |
| pdf | Adobe Acrobat Portable Document Format |
| PVWMA | Pajaro Valley Water Management Agency |
| RW | recycled water |
| RWQCB | Regional Water Quality Control Board |
| SCVWD | Santa Clara Valley Water District |
| SEIR | Supplemental Environmental Impact Report |
| SGMA | Sustainable Groundwater Management Act |
| SLDMWA | San Luis & Delta-Mendota Water Authority |
| SSCWD | Sunnyslope County Water District |
| USBR | U.S. Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| WRA | Water Resources Association of San Benito County |
| WTP | Water Treatment Plant |
| WWTP | Wastewater Treatment Plant |
| WY | water year |

# San Benito County Water District

## Annual Groundwater Report
## 2016

TODD GROUNDWATER

# ANNUAL GROUNDWATER REPORT

## WATER YEAR 2016

DECEMBER 2016

TODD GROUNDWATER

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# WATER YEAR 2016

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# ES EXECUTIVE SUMMARY

## *PLANNING A SUSTAINABLE FUTURE*

This Annual Groundwater Report for San Benito County Water District (District) describes groundwater conditions in the San Benito County portion of the Gilroy-Hollister basin. It documents water supply sources and uses, groundwater levels and storage, and District management activities for water year 2016.

Water year 2016 may be the beginning of a slow recovery from the long-term drought that the District and state has experienced; precipitation was above normal for the first time since 2011. The allocation for imported water increased to 5 percent for agriculture; this represents the first agricultural allocation since 2013. Total water use remained similar to water year 2015 and groundwater remains a large portion of total supply at 83 percent. Water levels remained above historical lows but decreased slightly from last year. Parts of the basin (like San Juan Subbasin) that relied on groundwater throughout the drought still show relatively low groundwater levels. While groundwater level recovery will require increased Central Valley Project (CVP) allocations and perhaps years for full recovery, such low levels are expected with conjunctive use of imported surface water and groundwater resources and can be consistent with long-term sustainability.

The special section of this year's report addresses water quality. The District's water quality database was updated to include recent water quality data for drinking water wells, District monitoring wells, and regulated facilities. Water quality trends and exceedances of water quality goals since the last update in 2013 are presented in this report. Overall, water quality remains stable in the basin but stricter regulatory limits for constituents such as Chromium VI have required municipal providers to take action.

Fewer wells were monitored in 2016 for both the water level and water quality networks, and the decreasing coverage and consistency of monitoring data have ramifications for tracking groundwater conditions. While recognizing that future planning (in accordance with the Sustainable Groundwater Management Act, SGMA) will likely entail revision of the monitoring program, it is recommended that the network of monitored wells (groundwater elevation and quality) be stabilized in terms of spatial distribution and number of wells and timing of measurements.

The District is continuing with long term water resource management planning, including compliance with SGMA. SGMA evolved significantly in 2016, most notably with completion of regulations for preparing a Groundwater Sustainability Plan (GSP). By June 30, 2017, establishment of a Groundwater Sustainability Agency (GSA) for local basins[1] is required; the District is considering the next steps for forming a GSA and for planning and funding a GSP.

[1] Except when specified, "basin" is used generally to include basins and subbasins.

# 1 INTRODUCTION

The San Benito County Water District (District) was formed by a special act of the State with responsibility and authority to manage groundwater. The special act allows the Board of Directors to require an annual groundwater report and, as documented in Appendix A, specifies the minimum content of the report should the District choose to prepare one. The District, at its discretion, has also directed that specific Annual Reports include focused discussion of selected topics; this year, the focused topic is an update on water quality conditions.

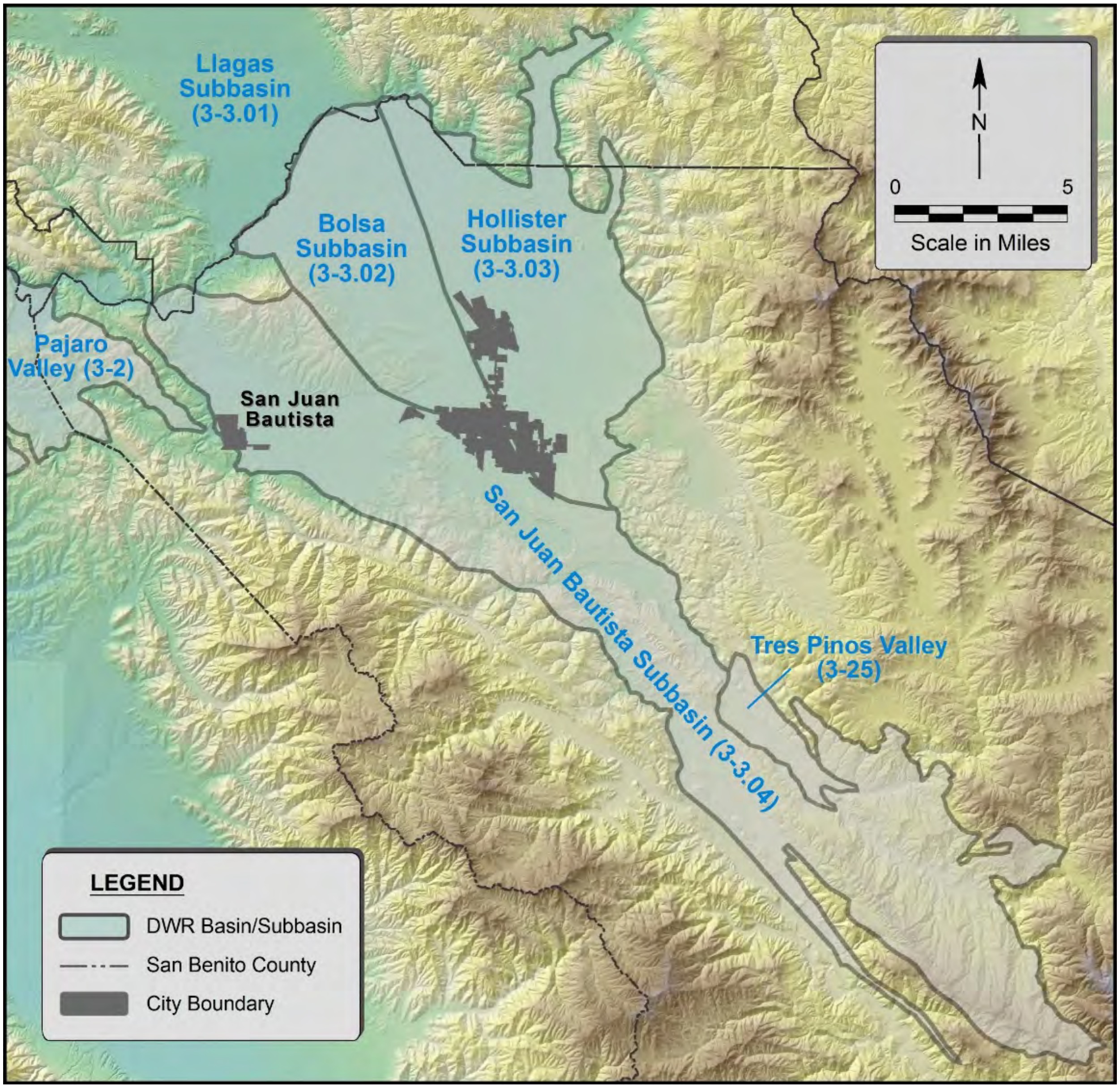
This Annual Report, prepared at the request of the District, documents water supply sources and use, groundwater levels and storage, and District management activities from October 2015 through September 2016. It is intended to present an overview of the state of the groundwater basin. It also conveys considerable information, including tables and figures, which are provided largely in Appendices B through E. Appendix F provides information on water rates and charges, Appendix G provides information on water quality, and Appendix H is a list of acronyms.

Throughout this report, water volumes and changes in storage are shown to the nearest acre-foot (AF). These values are accurate to one to three significant digits (depending on the measurement). All digits are retained in the text to maintain as much accuracy as possible during subsequent calculations, but results should be rounded appropriately.

## Acknowledgments

This report was prepared by Iris Priestaf, PhD, Maureen Reilly, PE, Chad Taylor, PG, CHg, and Gus Yates, PG, CHg of Todd Groundwater. We appreciate the assistance of San Benito County Water District staff, particularly Jeff Cattaneo, Garrett Haertel, and David Macdonald.

**Figure 1. DWR Defined Basins and Subbasins.**




## Geographic Areas

This report focuses on the northern San Benito County portion of the Gilroy-Hollister groundwater basin (**Figure 1**), which extends into southern Santa Clara County. The San Benito part of the basin encompasses the City of Hollister, City of San Juan Bautista, unincorporated residential areas, and expansive areas of irrigated agriculture. The Department of Water Resources (DWR) originally defined the boundaries of the Bolsa, Hollister, and San Juan Bautista

Subbasins largely based on geology (e.g., extent of alluvium). SGMA established a process for boundary revision, which included an application process in 2016 for local agencies to revise groundwater basin boundaries. The District did not choose to participate in the 2016 process, although it may do so in the future. In addition, DWR realigned some of the boundaries to better align with original descriptions in its Bulletin 118; this included some revision of the District's northern boundary along the Pajaro River, whereby the definition of boundaries was improved by aligning with the Santa Clara-San Benito County line (and District jurisdiction.)

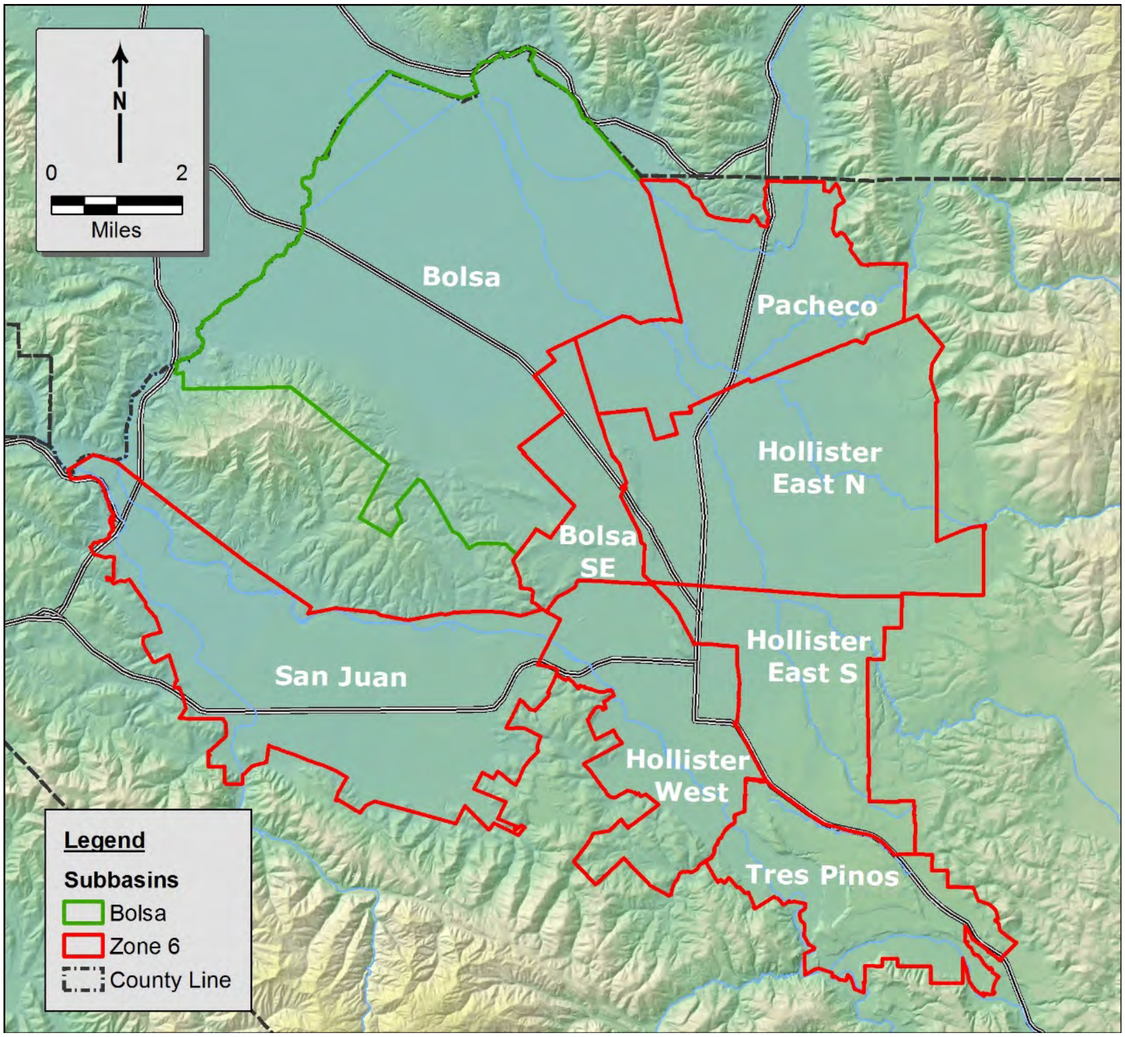
The jurisdiction of the District encompasses all of San Benito County, including all or portions of twelve groundwater basins (see Appendix C). District management of water resources is focused on three Zones of Benefit, listed in **Table 1**. For the purposes of District groundwater management and annual reporting, seven subbasins were delineated in 1996: Bolsa, Bolsa Southeast (SE), Pacheco, Hollister East (North and South), Tres Pinos, Hollister West, and San Juan subbasins (**Figure 2**). These subbasins were defined based on hydrogeologic and significant local factors (i.e., Zone 6 boundaries) and used effectively for management and data collection for the past 19 years. Of the subbasins shown on **Figure 2**, only the Bolsa subbasin receives no CVP deliveries and relies entirely on local groundwater.

The 1996 subbasins differ from the subbasins defined by DWR and identified for compliance with the Sustainable Groundwater Management Act. Recognizing that the DWR boundaries may be revised with approval of DWR (the next opportunity for applications is in 2018), future GSA formation and GSP preparation will be accomplished in terms of DWR defined basins and subbasins. For GSPs and other future reporting, the groundwater data will need to be collected and presented for management areas consistent with DWR defined basins.

**Table 1. District Zones of Benefit**

| Zone | Area | Provides |
|---|---|---|
| 1 | Entire County | Specific District administrative expenses |
| 3 | San Benito River Valley (Paicines to San Juan) and Tres Pinos River Valley (Paicines to San Benito River) | Operation of Hernandez and Paicines reservoirs and related groundwater recharge and management activities |
| 6 | San Juan, Hollister East, Hollister West, Pacheco, Bolsa SE, and Tres Pinos subbasins | Importation and distribution of CVP water and related groundwater management activities |

**Figure 2. Locations of SBCWD Subbasins**




## Hydrologic Conditions

Local rainfall is one indicator of hydrologic conditions in the basin, affecting specific basin inflows (e.g., deep percolation) and outflows (groundwater pumping). Recognizing that drought often is extensive across California, local dry years also may be indicative of regional drought and reduced CVP allocations. Accordingly, dry years often are characterized by increased groundwater pumping for agricultural irrigation to offset lack of rainfall and reduced CVP allocations.

In 2016, overall precipitation was 14.9 inches, which is above the long-term average (1875-2016) of 12.9 inches; 2016 was the first above-average rainfall year since 2011. As shown in **Figure 3**, most of the rainfall fell in a bimonthly pattern: November, January, and March.

**Figure 3. Monthly Precipitation in Water Year 2016**

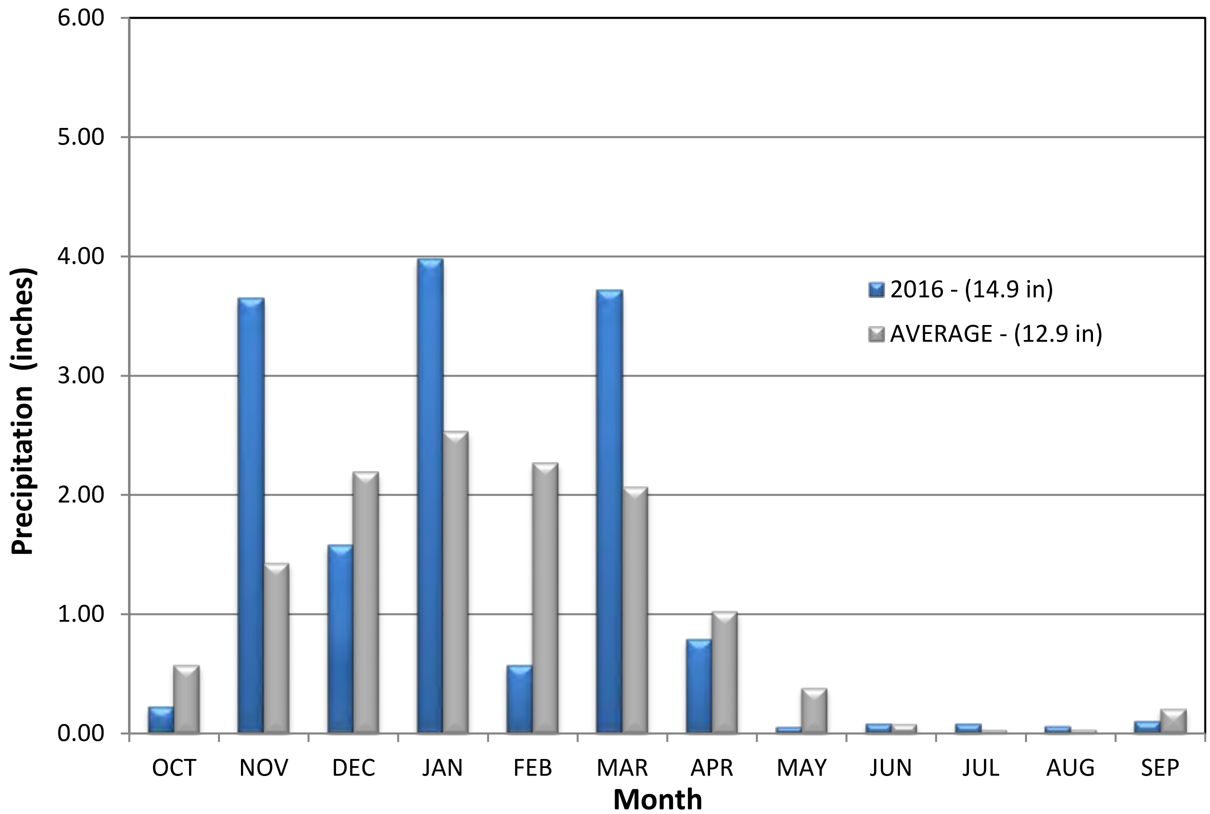
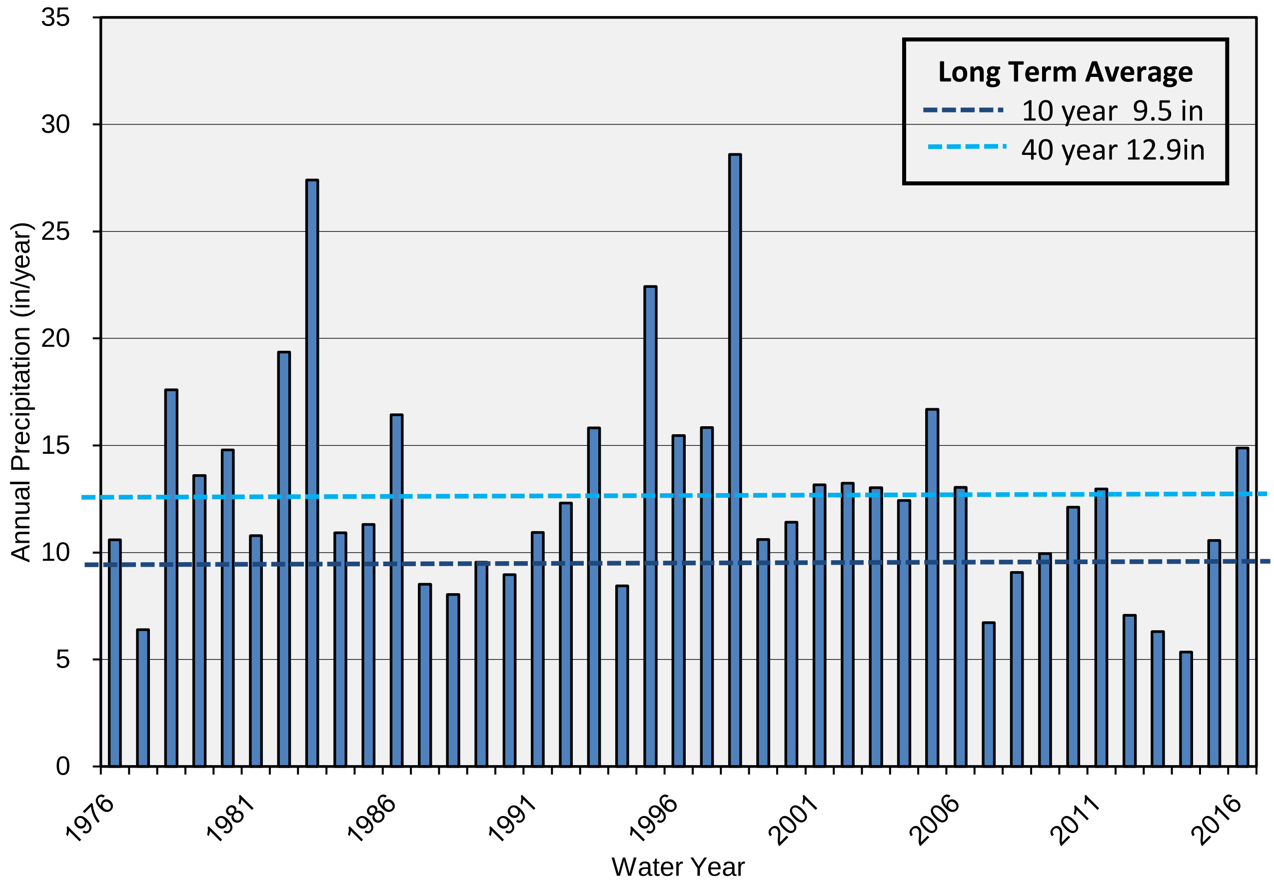



**Figure 4** shows annual rainfall from 1976 through 2016. Several notable droughts are shown, including the brief but extreme drought of 1976-1977, the prolonged drought of 1987-1990, the drought of 2007-2009 and the most recent drought beginning in 2012. Average annual precipitation over the past ten years has been significantly less than the long-term average (1875-2016). Even with the recent wet year, the ten-year average is only 9.5 inches, 26 percent less than the long-term average. Relative to historical droughts (see also Appendix B), the recent drought has been both prolonged and extreme.

Recovery of groundwater levels from previous droughts was accomplished with increased use of available imported water (with increased return flows) and recharge of local surface water. (Imported water also was recharged until 2007). While rainfall in water year 2016 was above normal and some groundwater level recovery has occurred, increased CVP allocations are necessary for significant groundwater level recovery.

**Figure 4. Annual Precipitation (1976-2016)**



# 2 MANAGEMENT ACTIVITIES

District water management activities, in addition to import and distribution of CVP water, include water resources planning, water conservation, and managed percolation of local surface water to augment groundwater. To track groundwater basin conditions, the District maintains a comprehensive monitoring program, including regular measurement of groundwater pumping, annual evaluation of groundwater storage change, and assessment of regional water quality.

## Water Resources Planning

In 2016, the District was engaged in various projects, programs and planning efforts that address water supply and demand, water quality, and wastewater management.

**West Hills Water Treatment Plant (WTP)**. Provision of water treatment allows increased direct use of CVP for municipal and industrial (M&I) purposes; it also allows delivery of improved quality water to customers. West Hills WTP is the second surface water treatment plant to treat CVP imports and allows delivery to urban areas currently not served by the Lessalt Water Treatment Plant. Construction of the West Hills Plant began in 2015 and the plant is expected to be online by summer 2017. With a design capacity of 4.5 MGD, the new WTP will increase the treated M&I CVP water available to the Hollister Urban Area by 2,520 AFY to a total of 4,760 AFY. Eventually, these two facilities will have a combined capacity capable of treating the entire volume of the M&I CVP contract.

**Urban Water Management Plan, Hollister Urban Area.** In July 2016, the District, in collaboration with Sunnyslope County Water District (SSCWD) and the City of Hollister, completed the latest Urban Water Management Plan (UWMP). The UWMP provides detailed information on the current and future water supply and demand for the Hollister Urban Area, and provides a comparison of supply and demand in normal years plus single-year and multi-year droughts. As documented in the UWMP, the Hollister Urban Area has adequate supplies to meet demands. The UWMP also documents local water conservation measures (see below).

**Recycled Water Project**. The District has worked cooperatively for many years with the County, City of Hollister, and SSCWD to implement recycled water use. Current recycled water use includes City of Hollister landscape irrigation. In June 2016, recycled water also was delivered to agriculture users in the Hollister East subbasin area. This extended system has increased the use of recycled water in the District by more than four times the 2015 total, for a total of 499 AF. An additional 250 AF was delivered in October 2016.

**Sustainable Groundwater Management Act**. SGMA, the most significant groundwater legislation in California history, requires sustainable management by local agencies of DWR-defined groundwater basins. In San Benito County, the subbasins of the Gilroy-Hollister Basin and the Pajaro Valley Groundwater Basin (mostly in Santa Cruz and Monterey counties) are subject to SGMA and must have Groundwater Sustainability Plans (GSPs) in place by 2022 (or 2020 in the case of Pajaro Valley, which has been designated as critically overdrafted).

SGMA evolved significantly in 2016, most notably with completion of detailed DWR regulations for preparing a GSP. In addition, groundwater basin boundaries were modified, including revision by DWR of the District's boundary along the Pajaro River, which was improved by aligning with the Santa Clara-San Benito County line (and District jurisdiction.) Final 2016 boundaries are now available for download from DWR. DWR also released a draft white paper on Water Available for Replenishment (with a report due in December 2016), draft Best Management Practices (BMPs) to help guide preparation of a GSP, and GSP guidance documents, including a draft Preparation Checklist for GSP Submittal and a draft GSP Annotated Outline. Other documents are in preparation; overall these are intended to assist GSAs in preparing GSPs.

As documented in the 2015 Annual Report, it was recommended that the District assume the responsibilities of a GSA and subsequently prepare a GSP for the subbasins of the Gilroy-Hollister Basin in San Benito County. Where portions of a basin overlap neighboring jurisdictions, it was recommended that the District work with the respective agency toward collaborative compliance with SGMA.

The next major milestone is establishment of a Groundwater Sustainability Agency (GSA) for local basins; the deadline is June 30, 2017. In 2016, District planning for SGMA included consideration of next steps for forming a GSA and for planning and funding a GSP, plus discussions with neighboring agencies. While GSA formation does not require much technical work, it does entail several steps. It is recommended that the District begin the process as soon as possible; this would provide time to resolve unforeseen issues and, once completed, allow the District to consider next steps, such as acquisition of funding. The competitive application process for Proposition 1 bond funds is likely to begin in 2017.

# Water Conservation

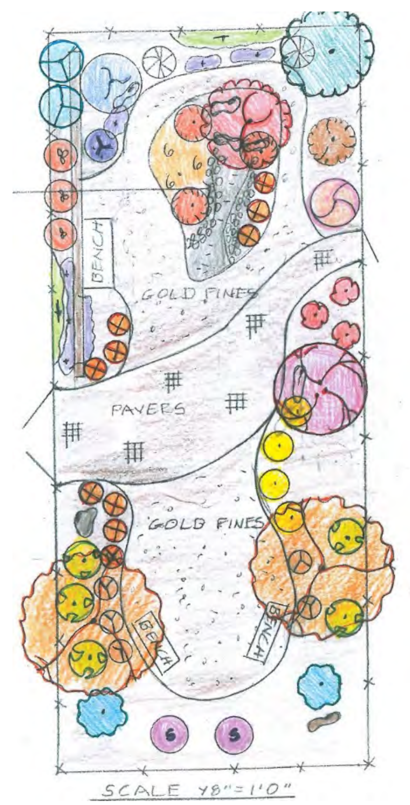
Water conservation is an important tool to manage demands on the groundwater basin. During the most recent drought, the state has mandated water retailers to reduce their demand. This state-ordered demand reduction, together with the expansion of ongoing water conservation efforts, successfully lowered water demand. Water conservation efforts in San Benito County are conducted mostly through the Water Resources Association (WRA), composed of representatives from the District, City of Hollister, City of San Juan Bautista, and Sunnyslope County Water District.

**Ongoing Conservation.** The State has lifted mandatory water demand reductions for agencies; nonetheless, the Hollister Urban Area continues voluntary demand reductions. The managers at Hollister and SSCWD plan to continue water demand reductions; their goal for total usage is 15 percent less than 2013 demands. Currently, the Hollister Urban Area is exceeding this goal with about 22 percent less than 2013 demands.

**Water Shortage Contingency Plan (WSCP)**. As part of the Urban Water Management Plan (UWMP), Hollister, SSCWD, and the District developed a joint WSCP. The plan includes many permanent prohibitions on water waste (including using water to clean paved surfaces and watering lawns within 48 hours of rain). In addition, the plan details what water conservation measures are triggered during drought conditions.

**Irrigation Education.** The District, in collaboration with the WRA, continues to offer a series of classes on irrigation efficiency and other agriculture practices. Since 2009, these workshops provide concepts, tools, and examples for optimizing irrigation and nitrogen management efficiency in row, tree, and greenhouse crop production.

**Water Wise Demonstration Garden and Plans.** WRA maintains a demonstration garden at Dunne Park in downtown Hollister (corner of 6th & Powell). Their website offers a map (see right inset) and brochure to help educate visitors on drought resistant landscaping. The WRA website also provides three sample Water Efficient Landscape Plans available for download.




**Turf Removal Program.** In July 2014, the WRA added a Turf Removal Program to encourage customers to remove high water use turf areas from residential parcels. This program complements the irrigation hardware rebates and free water efficient landscape plans. In Fiscal Year 15/16 the program expanded from offering a $1 per square of turf removed up to 500 square feet to 1,000 square feet. As of November 2016, over 145,500 square feet of turf have been removed in the Hollister Urban Area.

**Public Outreach.** WRA continues to educate the public about the regional water system and water use efficiency. WRA has given presentations to local school and lead school groups to the local WTP and WWTP, reaching over 400 students in autumn 2016 alone. Other outreach programs have provided water conservation outreach to 75 high school students this year.

Other ongoing water conservation programs involve irrigation rebates, toilet replacements, high-efficiency clothes washer rebates, education program and outreach. These water conservation programs, while successfully reducing water demand, are being continued and diversified to encourage the public to continue to use water wisely.

These water conservation programs, while successfully reducing water demand, are being continued and diversified to encourage the public to continue to use water wisely.

## Managed Percolation

**Percolation of Local Surface Water.** In most years, local surface water released from Hernandez and Paicines Reservoirs is percolated along the San Benito River and Tres Pinos Creek. Releases have been limited to percolate upstream of the confluence of San Benito River and Tres Pinos Creek. This helps maintain groundwater levels without causing shallow groundwater problems and competing for available storage space with City of Hollister wastewater percolation. This year, for the third year in a row, there were no releases from Paicines; 925 AF was released from Hernandez.

**Percolation of Wastewater.** Wastewater is percolated by the City of Hollister at its Domestic and Industrial plants, and is also percolated at the SSCWD Ridgemark Facilities and by Tres Pinos Water District. Recent changes in operation of the wastewater facilities have decreased the volume percolating to the groundwater. Information about the amount of groundwater recharged from these wastewater facilities is found in Appendix D.

**Percolation of CVP Water.** In the past, CVP percolation was used to recharge the groundwater basin. CVP percolation peaked in 1997 and was reduced subsequently in response to the successful recovery of the groundwater basin from overdraft. Direct in-stream recharge of CVP water is not expected to occur because of concerns for release of invasive Dreissenid mussels. A table of historical percolation is found in Appendix D.

## Monitoring Program

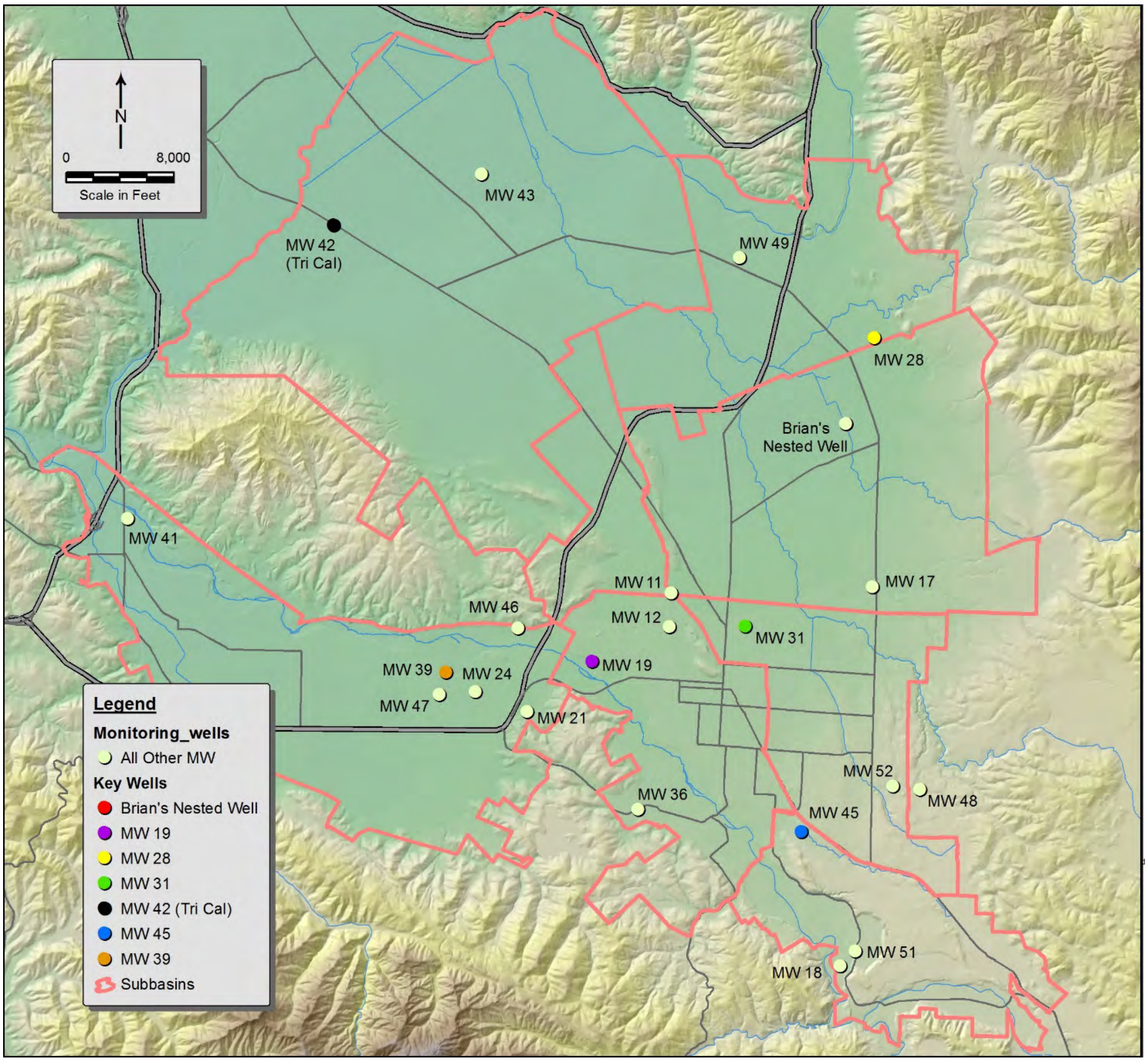
Development, implementation, and documentation of a monitoring program is a vital element of a Groundwater Sustainability Plan (GSP). It is basic to understanding how the surface water-groundwater system works, documenting groundwater conditions, and evaluating the effectiveness of management programs.  Consistent with its governing law, the District has been monitoring and providing annual reports for decades; monitoring data are provided in the appendices. Understanding that a GSP will require extensive documentation of the monitoring networks and protocols, the District monitoring program can be summarized as follows:

- Climate monitoring at the District CIMIS station
- Streamflow measurements at 25 sites at least quarterly
- Groundwater elevation measurements at 90 sites (spring and fall)
- Groundwater quality sampling at 18 sites (spring and/or fall)
- Monitoring of reservoir water budgets and releases for percolation
- CVP allocation and use by type and subbasin
- Groundwater pumping and use by type and subbasin
- Recycled water use and discharge

# 3 WATER QUALITY

The District currently monitors a distributed network of 18 wells for water quality, shown in **Figure 5**. Data from these monitoring wells and other water quality data are included in Appendix G. The District maintains a comprehensive water quality database, created in 2004 with a State Local Groundwater Assistance Grant and updated every three years. This year, the database was updated with readily available data from the District, Regional Water Quality Control Board, California State Water Resources Control Board, Tres Pinos Water District, City of Hollister, and SSCWD. The database now contains over 450,000 records from 175 water systems or regulated facilities and over 1,800 monitoring locations.

**Figure 5. District Monitoring Locations**



# Salt and Nutrient Management Plan

The San Benito County Salt and Nutrient Management Plan (SNMP) was developed for the basin in 2014, consistent with the 2013 State Water Resources Control Board (SWRCB) statewide Recycled Water Policy. The purpose of the SNMP was to identify all sources of salts and nutrients (both current and future) in the basins and to manage those salt and nutrient sources in a manner that ensures that groundwater is safe for drinking and all other beneficial uses. The District's SNMP analysis demonstrated that the both single and multiple recycled water irrigation projects planned through 2021 use less than 1% of the available TDS and nitrate assimilative capacity, the difference between average salt and nutrient concentrations in the basin and the respective basin plan objectives. Therefore, the irrigation projects satisfy the Recycled Water Policy criteria. The SNMP analysis found that recycled water use can be increased while still protecting groundwater quality for beneficial uses.

Based on the analysis, the SNMP concluded no additional implementation measures are warranted beyond those that have been implemented and those that are already planned. Nonetheless, the SNMP management process is active and ongoing, and continued water quality monitoring will ascertain the effectiveness of implementation measures.

With respect to monitoring, the Recycled Water Policy states that the Salt and Nutrient Management Plan (SNMP) should include a monitoring program that consists of a network of monitoring locations ". . . adequate to provide a reasonable, cost-effective means of determining whether the concentrations of salts, nutrients, and other constituents of concern as identified in the salt and nutrient plans are consistent with applicable water quality objectives." Additionally, the SNMP is required to focus on basin water quality near water supply wells and areas proximate to large water recycling projects, particularly groundwater recharge projects (Todd, 2014).

The SNMP Monitoring Plan laid out a program wherein the data collected and compiled by the District are analyzed and reported to the RWQCB every three years as part of the District's triennial Groundwater Report. The analyses are required to include the following:

- Discussion of Total Dissolved Solids (TDS) and nitrate in groundwater including,
    - Time-concentration plots,
    - Evaluation of vertical variation in water quality,
    - Water quality concentration maps,
    - Comparison of detections with basin-specific basin plan objectives (BSPOs), and
- Status of recycled water use and stormwater capture projects and implementation measures.

The following subsections summarize key constituents, time concentrations plots, vertical variation and areal distribution and BSPOs; discussion of recycled water and stormwater is provided in the following section.

## Key Constituents

Total dissolved solids (TDS) and nitrate are the indicator salts and nutrients and the key constituents of concern (COCs). TDS data are available for both inflows and outflows from the basin. While TDS is an indicator of anthropogenic impacts (e.g., infiltration of urban runoff, agricultural return flows, and wastewater disposal), there is also a relatively elevated natural background TDS concentration in groundwater. This has been documented since the 1930s and has been ascribed to the presence of marine sediments in the watershed.

Nitrate is the primary form of nitrogen detected in groundwater and natural nitrate levels in groundwater are generally very low. Elevated concentrations of nitrate in groundwater are associated with agricultural activities, septic systems, confined animal facilities, landscape fertilization, and wastewater treatment facility discharges. The maximum contaminant level (MCL) for nitrate (as NO3) is 45 mg/L. Nitrate data are available for basin inflows and outflows, and as documented in the SNMP, elevated nitrate concentrations have been a recognized, long-term concern in the basin.

Hexavalent chromium (also known as chromium VI, or CrVI) has been added as a key constituent of concern. This reflects the newly reduced California maximum contaminant level (MCL) of 10 micrograms per liter (µg/L) (SWRCB 2015). Recent analyses of water quality in some Hollister wells reported hexavalent chromium concentrations above the MCL.

These three constituents (which vary over time, space and depth) indicate general changes in groundwater quality. Previous water quality studies have identified other constituents of concern including boron, chloride, hardness, metals, sulfate, and potassium. In some parts of the basin, groundwater does not meet water quality standards for these constituents relative to the intended beneficial uses of the groundwater. Specific information (including water quality standards and number of samples that exceed standards) is presented in Appendix G.

## Water Quality Goals

Water quality goals were developed for the Salt Nutrient Management Plan. The General Basin Plan Objectives (GBPOs) for groundwater with municipal and domestic water supply and agricultural water supply beneficial uses in the Central Coast are shown in **Table 2**. The DDW has adopted Secondary Maximum Contaminant Levels (SMCLs) for TDS; SMCLs address aesthetic issues related to taste, odor, or appearance of the water and are not related to health effects. Nonetheless, elevated TDS concentrations can affect its desirability for irrigation uses. The recommended SMCL for TDS is 500 mg/L with an upper limit of 1,000 mg/L. It has a short-term limit of 1,500 mg/L.

The primary maximum contaminant level (MCL) for nitrate (as N) is 10 milligrams per liter (mg/L), or as expressed in this report in terms of nitrate (as NO3), the MCL is 45 mg/L. These MCLs are based on health concerns due to methemoglobinemia, or "blue baby syndrome," which affects infants, ruminant animals (such as cows and sheep) and infant monogastrics (such as baby pigs and chickens). Elevated levels may also be unhealthy for pregnant women (SWRCB, 2010).

The SNMP also developed basin specific plan objectives, listed in **Table 3**, with a TDS assimilative capacity benchmark of 1,200 mg/L for the DWR San Juan and Bolsa Subbasins. Ambient groundwater quality in the San Juan Bautista and Bolsa Subbasins is similar to or slightly poorer than in the Hollister subbasin; thus use of the same TDS objective is deemed reasonable. The GBPO for nitrate-NO3 (45 mg/L) is applied to assimilative capacity calculations in the DWR San Juan Bautista and Bolsa Subbasins (Todd, 2014).

**Table 2. General Basin Plan Objectives**

| **Parameter** | **Units** | Municipal | **Ag** |
|---|---|---|---|
| TDS | mg/L | 500/1,000/1,500[1] | 450 |
| Nitrate (as NO3) | mg/L | 45 | 100[2] |
| Nitrate + Nitrite-N | mg/L | 10 | 100[2] |

MUN – municipal AGR – agricultural mg/L – milligrams per liter

1 - The levels specified for TDS and chloride are the "recommended" levels for constituents with secondary maximum contaminant levels

2 - For livestock watering

**Table 3. Basin-Specific Basin Plan Objectives**

| Parameter | Units | Municipal | |
|---|---|---|---|
| | | Hollister | Tres Pinos |
| TDS | mg/L | 1,200 | 1,000 |
| Nitrogen (as N) | mg/L | 5 | 5 |
| Nitrate (as NO3) | mg/L | 22.5 | 22.5 |

California recently reduced the maximum contaminant level (MCL) for hexavalent chromium (also known as chromium VI, to 10 micrograms per liter (µg/L) (SWRCB 2015). Exceedances of water quality goals for all major constituents are included in Appendix G.

## Key Constituents Results

**Table 4** shows current average concentrations for each subbasin for TDS and nitrate. The values were developed by averaging all drinking water and ambient monitoring events that occurred from 2013-2016; water quality samples from regulated facilities were not included in the analysis. These average conditions serve as a snapshot for each subbasin and allow a simple comparison of water quality conditions across the basin.

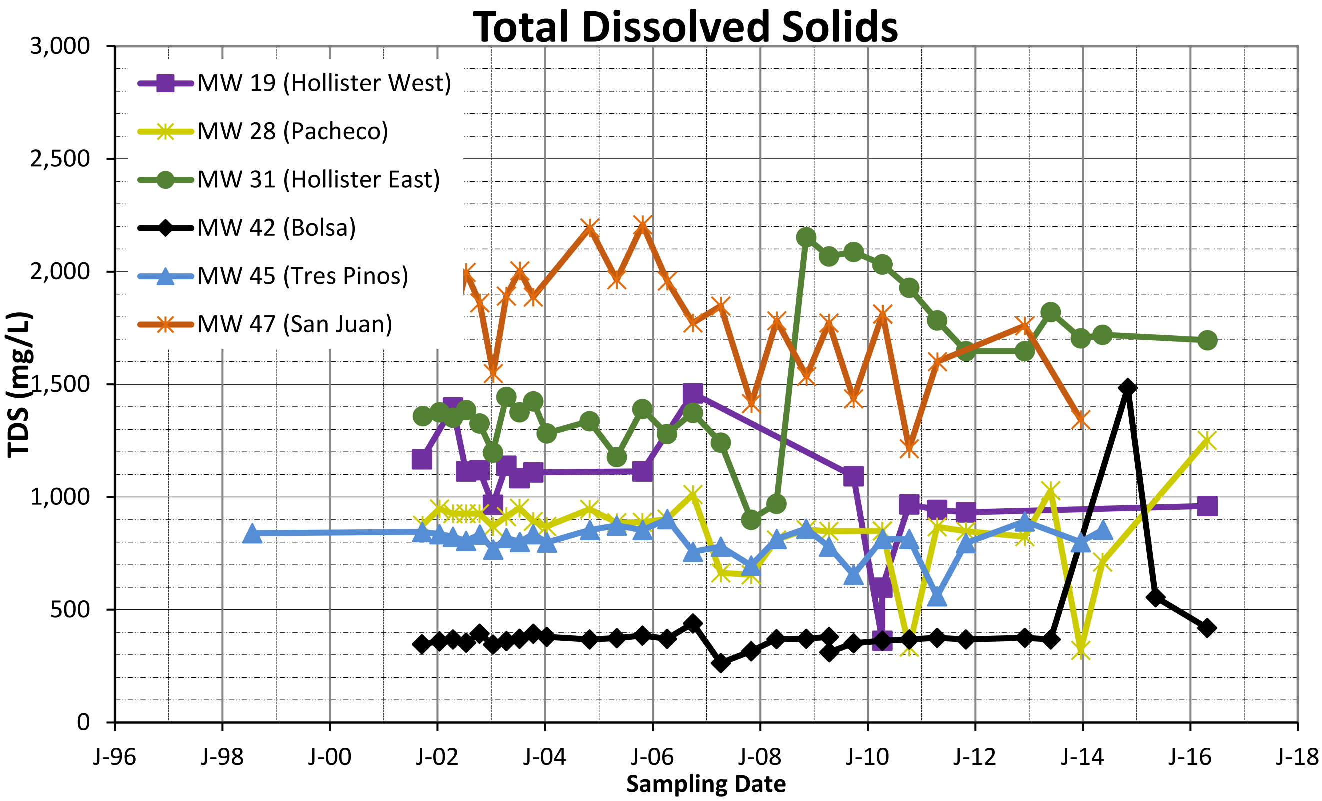
**Table 4. Average Constituent Concentrations by Subbasin 2013-2016 (mg/L)**

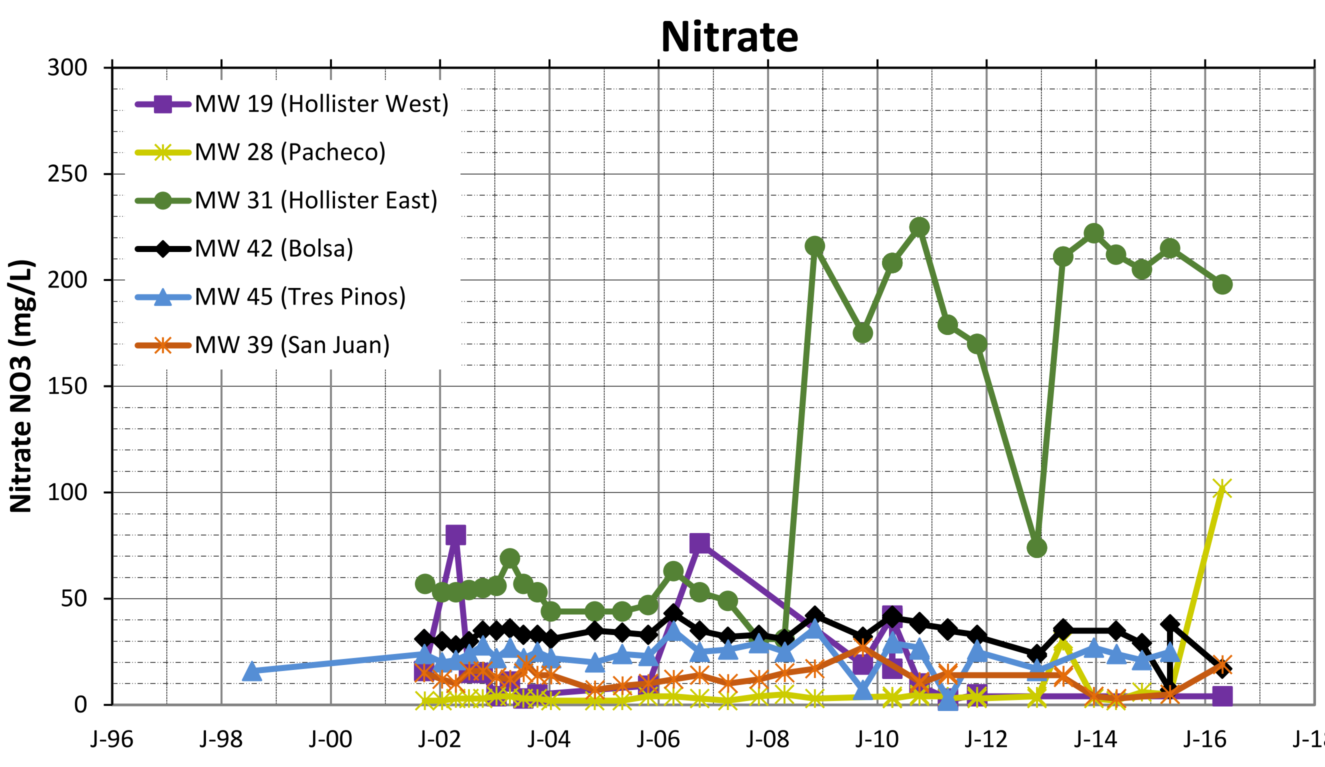
| Subbasin | NITRATE (AS NO3) | TOTAL DISSOLVED SOLIDS |
|---|---|---|
| Bolsa | 31.4 | 444 |
| Bolsa Southeast | 25.1 | Not available* |
| Hollister East | 17.6 | 1,485 |
| Hollister West | 34.4 | 968 |
| Pacheco | 12.9 | 572 |
| San Juan | 19.8 | 1,643 |
| Tres Pinos | 10.3 | 788 |
| Paicines | 4.4 | 260 |
| Outside subbasins | 5.8 | 633 |

*No TDS samples were reported from drinking water or monitoring wells.

While **Table 4** provides a current snapshot of groundwater quality, **Figure 6**, the time concentration plots, show concentrations of TDS and nitrate in selected wells over the past 13 years. These wells were selected to show significant trends in each subbasin. The following sections summarize current conditions and trends for TDS and nitrate, respectively.

**Figures 6a and 6b. Time Concentration Plots of Key Monitoring Wells.**



**Total Dissolved Solids (TDS).** As documented in **Table 4**, TDS concentrations are generally high in all subbasins. The northern subbasins (Bolsa and Pacheco) show relatively low concentrations and San Juan has the highest levels of TDS. As shown in **Table 4**, the average TDS concentrations in each of the subbasins (except Bolsa) exceed the secondary MCL for drinking water (500 mg/L). The very high TDS concentrations in MW31 probably indicate a local source. Average TDS concentrations are high in Hollister East and San Juan, and moderately high in Hollister West. These concentrations reflect both anthropogenic and natural sources.

As shown in **Figure 6a**, TDS concentrations in the basin are high and show variability over time and space. All subbasins have TDS concentrations at or above the agricultural water quality goal of 450 mg/L. In the last three years (since the last update), TDS concentrations have remained stable or decreased. In the San Juan subbasin, some wells downstream of the historical wastewater treatment ponds (e.g., MW47) show a general decrease in concentrations, possibly due to the reduced percolation of wastewater in recent years. However, water quality samples in this region continue to have high TDS concentrations relative to the rest of the basin.

In considering the last three years, MW 28 (in the Pacheco subbasin) has shown a noticeable increase; the May 2016 monitoring event recorded uncharacteristically high nitrate and higher than average TDS. Additional monitoring and investigation at this well should continue to see if this is indicative of actual quality changes or a data outlier reflecting procedural problems.

In Appendix G, **Figure G-3** shows the maximum concentrations at each well in the basin that has been sampled since 2013 (the last database update) for TDS.

**Nitrate as NO3.** As documented in **Table 4**, average nitrate conditions are high in all subbasins; the average nitrate concentrations in Hollister West and Bolsa are above 30 mg/L. The sources of these high concentrations are not known; however, wastewater disposal in Hollister West has contributed to high nitrate in the past. Bolsa has long been an agricultural area and agricultural practices and livestock would contribute to high nitrate.

Nitrate, long identified as a COC in the basin, has multiple and widespread sources including fertilizer application and wastewater disposal (both municipal and domestic). Given that these sources are on or near the ground surface, shallow groundwater typically is characterized by higher concentrations than deep groundwater. In fact, the highest recent concentrations occurred in shallow wells in the eastern San Juan subbasin. It should be noted that many of the samples from the San Juan subbasin are from monitoring wells positioned downgradient from the former wastewater percolation ponds. Review of **Table G-1** in Appendix G indicates that in the past, monitoring wells (e.g., MW 24 and MW47) in San Juan have shown elevated nitrate above 100 mg/L, however the currently monitored wells show much lower concentrations.

**Figure 6b** shows nitrate time concentration plots from selected monitoring wells. Nitrate concentrations are elevated above natural concentrations (typically less than 10 mg/L), but most samples have indicated nitrate concentrations below the MCL of 45 mg/L. With some exceptions, concentrations are relatively stable over time. Two wells (MW 39 and MW 28) had shown consistent nitrate concentrations until the 2016 monitoring event, when both wells showed increased nitrate concentrations. Continued monitoring should aid in identification of specific locations and changes in nitrate concentration.

The extremely high concentrations in Hollister East well MW31 appear anomalous and likely reflect a local, nearby source. **Figure G-4** shows the maximum concentrations at each well in the basin that has been sampled since 2013 (the last database update) for nitrate.

**Chromium VI.** Chromium VI concentrations in water samples from several City of Hollister water supply wells exceed the new MCL. In brief, 95 wells were tested for Chromium VI across the basin, 32 wells detected some level of Chromium VI, and 5 wells showed an exceedance of the new water quality goal. Most of the wells with detections are operated by the City of Hollister.

These problematic concentrations occurred in the four Hollister active water supply wells located on the west side of the City (Todd 2015b). Treatment for CrVI is expensive, and not all wells have equal treatment options. As such, Hollister is pursuing the option of blending groundwater from the existing wells with treated imported water from the West Hills WTP currently under construction. DDW has approved the HUA's proposal for a 50/50 blend of groundwater and treated water from the West Hills WTP (SWRCB 2016). Sunnyslope is currently monitoring their wells for CrVI and will continue to plan for possible water quality issues. **Figure G-5** shows the monitoring and detections of CrVI since 2013 (the last database update).

## Vertical Variations

In 2006, a nested well (funded in part by a State Local Groundwater Assistance Act grant) was completed in Hollister East to study vertical distribution of groundwater quality in an area of elevated TDS and boron. The nested well has five depth-specific ports: A through E from shallow to deep. Water quality concentrations for each port for TDS and nitrate are available in Appendix G. More frequent monitoring in recent years is beginning to reveal patterns; for example, the middle ports (C and D) are showing high TDS concentrations relative to shallow and deep ports. This may indicate a mid-range source of local poor water quality; we note that original siting of this nested well accounted for proximity to a geologic fault at depth. However, naturally high TDS and boron can also be found at depth reflecting regional geology. Across the basin, shallow groundwater generally has relatively high concentrations of TDS and nitrate reflecting agricultural drainage and other anthropogenic sources.

## SNMP Compliance

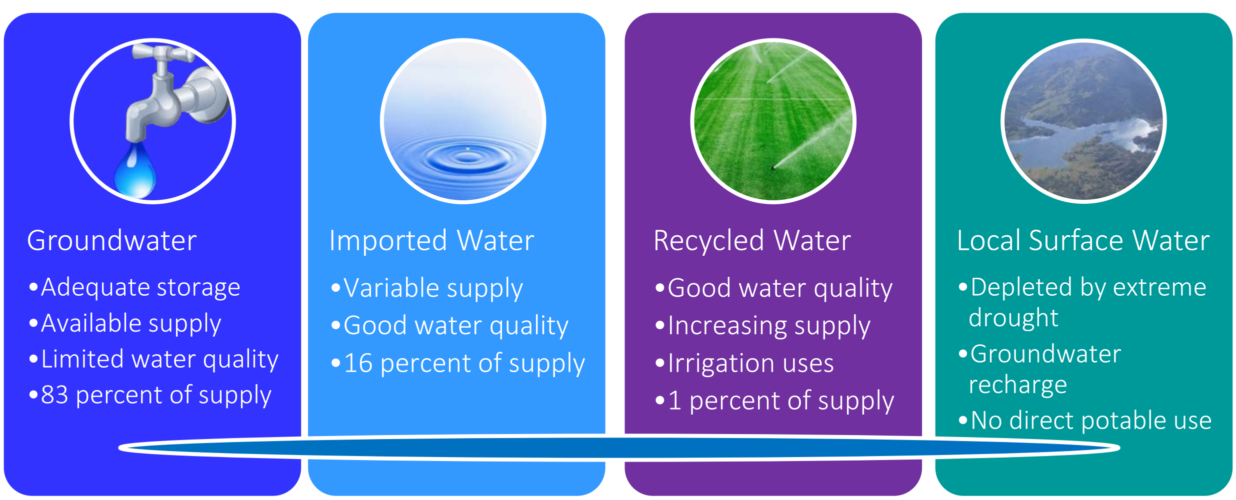
Water quality in the basin has not changed significantly since the SNMP concluded that recycled water would not adversely impact water quality. Concentrations of nitrate and TDS remain fairly stable across the subbasin. Active, ongoing and continued water quality monitoring should continue to track water quality changes and increase the understanding of water quality variation spatially and with depth.

# 4 WATER USE

## Water Supply Sources

San Benito County has four major sources of water supply for municipal, rural, and agricultural land uses. These are summarized below; for more data and graphs see Appendix E.

- **Local Groundwater.** Groundwater is withdrawn from the basin by private irrigation and domestic wells and by public water supply retailers. The District does not directly produce or sell groundwater, but is active in groundwater management throughout San Benito County. This report focuses on the southern part of the Gilroy-Hollister groundwater basin (DWR Basin 3-3) and reports on eight District-defined subbasins.
- **Imported Water.** The District purchases Central Valley Project (CVP) water from the U.S. Bureau of Reclamation (USBR). The District has a 40-year contract (extending to 2027) for a maximum of 8,250 AFY of M&I water and 35,550 AFY of agricultural water.
- **Recycled Water.** Recycled water is now available for selected ag users as well as continue irrigation for a municipal park. Recycled water use was 499 AF in WY 2016 and is expected to continue to increase. This source is generally reliable during drought and helps secure a sustainable water supply.
- **Local Surface Water.** Surface water is not used directly for potable or irrigation use in the basin, but creek percolation is a significant source of groundwater recharge. In 2016 there were limited storage releases from the District's Hernandez reservoir and none from Paicines. Stormwater reuse is not a significant source of recharge in the basin. However, some stormwater is directed to the Hollister Industrial WWTP via a combined sewer system for treatment and discharge to percolation and evaporation ponds included in the percolation totals in Appendix D.



## Available Imported Water

The District distributes CVP water to agricultural and M&I customers in Zone 6. In USBR contract year 2016 (March 2016 - February 2017), water allocations were reduced by USBR to 5 percent of the contract for agriculture and 55 percent of the contract for M&I. **Table 5** shows the contract entitlements and recent allocations (SLDMWA 2016). Note that USBR contract years are March through February, so water year 2016 overlapped two contract years.

The District renegotiated their shortage policy with USBR in 2014. Now the District will receive the allocated percent of their full M&I contract (8,250 AFY), even in dry years. In past years if the allocation was decreased due to water shortage (an allocation of 75 percent or less), the District received the allocated percent of their historic use. In 2014 for example, the historic use was 5,556 AFY. In Water Year 2016, the District is allocated 55 percent of their full contract (8,250 AFY).

**Table 5. CVP Entitlements and Allocations, USBR Contract Years 2015-2016**

March 2015 - February 2016

| | Shortage Year Adjustments | % Allocation | Allocation Volume (af) |
|---|---|---|---|
| Agriculture | 38,244 | 0% | 0 |
| M&I | 8,250 | 25% | 2,063 |
| **TOTAL** | **43,800** | | **2,063** |

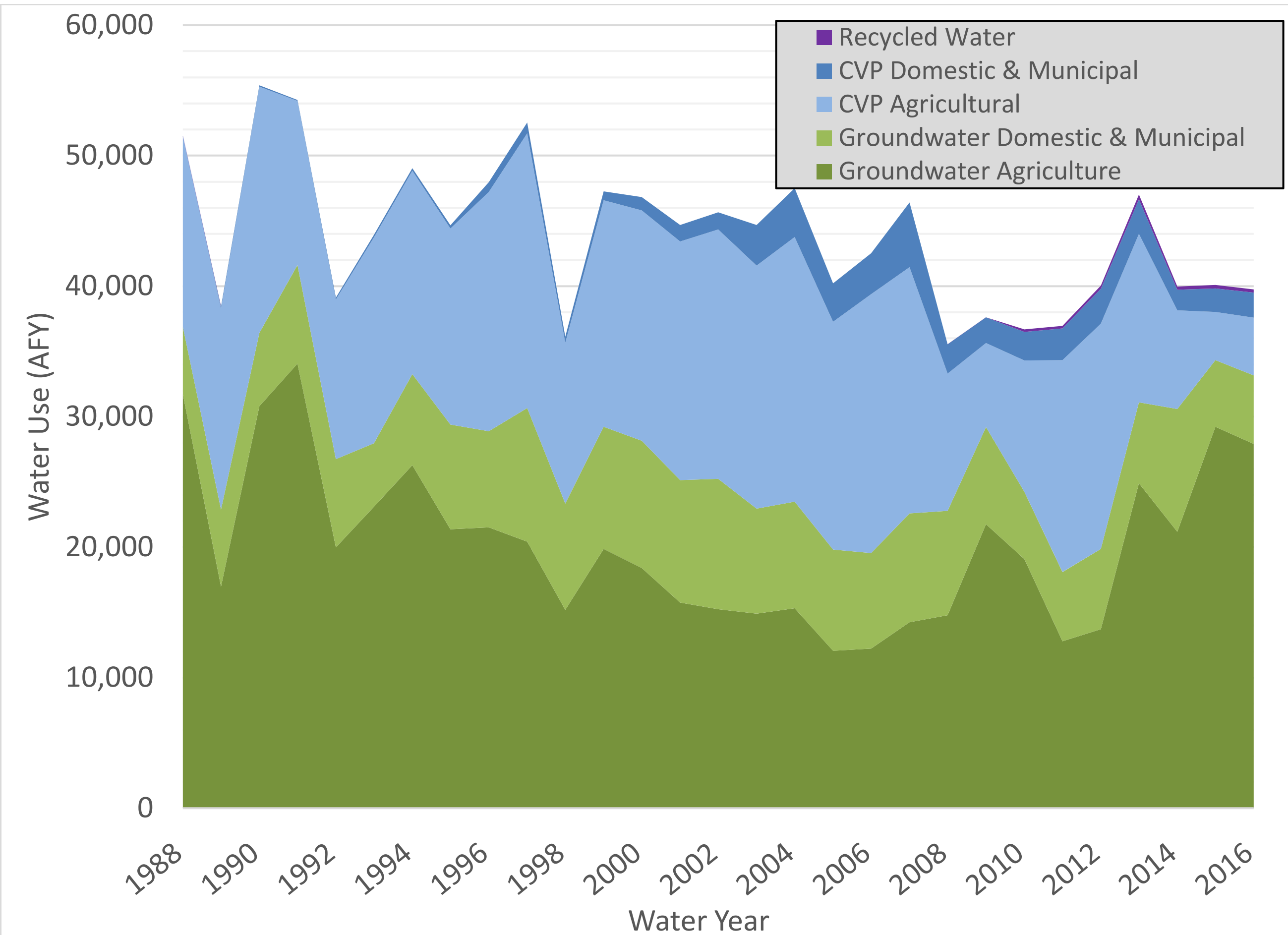
March 2016 - February 2017

| | Shortage Year Adjustments | % Allocation | Allocation Volume (af) |
|---|---|---|---|
| Agriculture | 38,244 | 5% | 1,912 |
| M&I | 8,250 | 55% | 4,538 |
| **TOTAL** | **43,800** | | **6,450** |

## Water Use

In 2016, total water use was similar to 2015 water use, just over 40,000 AF. **Figure 7** shows the total water use from 1988 through 2016. As indicated, groundwater pumped by agricultural users has represented the largest portion of water use in recent dry years when CVP allocations were reduced. **Figure 7** also shows that overall water demand has generally declined due in part to drought conservation.

**Figure 7. Total Water Use by Source and use 1988-2016 (AFY)**



## Distribution of Demand by Source and Use

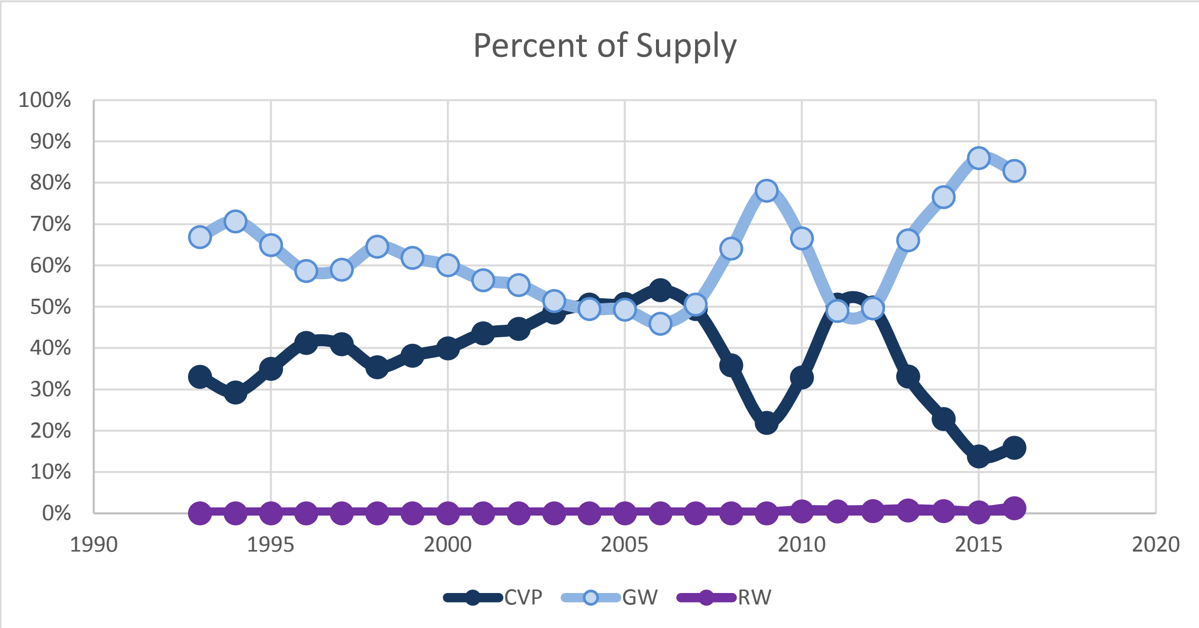
Water year 2016 saw a small increase in the availability of CVP water and recycled water. For the first time, recycled water was supplied to agriculture users in the Hollister East and Bolsa South East subbasins. While total recycled water deliveries only represent one percent of supply, use has quadrupled since 2015. **Table 6** shows the total water deliveries from CVP, groundwater (GW), and recycled water (RW) sources.

**Table 6. Total Water Deliveries for Water Year 2016 (AF)**

| | CVP | | GW | | RW | | Total | |
|---|---|---|---|---|---|---|---|---|
| | **2015** | **2016** | **2015** | **2016** | **2015** | **2016** | **2015** | **2016** |
| Agriculture | 3,697 | 4,434 | 29,229 | 27,912 | - | 246 | 32,926 | 32,591 |
| M&I | 1,810 | 1,914 | 5,099 | 5,251 | 101 | 253 | 7,010 | 7,417 |
| **TOTAL** | **5,507** | **6,347** | **34,327** | **33,162** | **101** | **499** | **39,935** | **40,008** |

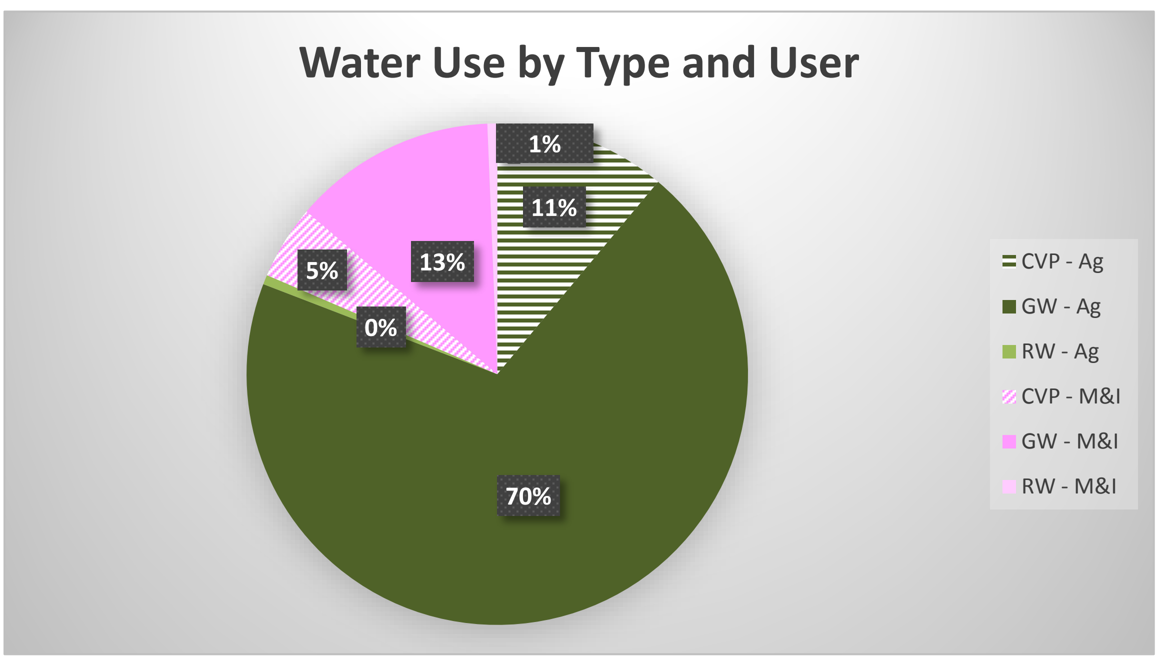
In 2016, groundwater represented 83 percent of total supply, again mostly due to increases in groundwater pumping for agricultural use. While the percent of supply from groundwater is less than 2015 (86 percent), it remains a much larger portion of total supply than the period of record.  **Figure 8** on the following page shows that since 1991, groundwater has averaged only 62 percent of supply but increased periodocally due to drought and reduced CVP allocations.

**Figure 8. Percent of supply by source, 1991- 2016**




Agricultural irrigation has represented most water use, ranging from 71 to 90 percent of total demand. In 2016, this sector represented 81 percent of demand. Groundwater for agriculture use is the highest water use/water source combination in most years, averaging 46 percent of total demand from 1988 through 2016. In 2016, groundwater use for agriculture represented 70 percent of the total water use. With the exception of last year, groundwater for agriculture uses is the highest portion of total water use since 1988. **Figure 9** shows the breakdown of water use by source and user.

**Figure 9. Percent of supply by source and user, 2016**



Municipal and domestic use increased slightly in water year 2016, but remained lower than the average over the period of record. Urban demand remained low in a large part due to water conservation. In the past, use of CVP water for direct M&I use was usually limited by the available treatment capacity of the Lessalt treatment plant. This is the first full year after the plant was expanded: in 2016, Lessalt served 1,682 AF, the highest volume since 2007.

Water year 2016 was the first year in which recycled water was delivered to both agriculture and municipal customers.

## Distribution by Subbasin

Water use by subbasin remained similar as in previous years, with groundwater making up a large portion of supply in Bolsa South East, San Juan, and Tres Pinos subbasins. **Table 7** shows the water use by user, and water type for each subbasin. Graphs showing total water use by water source are available in Appendix E.

**Table 7. Zone 6 Water Use in Water Year 2016 (AF)**

| | | CVP Water | | Groundwater | | Recycled Water | |
|---|---|---|---|---|---|---|---|
| **Subbasin** | **TOTAL** | **Agriculture** | **Domestic & Municipal** | **Agricultural** | **Domestic & Municipal** | **Agricultural** | **Domestic & Municipal** |
| Bolsa South East | 2,626 | 30 | 0 | 2,533 | 24.8 | 38 | 0.0 |
| Hollister East | 11,401 | 3,059 | 1,752 | 5,518 | 865 | 207 | 0 |
| Hollister West | 4,446 | 157 | 5 | 2,036 | 1,996 | 0 | 253 |
| Pacheco | 4,806 | 396 | 24 | 4,220 | 167 | 0 | 0 |
| San Juan | 14,399 | 742 | 77 | 13,084 | 497 | 0 | 0 |
| Tres Pinos | 2,329 | 51 | 56 | 522 | 1,701 | 0 | 0 |
| **TOTAL** | **40,008** | **4,434** | **1,914** | **27,912** | **5,251** | **246** | **253** |

# 5 WATER LEVELS

In October 2016, groundwater levels continued to decline in areas of the basin that rely on groundwater, specifically in the Bolsa, San Juan, Hollister West, Bolsa SE, and Tres Pinos subbasins. While some subbasins showed groundwater level increases, overall groundwater in storage decreased. Groundwater elevation declines and storage decreases during drought do not constitute overdraft; nevertheless, the continued reduced supplies of imported water in tandem with increased groundwater demands are a warning of potential overdraft.

The groundwater level analysis depends on a consistent network of reliable wells. The number of wells in the District's groundwater monitoring program for the autumn was at an all-time low, increasing the uncertainty of a subbasin wide storage change calculations. In addition, the set of wells monitored was different from that monitored in previous years in some key locations. It is recommended that the District assess the monitoring network and redouble efforts to record water levels in a stable network of wells on a quarterly basis. If for some reason wells are no longer part of the network they should be replaced as soon as possible with a nearby, comparably-constructed well that can serve as a permanent addition to the network.

The District should continue to manage groundwater resources for substantial and rapid recovery in wet years, recognizing that most years are average to dry and wet years are less frequent. Additional information on groundwater elevations (including profiles of basin cross sections and depth to water contours) are included in Appendix C.

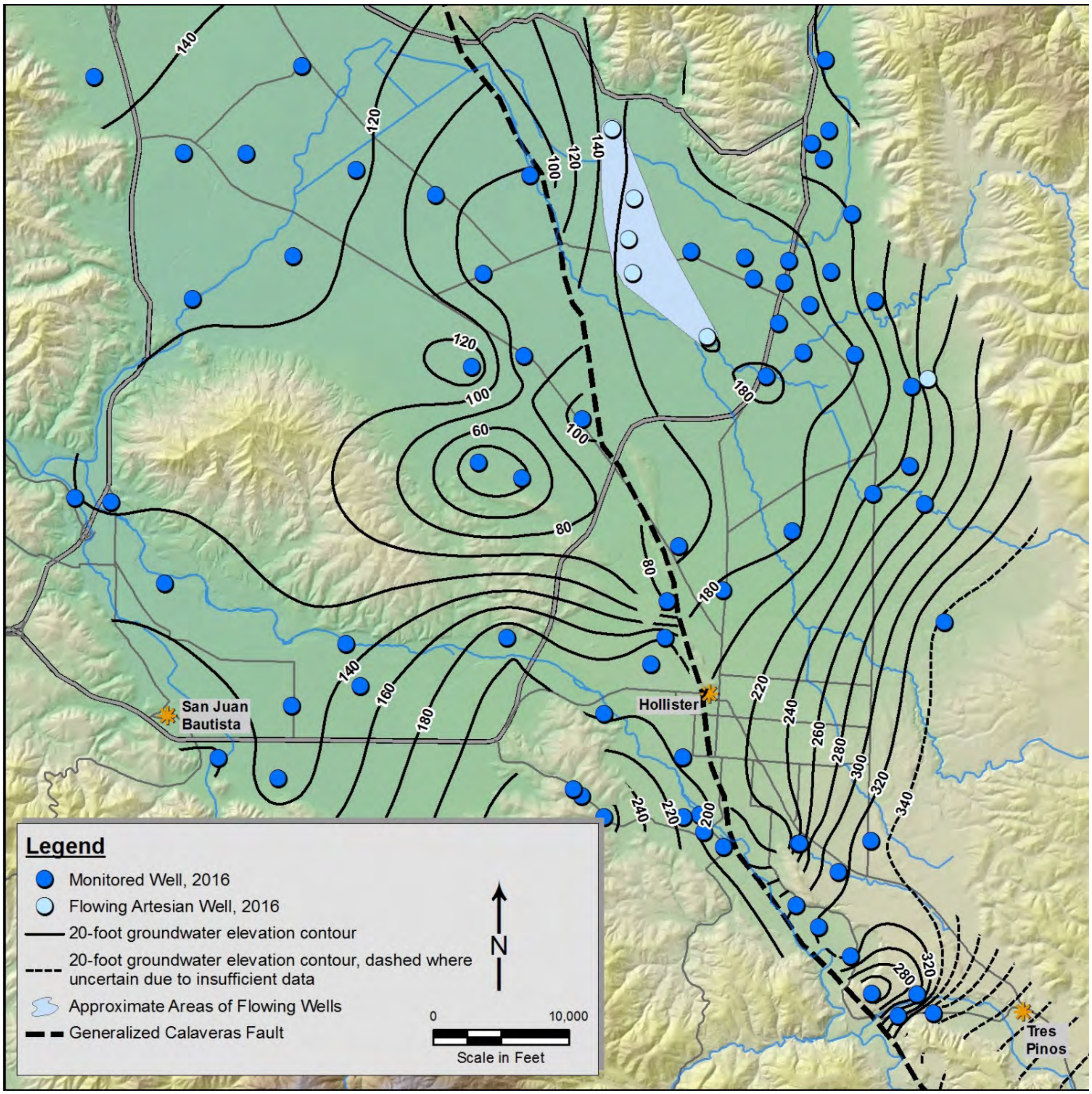
## Groundwater Elevations

Groundwater elevation data were examined from 90 wells in the District's quarterly groundwater elevation monitoring program. Generally, October groundwater elevation data are used for preparing groundwater elevation contour maps. However, this year some of the measurements were collected in early November. Groundwater elevations in the fall, including those shown in **Figure 10**, are assumed to represent the lowest levels for the water year. The groundwater elevation contouring methods incorporate the effects of the Calaveras Fault on water levels by splitting the area into eastern and western portions and then generating contours for each. The resulting contours are then evaluated for consistency and reasonableness and any necessary refinements are made. The contours indicate a general flow from southeast to northwest.

Profiles of historical groundwater levels are provided in Figure C-6 in Appendix C. These profiles show groundwater levels for 2016 and 2015 plus historic groundwater lows and the range of historical water levels. Review of Figure C-6 indicates new historic lows in the Tres Pinos area (Profile A-A') and Bolsa (Profile B-B'). Previous annual reports (2014 and 2015) also indicated new historic lows.

Additional groundwater level data are presented in Appendix C, including maps, summary tables, and water level data.

**Figure 10. Groundwater Elevations, October 2016**



The relative changes in groundwater elevations from October 2015 to October 2016 are shown on **Figure 11.** The map was prepared by calculating and contouring the differences between mapped groundwater elevations for the two periods. The accuracy of this map was checked by examining water level changes in individual wells that were monitored in the fall quarter of both years. **Figure 12** shows the cumulative drawdown over the current drought (2011 through 2016). While the reduced water levels are uneven, average levels in all subbasins have decreased up to 30 feet since 2011.

In both change maps, some localized areas of apparent significant change (for example in the Bolsa) reflect available data in a single well and thereby over-emphasize groundwater level changes. Resolution of such inaccuracies would be achieved by increasing the monitoring well network and stabilizing the year-to-year measurements.

**Figure 11. Change in Groundwater Elevations 2015-2016**

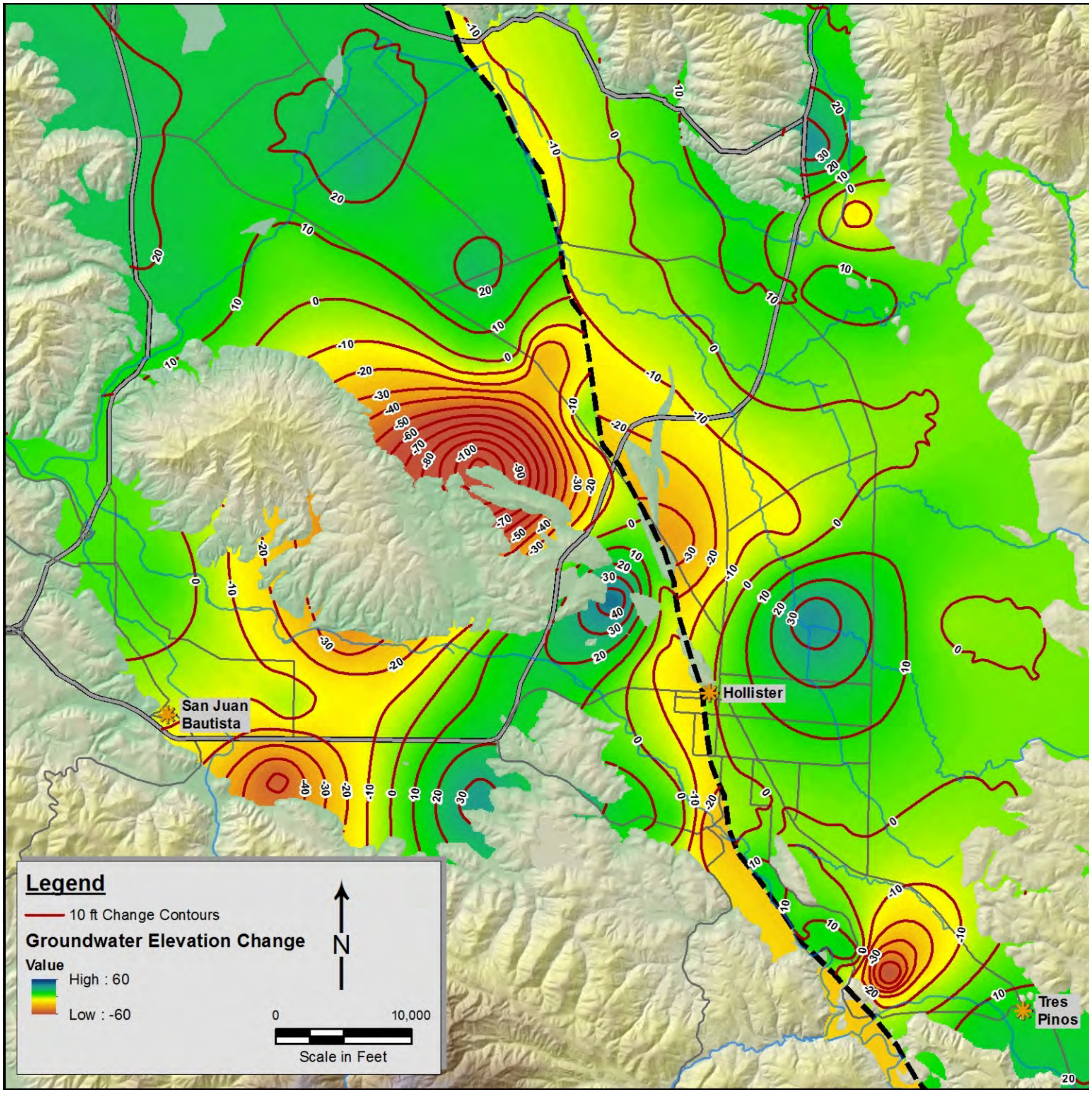
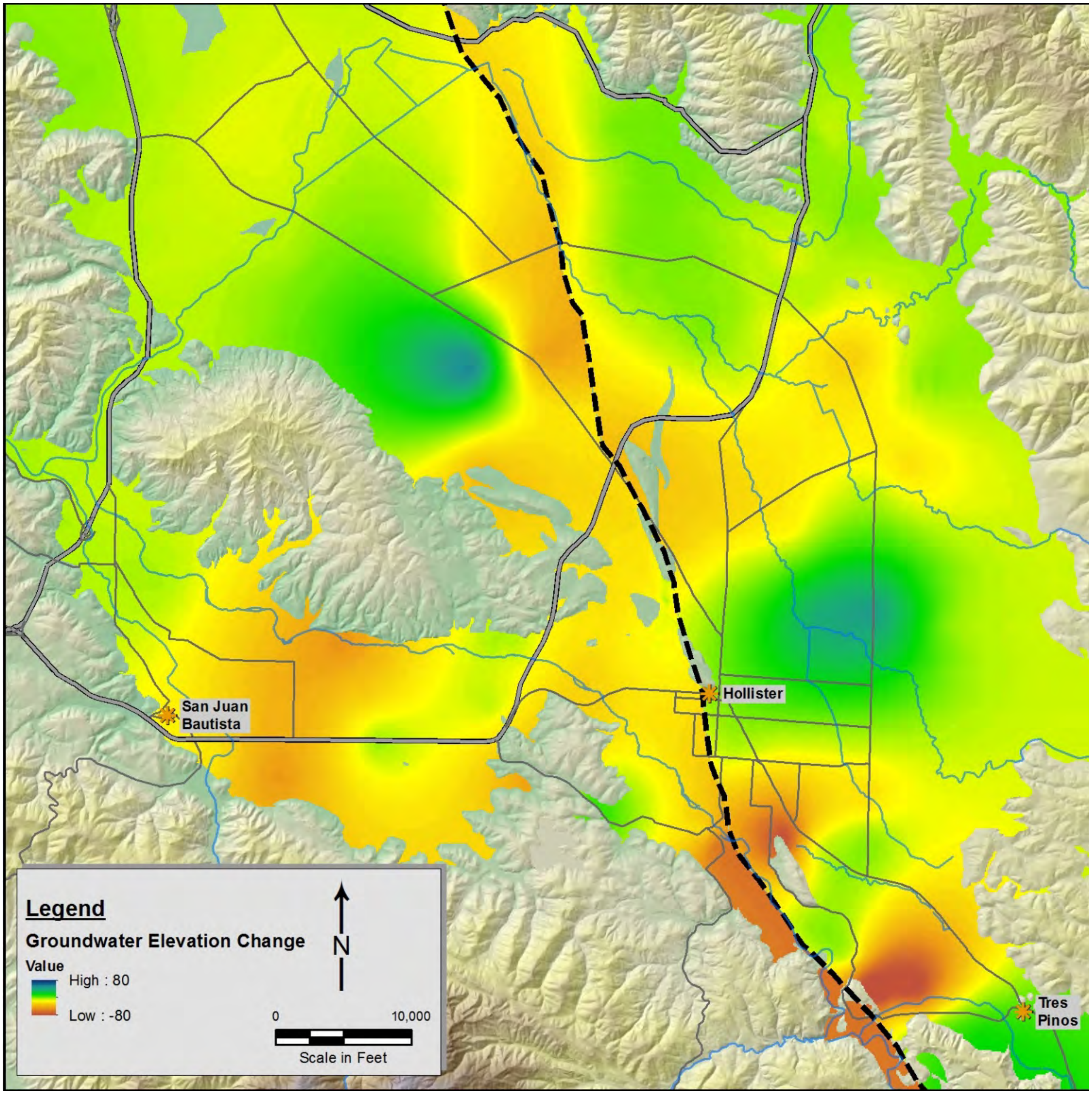


**Figure 12. Cumulative Change in Groundwater Elevations 2011-2016**



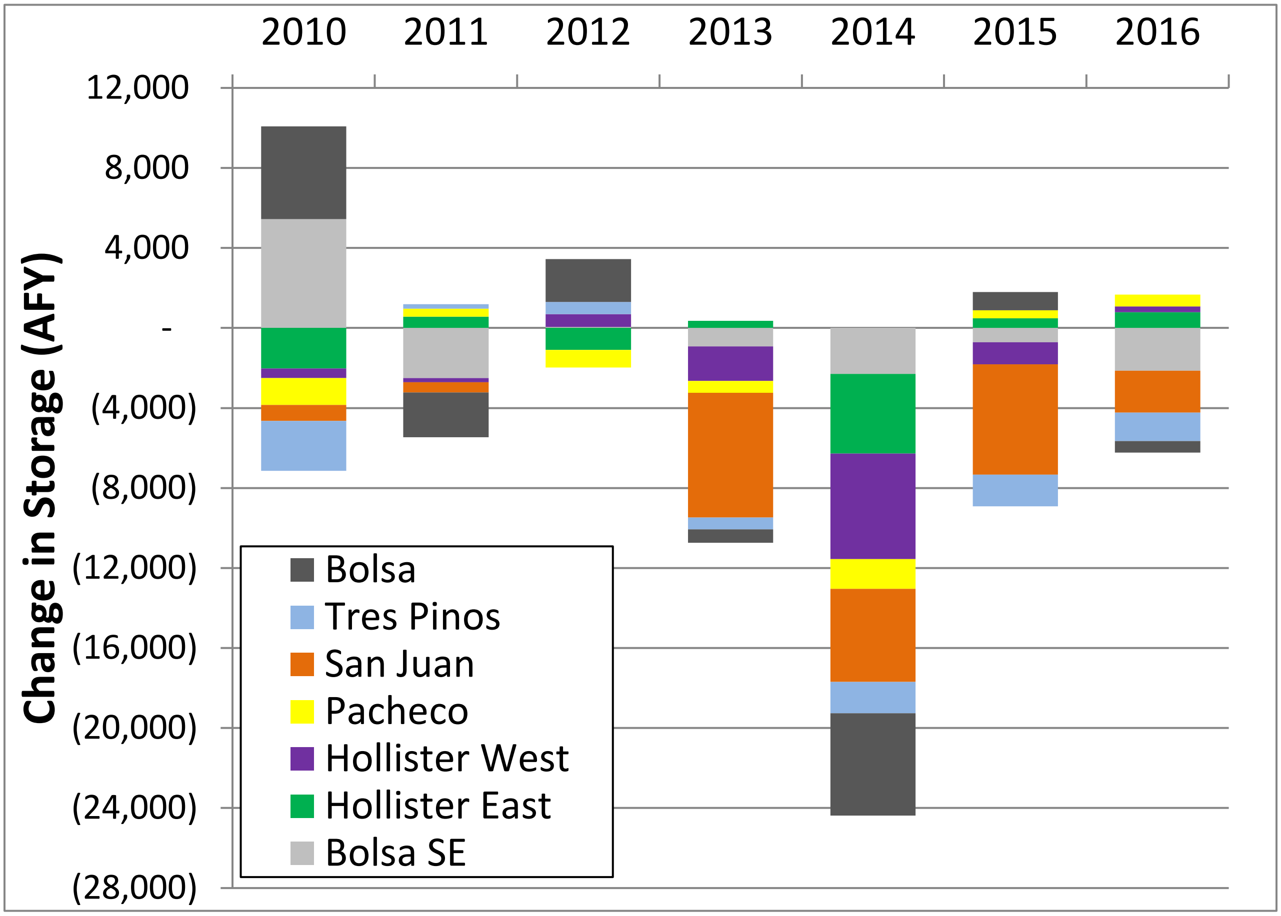
## Change in Storage

Groundwater elevation changes from October 2015 to October 2016 were used to determine the change in storage, which is the net volume of water added to or removed from the basin over the water year. The change in storage was calculated using the change in groundwater elevations (feet) and multiplying by the total area (acres) to determine the total bulk volume of change. This bulk volume of change is then multiplied by the average storativity of the subbasin to represent the amount of water that a given volume of aquifer will produce. The storativity values for each subbasin were derived from a numerical model of the basin developed by Yates and Zhang (2001).

The total change in groundwater storage for Zone 6 was a decrease of 3,977 AF, while the total change for the basin, including the Bolsa subbasin, was a decrease of 4,555 AF. While recognizing that low groundwater levels can represent available capacity in the basin for future groundwater storage or banking, these ongoing large decreases in storage are significant. This marks the fourth year of significant decreased storage in San Juan. While not all subbasins showed decreased storage this year, average water levels in all subbasins continue to be well below the elevations when the current drought began in 2011. Average subbasin water levels compared to 2011 are still over 30 feet lower in Tres Pinos, nearly 27 feet lower in Bolsa SE, over 24 feet lower in Hollister West, and over 22 feet lower in San Juan. **Figure 13** illustrates the change in storage by subbasin for the past seven years.

The change in storage analysis and subsequent calculations are highly dependent on how many and which wells are monitored from year to year. As noted before, the number of monitored wells has diminished and the set of monitored wells has not been stable. This increases the uncertainty of a subbasin-wide storage change calculation because actual groundwater elevation changes cannot be effectively distinguished from apparent fluctuations related to variations in which wells are monitored. In some subbasins and some years the effects of variations in the monitoring well network have more influence on the average change in groundwater elevations than do measured differences. Stabilization of the year-to-year monitoring well network is necessary for valid assessment of change in storage.

**Figure 13. Change in Storage by Subbasin (2006-2016)**




## Hydrographs

Long term changes in groundwater elevations are illustrated in composite hydrographs. These composite hydrographs are generated by averaging elevations from key wells from each subbasin for each monitoring event. The key well locations are shown on **Figure 14.** It should be noted that these subbasin hydrographs represent average conditions in each subbasin and illustrate long-term trends, but do not show localized variations in groundwater elevations. Overall, groundwater elevations do not indicate overdraft conditions as of 2016.

Water levels in most subbasins have shown a decrease over the multi-year drought consistent with increased pumping and decreased storage. **Figures 15a and 15b** show the composite hydrographs. While precipitation in 2016 was higher than the long-term average, it will be some time before groundwater levels recover to pre-drought levels. Some factors that will determine the length of recovery include not only precipitation but groundwater use, pattern and intensity of rainfall, local geology (that would affect how much time recharge travels from the surface to the aquifer), and any managed recharge activities (like wastewater percolation).

**Figure 14. Locations of Key Wells Used in Hydrographs**

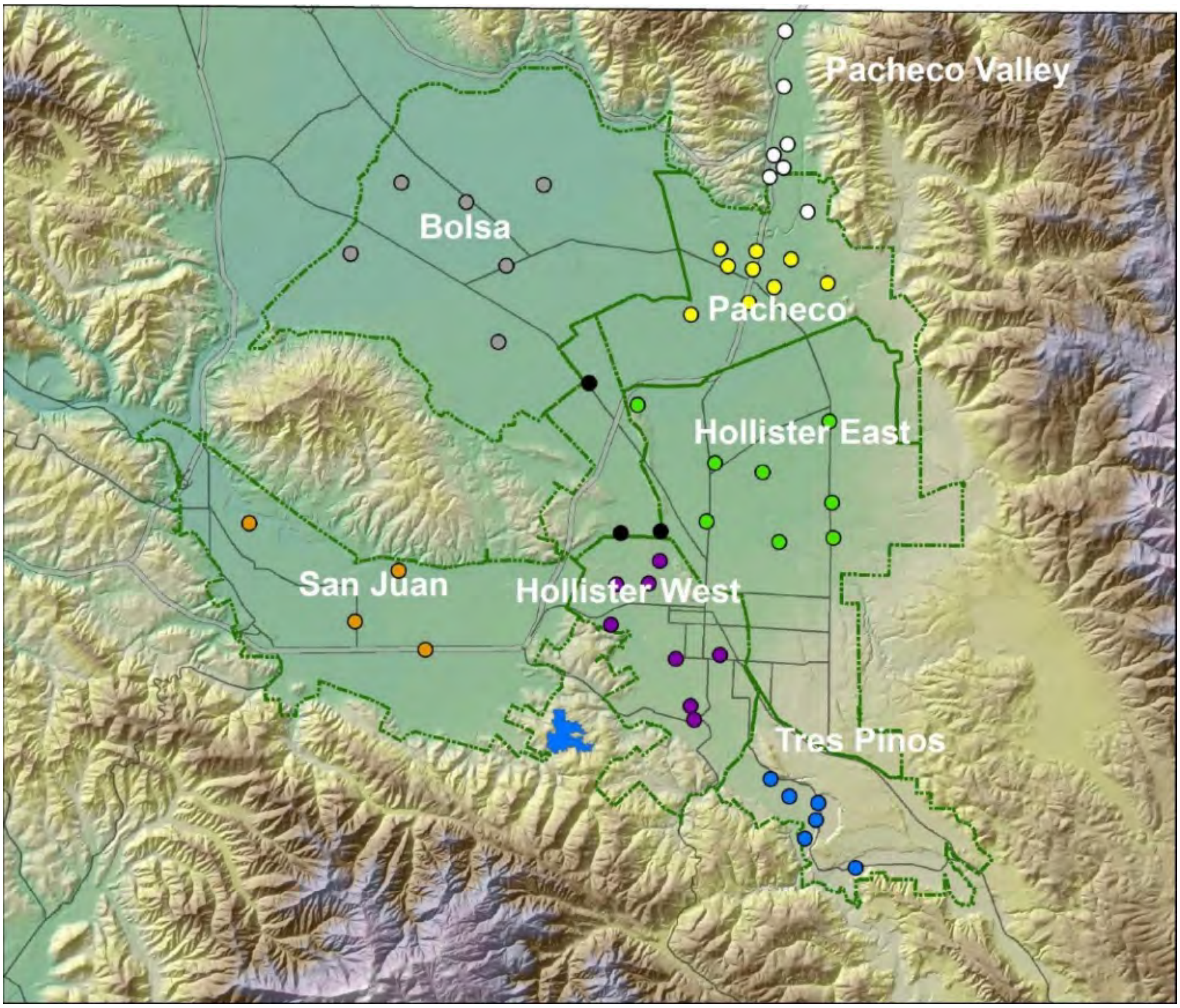
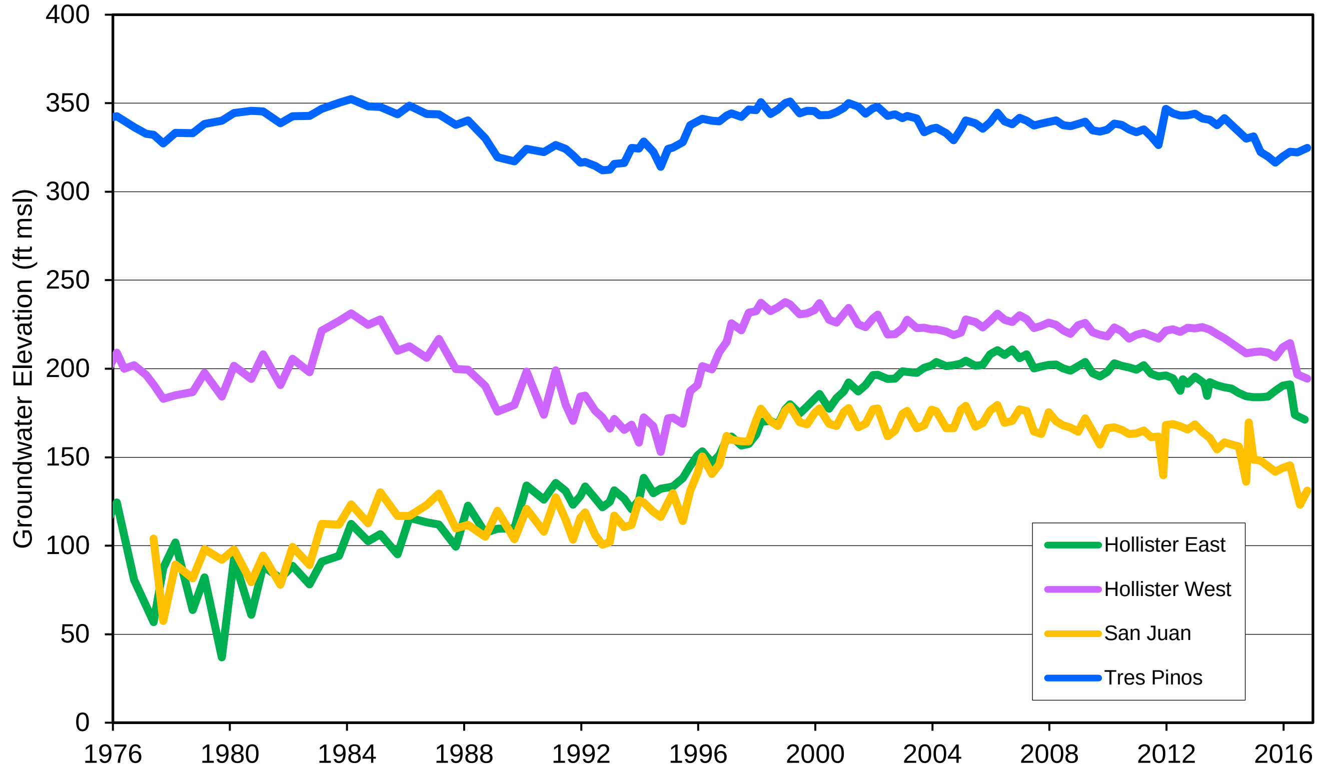
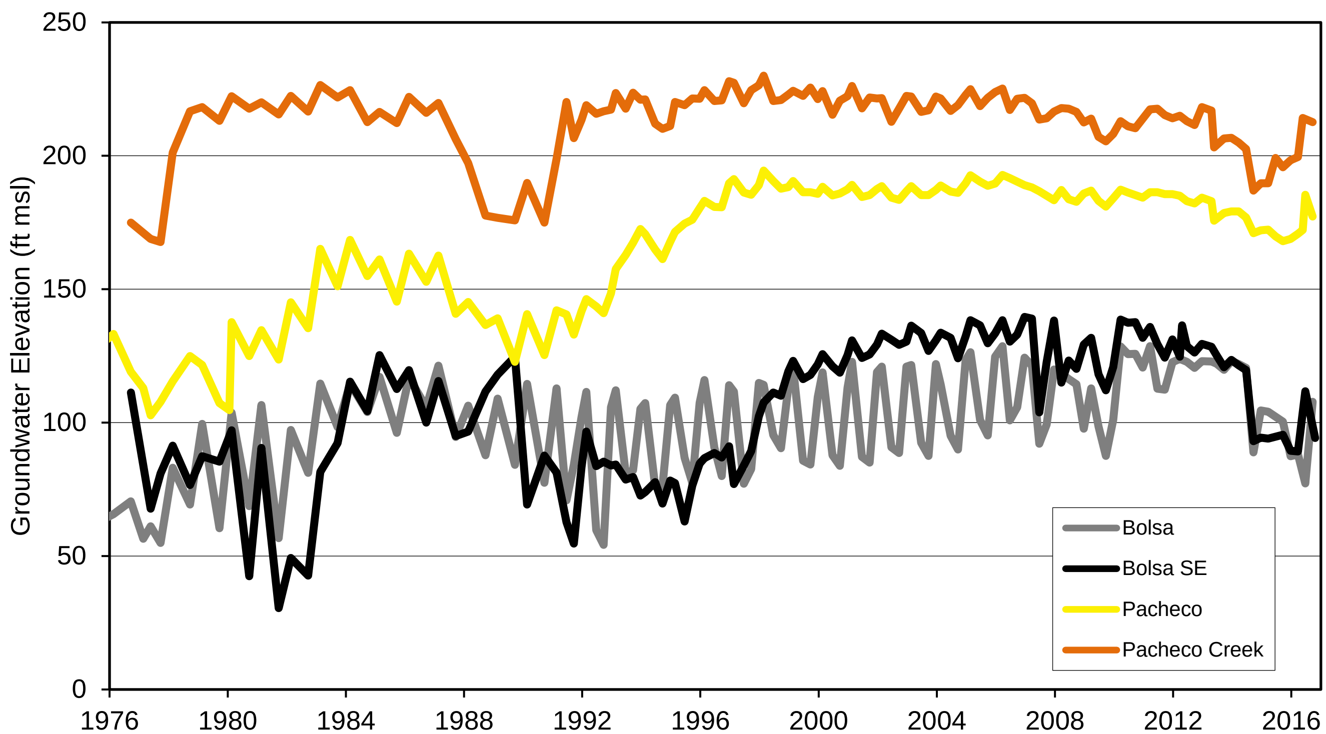


**Figure 15. Composite Hydrographs**



# 6 FINANCIAL INFORMATION

The District derives its operating revenue from charges levied on landowners and water users. Non-operating revenue is derived from property taxes, interest, standby and availability charges, and grants. Zone 6 charges relating to the importation and distribution of CVP water are the focus of this section.

The groundwater charge for Zone 6 water users reflects costs associated with groundwater monitoring and management, including the cost of purchasing CVP water and power charges associated with percolation. The per-acre-foot charge is determined by dividing these costs by the volume of groundwater usage. Groundwater charges are adjusted annually in March. For March 2016-February 2017, the District rates are $4.95 for agricultural use and a groundwater charge of $24.25 for M&I use.

The District has also calculated the groundwater charge for the next USBR water year (March 2017-February 2018). The detailed calculation is shown in Appendix F and the District recommends rates remain at $6.45 for agricultural use in Zone 6 and a groundwater charge of $24.25 is recommended for M&I use in Zone 6.

CVP rates (provided by the USBR) include the cost of service, restoration fund payment, charges for maintenance of San Luis Delta Mendota Water Authority facilities, and others fees (the breakdown is found in Appendix F). The District San Felipe rates paid by users include a standby and availability charge, power charge, and a water charge. The standby and availability charge is a $6 per-acre charge assessed on all parcels with access to CVP water (an active or idle turnout from the distribution system). Power charges depend on the location of user. **Table 8a and b,** on the following page, shows the District San Felipe water and power charges, respectively, for the Water Years 2016-2017 and 2017-2018.

**Table 8a. District San Felipe Water Charges 2016-2017 and 2017-2018**

| Blue Valve Water Charge ($/af) | | | | |
|---|---|---|---|---|
| Year | Agricultural | | | Municipal & Industrial |
| | Non - Full Cost | Full Cost (1a) | Full Cost (1b) | |
| **2016-2017** | $272.00 | $445.00 | $463.00 | $363.00 |
| **2017-2018** | $272.00 | $445.00 | $463.00 | $363.00 |

**Table 8b. District San Felipe Power Charges 2016-2017 and 2017-2018**

| Blue Valve Power Charge ($/acre-foot) | 2016-2017 | 2017-2018 |
|---|---|---|
| Subsystem 2 | $123.10 | $126.80 |
| Subsystem 6H | $75.65 | $77.90 |
| Subsystem 9L | $109.95 | $113.25 |
| Subsystem 9H | $162.55 | $167.45 |
| All other subsystems | $66.05 | $68.05 |

Notes:

1 "Full-cost rates for agricultural users apply to landholders that have exceeded his/her or its non full-cost entitlement. There are two full-cost rates:

a. Section 202(3) - the lower full-cost rate, which applies to qualified recipients leasing in excess of their 960-acre entitlement, limited recipients that received Reclamation irrigation water on or before October 1, 1981, and extended recordable contracts.

There are currently no Zone 6 full-cost users under this section.

b. Section 205(a)(3) - the higher full-cost rate, which applies to prior law recipients leasing in excess of their applicable no full-cost entitlement, and limited recipients that did not receive Reclamation irrigation water on or before October 1, 1981.

See Section 202(3) or 205(a)(3) of RRA Rules and Regulations for further non full-cost definitions.

Recycled Water rates (**Table 9)** were set through 2017 to recover current operating and maintenance costs related to the water service. Recycled water rates include those costs associated with water supply, water quality and infrastructure (SBCWD February 2015).

**Table 9. Recycled Water Charges, 2016-2017**

| Recycled Water | | |
|---|---|---|
| Effective | Agriculture Rate | Power Charge |
| 3/1/2016 | $182.55 | $57.70 |
| 3/1/2017 | $183.45 | $59.45 |

Minimum Annual Purchase of water for each parcel is $700

Assuming that the District becomes a GSA and prepares a GSP, compliance with SGMA will entail increased costs for operation and maintenance; the District should explore the financial measures to support SGMA compliance equably across the managed subbasins.

# 7 OUTLOOK

## La Niña

The next water year is expected to be a weak La Niña year, and the National Weather Service (NWS) is predicting that precipitation will be normal for Northern California, for most of the winter and spring (NWS 2016). Even average precipitation will aid in the replenishment of the groundwater basins and perhaps translate to higher CVP allocations.  A return to normal rainfall alone is unlikely to end the drought.

## CVP Deliveries

The annual allocation of CVP water remains uncertain. In past years, San Luis & Delta Mendota Water Authority (SLDMWA) has forecasted CVP allocation for the next year. SLDWMA no longer publishes estimated allocation in the fall. Many factors affect the allocation, including environmental considerations in the Delta, seniority of CVP water rights on water ways, reduced snowpack due to climate change, debt to the State Water Project System and other factors. The District must continue to use their existing tools (and continue to develop new management tools) to secure a reliable water supply despite variable CVP allocations.

## Groundwater

In 2016, groundwater storage was reduced significantly in parts of the basin due to increased groundwater use in a context of years of extreme drought and reduced CVP allocations. Years of abundant rainfall and restored CVP supply will be needed to replenish the groundwater.

Current groundwater storage is sufficient to accommodate water demand in the short term with negative water budgets, and the capacity for groundwater recovery in subsequent wet years is sufficient to balance moderate increases in groundwater pumping without causing long-term overdraft. However, persistence of drought and reduced CVP supply entail a real risk of overdraft.

# 8 RECOMMENDATIONS

The water supply outlook for 2016 is mixed. While precipitation is expected to be average, the state's and the basin's water resources need to be replenished. The District should continue to move forward with plans and projects to ensure a more sustainable water supply system that includes a portfolio of sources.

**Groundwater Sustainability.** It is recommended the District assume the responsibilities of a Groundwater Sustainability Agency and prepare a groundwater sustainability plan for the subbasins of the Gilroy-Hollister Basin in San Benito County. Where portions of a basin overlap neighboring jurisdictions, it is recommended that the District work with the respective agency toward collaborative compliance with SGMA.

The next major milestone is establishment of a Groundwater Sustainability Agency; the deadline is June 30, 2017. It is recommended that the District begin the process as soon as possible; this would provide time to resolve unforeseen issues and, once completed, allow the District to consider next steps, such as acquisition of funding.

**Groundwater Charges.** Based on the methodology used since 2006, the groundwater charge for the USBR contract year (March 2017-February 2018) is recommended to be $6.45 for agricultural use in Zone 6 and a groundwater charge of $24.25 is recommended for M&I use in Zone 6.

G**roundwater Production and Replenishment.** District percolation operations helped reverse historical overdraft and then accumulated a substantial water supply reserve. The District currently manages groundwater storage and surface water to minimize excessively high or low water levels on a temporal and geographic basis. In 2016, it is recommended—insofar as possible—that storage in Hernandez Reservoir be replenished as much as possible. Percolation of available local water supplies should be focused on portions of the basin with groundwater level decline, like San Juan and Hollister West. Both subbasins are along San Benito River and would benefit from increased reservoir releases and recharge.

**Groundwater Monitoring.** The number of wells in both the water level network and water quality network has declined over time. It is recommended that the District assess the monitoring network and redouble efforts to monitor a stable network of wells on a regular basis. If for some reason wells are no longer part of the network, they should be replaced as soon as possible with a nearby, comparably-constructed well that can serve as a permanent addition to the network.

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# A REPORTING REQUIREMENTS AND SPECIAL TOPICS

The San Benito County Water District Act (1953) is codified in California Water Code Appendix 70. Section 70-7.6 authorizes the District Board of Directors to require the District to prepare an annual groundwater report; this report addresses groundwater conditions of the District and its zones of benefit for the water year, which begins October 1 of the preceding calendar year and ends September 30 of the current calendar year. The Board has consistently ordered preparation of Annual Reports, and the reports have included the contents specified Section 70-7.6:

- An estimate of the annual overdraft for the current water year and for the ensuing water year
- Information for the consideration of the Board in its determination of the annual overdraft and accumulated overdraft as of September 30 of the current year
- A report as to the total production of water from the groundwater supplies of the District and its zones as of September 30 of the current year
- Information for the consideration of the Board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the District and its zones
- The amount of water the District is obligated to purchase during the ensuing water year
- A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the District and its zones during the ensuing water year
- A recommendation as to whether or not a groundwater charge should be levied in any zone(s) of the District in the ensuing water year and if so, a rate per acre-foot for all water other than agricultural water for such zone(s)
- Any other information the Board requires.
- The full text of Appendix 70, Section 70-7.6 through 7.8 is enclosed at the end of this appendix.
- Each water year a special topic is identified for further consideration. These topics have included water quality, salt loading, shallow wells, and others. Additional analyses and documentation provided in previous annual reports are summarized in the following table.

Table A-1. Special Topics in Previous Annual Reports

| Water Year | Additional Analyses and Reporting |
|---|---|
| 2000 | Methodology to calculate water supply benefits of Zone 3 and 6 operations |
| 2001 | Preliminary salt balance |
| 2002 | Investigation of individual salt loading sources |
| 2003 | Documentation of nitrate in supply wells, drains, monitor wells, San Juan Creek |
| 2004 | Documentation of depth to groundwater in shallow wells |
| 2005 | Tabulation of waste discharger permit conditions and recent water quality monitoring results |
| 2006 | Rate study |
| 2007 | Water quality update |
| 2008 | Water budget update |
| 2009 | Water demand and supply |
| 2010 | Water quality update |
| 2011 | Water budget update |
| 2012 | Land use update |
| 2013 | Water quality update |
| 2014 | Water balance update and Groundwater Sustainability |
| 2015 | Groundwater Sustainability – Basin Boundaries and GSAs |
| 2016 | Water quality update |

**Water Code Appendix 70 Excerpts**

**Section 70-7.6. Groundwater; investigation and report: recommendations San Benito County**

Sec. 7.6. the board by resolution require the district to annually prepare an investigation and report on groundwater conditions of the district and the zones thereof, for the period from October 1 of the preceding calendar year through September 30 of the current year and on activities of the district for protection and augmentation of the water supplies of the district and the zones thereof. The investigation and report shall include all of the following information:

(a) Information for the consideration of the board in its determination of the annual overdraft.

(b) Information for the consideration of the board in its determination of the accumulated overdraft as of September 30 of the current calendar year.

(c) A report as to the total production of water from the groundwater supplies of the district and the zones thereof as of September 30 of the current calendar year.

(d) An estimate of the annual overdraft for the current water year and for the ensuing water year.

(e) Information for the consideration of the board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the district and the zones thereof for the ensuing water year.

(f) The amount of water the district is obligated to purchase during the ensuing water year.

(g) A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the district and the zones thereof the ensuing water year.

(h) A recommendation as to whether or not a groundwater charge should be levied in any zone or zones of the district during the ensuing year.

(i) If any groundwater charge is recommended, a proposal of a rate per acre-foot for agricultural water and a rate per acre-foot for all water other than agricultural water for such zone or zones.

(j) Any other information the board requires.

(Added by Stats. 1965,c. 1798,p.4167, 7. Amended by Stats.1967,c.934, 5, eff. July27,1967; Stats. 1983, c. 402, 1; Stats. 1998, c. 219 (A.B.2135), 1.)

**Section 70-7.7. Receipt of report; notice of hearing; contents; hearing**

Sec. 7.7. (a) On the third Monday in December of each year, the groundwater report shall be delivered to the clerk of the board in writing. The clerk shall publish, pursuant to Section 6061 of the Government Code, a notice of the receipt of the report and of a public hearing to be held on the second Monday of January of the following year in a newspaper of general circulation printed and published within the district, at least 10 days prior to the date at which the public hearing regarding the groundwater report shall be held. The notice shall include, but is not limited to, an invitation to all operators of water producing facilities within the district to call at the offices of the district to examine the groundwater report.

(b) The board shall hold, on the second Monday of January of each year, a public hearing, at which time any operator of a water-producing facility within the district, or any person interested in the condition of the groundwater supplies or the surface water supplies of the district, may in person, or by representative, appear and submit evidence concerning the groundwater conditions and the surface water supplies of the district. Appearances also may be made supporting or protesting the written groundwater report, including, but not limited to, the engineer's recommended groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4167, 8. Amended by Stats. 1983, c. 02,2; Stats. 1998, c. 219 (A.B.2135,2.)

**Section 70-7.8. Determination of groundwater charge; establishment of rates; zones; maximum charge; clerical errors**

Sec. 7.8. (a) Prior to the end of the water year in which a hearing is held pursuant to subdivision (b) of Section 7.7, the board shall hold a public hearing, noticed pursuant to Section 6061 of the government Code, to determine if a groundwater charge should be levied, it shall levy, assess, and affix such a charge or charges against all persons operating groundwater- producing facilities within the zone or zones during the ensuing water year. The charge shall be computed at fixed and uniform rate per acre-foot for agricultural water, and at a fixed and uniform rate per acre-foot for all water other than agricultural water. Different rates may be established in different zones. However, in each zone, the rate for agricultural water shall be fixed and uniform and the rate for water other than agricultural water shall be fixed and uniform. The rate for agricultural water shall not exceed one-third of the rate for all water other than agricultural water.

(b) The groundwater charge in any year shall not exceed the costs reasonably borne by the district in the period of the charge in providing the water supply service authorized by this act in the district or a zone or zones thereof.

(c) Any groundwater charge levied pursuant to this section shall be in addition to any general tax or assessment levied within the district or any zone or zones thereof.

(d) Clerical errors occurring or appearing in the name of any person or in the description of the water-producing facility where the production of water there from is otherwise properly charged, or in the making or extension of any charge upon the records which do not affect the substantial rights of the assesse or assesses, shall not invalidate the groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4168, 9. Amended by Stats. 1983, c. 402, 3; Stats.1983, c. 402, 3; Stats. 1998, c. 219 (A.B.2135), 3.)

# B CLIMATE DATA

List of Tables and Figures

**Table B-1a. Monthly Precipitation at the SBCWD CIMIS Station (inches)**

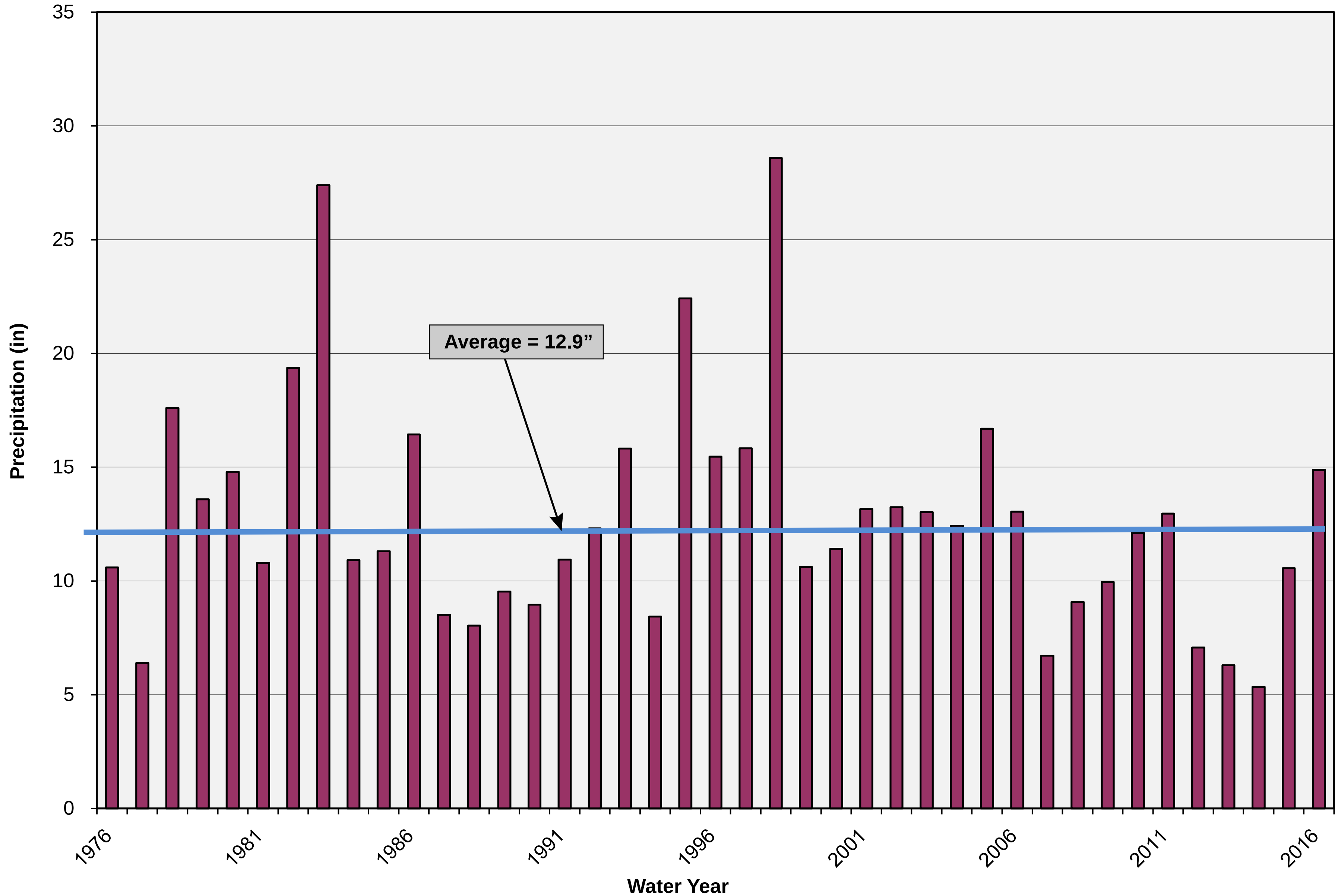
| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.1 | 0 | 2.2 | 4.4 | 4.5 | 1.6 | 1.3 | 1.3 | 0 | 0 | 0 | 0 | 15.5 | 32% |
| 1997 | 1.0 | 3.2 | 4.3 | 6.8 | 0.2 | 0.1 | 0.2 | 0 | 0.1 | 0 | 0 | 0 | 15.9 | 122% |
| 1998 | 0.2 | 3.8 | 2.6 | 4.9 | 9.1 | 2.7 | 2.3 | 2.4 | 0.1 | 0 | 0 | 0.1 | 28.1 | 216% |
| 1999 | 0.5 | 1.9 | 0.8 | 2.5 | 2.5 | 1.5 | 0.7 | 0.1 | 0.1 | 0 | 0 | 0 | 10.6 | 81% |
| 2000 | 0.1 | 1.0 | 0.1 | 4.1 | 4.5 | 0.7 | 0.4 | 0.5 | 0.1 | 0 | 0 | 0 | 11.5 | 88% |
| 2001 | 3.5 | 0.8 | 0.2 | 2.9 | 2.8 | 0.6 | 2.2 | 0 | 0 | 0 | 0 | 0 | 13.1 | 100% |
| 2002 | 0.7 | 11.5 | 11.9 | 0.7 | 1.2 | 1.6 | 0.4 | 0.3 | 0 | 0 | 0 | 0 | 28.1 | 216% |
| 2003 | 0.0 | 1.7 | 5.0 | 0.8 | 1.4 | 1.1 | 3.1 | 0.1 | 0 | 0 | 0.1 | 0 | 13.1 | 101% |
| 2004 | 0.2 | 0.6 | 5.3 | 1.3 | 4.2 | 0.6 | 0.3 | 0.1 | 0 | 0 | 0 | 0 | 12.5 | 96% |
| 2005 | 2.0 | 0.5 | 3.5 | 2.5 | 2.9 | 3.4 | 0.8 | 0.6 | 0.4 | 0 | 0 | 0 | 16.7 | 128% |
| 2006 | 0.1 | 0.3 | 3.1 | 1.5 | 1.0 | 5.0 | 1.7 | 0.4 | 0 | 0 | 0 | 0 | 13.0 | 100% |
| 2007 | 0.2 | 0.7 | 1.7 | 0.6 | 2.2 | 0.3 | 0.6 | 0 | 0 | 0 | 0 | 0.4 | 6.7 | 52% |
| 2008 | 0.7 | 0.7 | 0.9 | 4.6 | 2.1 | 0.1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 9.1 | 70% |
| 2009 | 0.3 | 1.1 | 1.9 | 0.4 | 3.7 | 1.8 | 0.2 | 0.5 | 0 | 0 | 0 | 0.2 | 10.0 | 76% |
| 2010 | 0.5 | 0 | 1.3 | 2.3 | 2.2 | 1.7 | 3.4 | 0.6 | 0 | 0 | 0 | 0 | 12.1 | 93% |
| 2011 | 0.7 | 1.9 | 2.6 | 1.6 | 2.6 | 2.3 | 0.2 | 0.8 | 0 | 0 | 0 | 0 | 13.0 | 99% |
| 2012 | 0.7 | 1.0 | 0.1 | 0.8 | 0.5 | 2.3 | 1.4 | 0.3 | 0 | 0 | 0 | 0 | 7.1 | 54% |
| 2013 | 0.0 | 2.2 | 1.2 | 1.4 | 0.6 | 0.5 | 0.3 | 0.0 | 0 | 0 | 0 | 0 | 6.3 | 48% |
| 2014 | 0.1 | 0.4 | 0.2 | 0.2 | 1.9 | 1.6 | 0.9 | 0.0 | 0 | 0 | 0 | 0 | 5.4 | 41% |
| 2015 | 1.6 | 0.5 | 5.8 | 0.0 | 1.2 | 0.2 | 0.2 | 0.9 | 0.0 | 0.0 | 0.1 | 0.1 | 10.6 | 82% |
| 2016 | 0.2 | 3.7 | 1.6 | 4.0 | 0.6 | 3.7 | 0.8 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 14.9 | 115% |
| AVG | 0.7 | 1.7 | 2.7 | 2.2 | 2.6 | 1.5 | 1.0 | 0.4 | 0.1 | 0.0 | 0.0 | 0.1 | 12.9 | 95% |

**Table B-1b. Reference Evapotranspiration at the SBCWD CIMIS Station (inches)**

| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 3.9 | 2.2 | 1.2 | 1.5 | 1.9 | 3.7 | 5.1 | 6.1 | 6.7 | 7.4 | 6.7 | 4.7 | 51.0 | 105% |
| 1997 | 3.8 | 1.8 | 1.4 | 1.4 | 2.5 | 4.3 | 5.8 | 7.5 | 7.1 | 7.2 | 6.7 | 5.7 | 55.2 | 113% |
| 1998 | 3.9 | 1.8 | 1.5 | 1.3 | 1.4 | 2.8 | 4.3 | 4.5 | 5.3 | 6.9 | 6.8 | 4.7 | 45.2 | 93% |
| 1999 | 3.5 | 1.7 | 1.5 | 1.5 | 1.8 | 3.0 | 4.7 | 5.8 | 6.7 | 6.9 | 5.9 | 4.7 | 47.8 | 98% |
| 2000 | 4.0 | 2.0 | 1.9 | 1.2 | 1.6 | 3.7 | 5.1 | 6.0 | 6.7 | 6.7 | 6.2 | 4.7 | 50.0 | 103% |
| 2001 | 2.9 | 1.7 | 1.5 | 1.5 | 1.8 | 3.1 | 3.9 | 6.2 | 6.5 | 6.0 | 6.2 | 4.8 | 46.0 | 94% |
| 2002 | 3.5 | 1.9 | 1.2 | 1.5 | 2.3 | 3.7 | 4.2 | 6.4 | 7.1 | 7.2 | 6.1 | 5.4 | 50.5 | 104% |
| 2003 | 3.6 | 1.9 | 1.3 | 1.6 | 1.8 | 3.9 | 3.8 | 6.0 | 6.5 | 7.3 | 6.2 | 5.1 | 48.8 | 100% |
| 2004 | 4.1 | 1.7 | 1.2 | 1.3 | 1.7 | 4.0 | 5.2 | 6.4 | 6.7 | 6.6 | 6.0 | 5.3 | 50.3 | 103% |
| 2005 | 3.1 | 1.7 | 1.4 | 1.3 | 1.7 | 3.0 | 4.4 | 5.7 | 6.4 | 6.9 | 6.1 | 4.6 | 46.2 | 95% |
| 2006 | 3.6 | 2.0 | 1.2 | 1.4 | 2.2 | 2.4 | 3.0 | 5.5 | 6.4 | 7.0 | 5.6 | 4.4 | 44.7 | 92% |
| 2007 | 3.3 | 1.7 | 1.4 | 1.8 | 1.8 | 4.1 | 4.8 | 6.3 | 6.9 | 6.8 | 6.5 | 4.7 | 49.8 | 102% |
| 2008 | 3.5 | 2.2 | 1.4 | 1.3 | 2.0 | 3.8 | 5.2 | 6.0 | 6.9 | 6.7 | 6.3 | 5.0 | 50.2 | 103% |
| 2009 | 3.8 | 1.9 | 1.4 | 1.7 | 1.7 | 3.5 | 4.8 | 5.5 | 6.3 | 7.1 | 6.3 | 5.3 | 49.3 | 101% |
| 2010 | 3.5 | 2.2 | 1.7 | 1.3 | 1.8 | 3.5 | 3.9 | 5.4 | 6.7 | 6.3 | 5.9 | 5.0 | 47.0 | 96% |
| 2011 | 3.0 | 1.9 | 1.1 | 1.6 | 2.1 | 2.7 | 4.4 | 5.3 | 6.0 | 6.6 | 5.7 | 4.6 | 45.0 | 92% |
| 2012 | 3.3 | 1.9 | 1.8 | 1.8 | 2.5 | 3.3 | 4.4 | 6.4 | 6.8 | 6.6 | 6.0 | 4.6 | 49.5 | 101% |
| 2013 | 3.3 | 1.8 | 1.2 | 1.5 | 2.1 | 3.7 | 5.4 | 6.3 | 6.4 | 6.5 | 6.0 | 4.8 | 48.8 | 100% |
| 2014 | 3.5 | 2.0 | 1.8 | 2.1 | 1.9 | 3.6 | 4.9 | 6.8 | 6.6 | 6.4 | 6.0 | 4.7 | 50.4 | 103% |
| 2015 | 3.9 | 1.9 | 1.5 | 1.8 | 2.2 | 4.1 | 5.1 | 5.0 | 6.4 | 6.5 | 6.5 | 5.3 | 50.2 | 103% |
| 2016 | 4.1 | 2.1 | 1.4 | 1.3 | 2.7 | 3.4 | 4.7 | 5.7 | 7.5 | 7.2 | 5.7 | 5.2 | 51.0 | 105% |
| AVG | 3.5 | 1.9 | 1.4 | 1.5 | 1.9 | 3.5 | 4.6 | 6.0 | 6.6 | 6.8 | 6.2 | 4.9 | 48.7 | 100% |

Note: The averages are for the available period of record, starting in 1875 for precipitation and 1995 for reference evapotranspiration.

Todd Groundwater 12/1/2016




December 2016

TODD GROUNDWATER

**Figure B-1**
**Annual Precipitation in Hollister**
**(1875 - 2015)**

# C HYDROLOGICAL DATA

List of Tables and Figures

**Table C-1. Miscellaneous Streamflow Measurements during Water Year 2016**

| | Streamflow Measurement Site | Flow (cfs) | | | | |
|---|---|---|---|---|---|---|
| | | Oct-14 | Jan-15 | Apr-15 | Jul-15 | Oct-15 |
| 1 | Tres Pinos Cr - Southside Road Bridge | 0 | 0 | 0 | 0 | 0 |
| 2 | San Benito River - KT Road Bridge | 0 | 0 | 0 | 0 | 0 |
| 3 | San Benito River - Hospital Road | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| 4 | San Benito River - Cienega Road | 0 | 0 | 0 | 0 | 0 |
| 5 | San Benito River - Nash Road | 0 | 0 | 0 | 0 | 0 |
| 6 | San Benito River - old Highway 156 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| 7 | San Benito River - near Flint Road | 0 | 0 | 0 | 0 | 0 |
| 8 | San Benito River - near Mitchell Road | 0 | 0 | 0 | 0 | 0 |
| 9 | San Benito River - upstream of Bixby Road | 0 | 0 | 0 | 0 | 0 |
| 10 | San Benito River - Y Road | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| 11 | San Juan Creek - San Juan-Hollister Road | 0 | 0 | 0 | 0 | 0 |
| 12 | San Juan Creek - Highway 156 | 0 | 0 | 0 | 0 | 0 |
| 13 | San Juan Creek - Anzar Road | 0 | 0 | 0 | 0 | 0 |
| 14 | San Juan Creek - 2000 ft downstream of HWY 101 | | | | | |
| | | | | | | |
| 15 | Pacheco Creek - Walnut Avenue | 0 | 0 | 0 | 0 | 0 |
| 16 | Pacheco Creek - Highway 156 | 0 | 0 | 0 | 0 | 0 |
| 17 | Pacheco Creek - Lovers Lane | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| 18 | Arroyo de las Viboras - Hawkins Ranch driveway | 0 | 0 | 0 | 0 | 0 |
| 19 | Arroyo de las Viboras - Fairview Road | 0 | 0 | 0 | 0 | 0 |
| 26 | Arroyo Dos Picachos - Lone Tree Road | 0 | 0 | 0 | 0 | 0 |
| 20 | Arroyo Dos Picachos - Fallon Road | 0 | 0 | 0 | 0 | 0 |
| 21 | Arroyo Dos Picachos - Aquistapace Road | 0 | 0 | 0 | 0 | 0 |
| | | | | | | |
| 22 | Santa Ana Creek - Fairview Road | 0 | 0 | 0 | 0 | 0 |
| 23 | Santa Ana Creek - Fallon Road | 0 | 0 | 0 | 0 | 0 |
| 24 | Tequisquita Slough - San Felipe Road | 0 | 0 | 0 | 0 | 0 |
| 25 | Millers Canal - 2000 ft downstream of San Felipe Lake | Locked Out | Locked Out | Locked Out | Locked Out | Locked Out |
| | | | | | | |
| 27 | Pajaro River - above Millers Canal | | | | | |
| 28 | Pajaro River - Highway 25 | | | | | |
| 29 | Pajaro River - below Carnadero Cr | | | | | |
| 30 | Carnadero Cr - above Pajaro River | | | | | |

Notes:

See Figure C-3 for numbered site locations

~ = streamflow estimated visually or by relatively inaccurate methods (e.g., width x depth x estimated centerline surface velocity)

Sites were monitored within days in the cited month;
Most sites along any individual stream were measured on the same day.

Todd Groundwater 12/1/2016

Table C-2. Groundwater Elevations October 2015 through October 2016

| Well Number | Well Depth | Depth to Top | Ground | Subbasin | Key Well | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Oct-15 | Jan-16 | Apr-16 | Jul-16 | Oct-16 |
| **Bolsa SE** | | | | | | | | | | |
| 12-5-21Q1 | 500 | 0 | 260 | BSE | * | 67.64 | 68.76 | 69.13 | 110 | |
| 12-5-21Q1 | 500 | 0 | 260 | BSE | * | 70.58 | 71.35 | 70.72 | | 67.64 |
| 12-5-22N1 | 372 | 250 | 265 | BSE | * | 86.9 | 89.4 | 90.32 | | 85.15 |
| **Hollister East** | | | | | | | | | | |
| 12-6-30E1 | 0 | 0 | 375 | HE | | 349.02 | 351.76 | 352.84 | 348 | 347.41 |
| 12-6-18G1 | 198 | 70 | 303 | HE | | 248.91 | 250.86 | 251.74 | 259.56 | 257.35 |
| 13-6-07D2 | 0 | 0 | 500 | HE | | 335.02 | 335.47 | 336.74 | 335.41 | 335.19 |
| 12-6-07P1 | 147 | 0 | 266 | HE | | 224.2 | 226.64 | 227.76 | 231.31 | 224.09 |
| 12-5-24N1 | 300 | 182 | 270 | HE | * | 188.12 | 190.58 | 191.37 | 167.42 | |
| 12-5-23A20 | 862 | 178 | 239 | HE | * | 185.32 | 187.73 | 188.64 | 179 | 173 |
| 12-5-22J2 | 355 | 120 | 250 | HE | * | 194.64 | 199.44 | 199.88 | 187.77 | 185.47 |
| 12-5-22C1 | 237 | 102 | 236 | HE | * | 192.87 | 194.74 | 195.62 | 161.95 | 155.02 |
| 12-5-14N1 | 0 | 0 | 229 | HE | * | 176.87 | 179.17 | 179.74 | | |
| ROSSI 1 | 0 | 0 | 0 | HE | | 222.43 | 225.64 | 227.64 | 226.71 | 223.24 |
| 2317 | 0 | 0 | 299.5 | HEN | | 232.86 | 234.34 | 235.64 | 224.61 | 222.71 |
| **Hollister West** | | | | | | | | | | |
| 13-5-03L1 | 126 | 0 | 303 | HW | * | 223.86 | 226.54 | 229.37 | 208.16 | 206.51 |
| 12-5-27E1 | 175 | 0 | 270 | HW | * | 190.54 | 211.54 | 212.54 | 161.09 | 182.32 |
| 12-5-35N2 | 612 | 288 | 305 | HW | * | 215.87 | 220.24 | 221.67 | 0 | 0 |
| 12-5-34P1 | 195 | 153 | 294 | HW | * | 202.57 | 204.44 | 206.64 | 194.98 | 193.38 |
| 12-5-33E2 | 121 | 81 | 266 | HW | * | 191.32 | 197.44 | 201.64 | 196.82 | 195.3 |
| 13-5-10B1 | 0 | 0 | 305 | HW | * | 217.59 | 219.22 | 221.64 | 215.25 | 195.13 |
| 12-5-28J1 | 220 | 0 | 276 | HW | * | 203.59 | 205.59 | 207.88 | 203.78 | 193.97 |
| 13-5-04B | 0 | 0 | 285 | HW | | 204.82 | 205.12 | 208.14 | 212.86 | 212.75 |
| San Justo 4 (INDART) | 0 | 0 | 318 | HW | | 254.54 | 256.53 | 256.62 | 272 | 271.64 |
| San Justo 6 (ROSE) | 0 | 0 | 338 | HW | | 231.86 | 230.55 | 229.88 | 235.1 | 234.64 |
| 13-5-11E1 | 0 | 0 | 309 | HW | | 243.61 | 244.34 | 261.63 | 246.05 | 239.04 |
| **Pacheco** | | | | | | | | | | |
| 11-5-26R3 | 225 | 65 | 208 | P | * | 166.77 | 169.24 | 170.11 | 170.03 | 169.57 |
| 11-5-36M1 | 0 | 0 | 223 | P | * | 0 | 0 | 0 | 171.45 | 172.66 |
| 11-5-36C1 | 98 | 0 | 223 | P | * | 174.64 | 182.35 | 183.14 | 188.75 | 187.83 |
| 11-5-35G1 | 230 | 0 | 206 | P | * | 161.35 | 164.77 | 165.12 | 174.37 | 171.98 |
| 11-5-35Q3 | 0 | 0 | 203 | P | * | 152.44 | 154.24 | 160.64 | 203 | 160.56 |
| 12-6-06K1 | 260 | 16 | 260 | P | | 259.99 | 259.99 | 0 | 0 | 260 |
| 11-5-35C1 | 180 | 0 | 198 | P | * | 155.88 | 156.29 | 157.44 | 164.61 | 169.81 |
| 12-5-03B1 | 128 | 100 | 182 | P | * | 182 | 0 | 0 | 0 | 182 |
| 12-5-01G2 | 300 | 0 | 215 | P | | 172.42 | 174.53 | 174.37 | 177.36 | 176.59 |
| 12-5-02H5 | 128 | 42 | 210 | P | | 165.67 | 167.83 | 166.9 | 172.27 | 169.82 |
| 12-6-06L4 | 235 | 50 | 248 | P | | 212.9 | 212.42 | 211.72 | 214.21 | 213.52 |
| 12-5-02L2 | 170 | 0 | 202 | P | | 179.87 | 180.63 | 181.82 | 187.67 | 185.62 |
| 11-5-26N2 | 232 | 95 | 198 | P | * | 150.62 | 151.65 | 154.56 | 162.68 | 165.38 |
| 11-6-31M2 | 188 | 155 | 284 | P | * | 200.59 | 203.86 | 204.54 | 221.62 | 215.56 |

Table C-2. Groundwater Elevations October 2015 through October 2016

| Well Number | Well Depth | Depth to Top | Ground | Subbasin | Key Well | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Oct-15 | Jan-16 | Apr-16 | Jul-16 | Oct-16 |
| **San Juan** | | | | | | | | | | |
| 12-4-18J1 | 0 | 0 | 150 | SJ | | 116.74 | 119.35 | 121.72 | 120 | 120.32 |
| 12-5-31H1 | 0 | 0 | 248 | SJ | | 187.84 | 187.87 | 188.44 | 0 | 0 |
| 12-4-17L20 | 0 | 0 | 140 | SJ | | 113.64 | 118.54 | 69.64 | 119.85 | 117.76 |
| 12-4-21M1 | 250 | 0 | 170 | SJ | * | 126.59 | 128.53 | 129.35 | 128.5 | 134.65 |
| 12-4-26G1 | 876 | 240 | 210 | SJ | * | 165.88 | 166.24 | 168.73 | 0 | 128.55 |
| 12-4-34H1 | 387 | 120 | 199 | SJ | * | 132.74 | 137.35 | 138.35 | 117.75 | 130.06 |
| RIDER BERRY | 0 | 0 | 241.5 | SJ | | 175.04 | 179.94 | 180.94 | 0 | 0 |
| 13-4-03H1 | 312 | 168 | 206.25 | SJ | | 182.85 | 186.82 | 187.82 | 0 | 126.52 |
| 12-5-30H1 | 240 | 0 | 250 | SJ | | 186.82 | 189.35 | 190 | 199.78 | 199.16 |
| 12-4-36D2 | 0 | 0 | 219 | SJ | | 171.82 | 173.54 | 174.77 | 0 | 0 |
| 12-4-35A1 | 325 | 110 | 216 | SJ | | 163.87 | 165.35 | 167.44 | 140.57 | 150.62 |
| 13-4-4A3 | 0 | 0 | 210 | SJ | | 182.82 | 185.84 | 186.61 | 163.86 | 163.17 |
| **Tres Pinos** | | | | | | | | | | |
| 13-5-13Q1 | 185 | 44 | 360 | TP | * | 312.83 | 320.12 | 322.88 | 0 | 0 |
| POSEY (Ridgemark) | 0 | 0 | 521 | TP | | 331.46 | 329.74 | 330.34 | 0 | 0 |
| LEMOS (Ridgemark) | 0 | 0 | 522 | TP | | 338.26 | 340.27 | 341.42 | 0 | 0 |
| 13-6-20K1 | 0 | 0 | 440 | TP | | 422.14 | 425.37 | 427.63 | 407.45 | 0 |
| 13-6-19K1 | 211 | 0 | 422 | TP | * | 348.54 | 351.83 | 353.64 | 353.6 | 344.8 |
| 13-5-12K1 | 0 | 0 | 440 | TP | | 314 | 0 | 0 | 0 | 313 |
| 13-5-13J2 | 180 | 0 | 375 | TP | * | 302.88 | 305.42 | 309.64 | 325.78 | 327.24 |
| 13-5-13H1 | 252 | 112 | 400 | TP | * | 322.52 | 325.74 | 328.52 | 0 | 0 |
| 13-5-13F1 | 134 | 30 | 348 | TP | * | 311.12 | 313.77 | 315.92 | 324.97 | 324.18 |
| 13-5-12N20 | 352 | 301 | 332 | TP | * | 300.54 | 302.54 | 304.64 | 284.5 | 303 |
| 13-5-11Q1 | 178 | 61 | 324 | TP | | 231.61 | 266.86 | 267.64 | 0 | 0 |
| 13-5-14C1 | 0 | 0 | 365 | TP | | 252.52 | 253.82 | 256.24 | 252 | 0 |
| 13-6-19J1 | 340 | 128 | 450 | TP | | 413.89 | 415.79 | 418.92 | 415.85 | 413.34 |
| 13-5-12D4 | 0 | 0 | 360 | TP | | 198 | 199 | 200 | 207 | 197 |
| **Bolsa** | | | | | | | | | | |
| 11-5-31F1 | 515 | 312 | 159 | B | * | 43.64 | 45.11 | 46.44 | 24.08 | 68.58 |
| 11-4-25H1 | 0 | 0 | 148 | B | | 0 | 0 | 0 | 57.72 | 86.31 |
| 11-5-27P2 | 331 | 67 | 185 | B | | 0 | 0 | 0 | 162.33 | 165.05 |
| 11-5-28B1 | 198 | 125 | 168 | B | | 168 | 0 | 0 | 0 | 168 |
| 11-5-21E2 | 220 | 100 | 155 | B | | 155 | 0 | 0 | 0 | 155 |
| 11-5-20N1 | 300 | 0 | 150 | B | * | 87.64 | 89.35 | 89.74 | 45.56 | 72.32 |
| 11-5-28P4 | 140 | 80 | 165 | B | | 165 | 0 | 0 | 0 | 165 |
| 11-5-33B1 | 125 | 0 | 169 | B | | 169 | 0 | 0 | 0 | 169 |
| 12-5-06L1 | 0 | 0 | 177 | B | * | 145.74 | 0 | 0 | 0 | 143.51 |
| 12-5-05G1 | 500 | 150 | 175 | B | | 103.24 | 102.27 | 103.76 | 0 | 0 |
| 12-5-05M1 | 0 | 0 | 175 | B | | 59.82 | 0 | 0 | 0 | 62.51 |
| 12-5-17D1 | 950 | 314 | 217 | B | | 0 | 0 | 0 | 39.64 | 32 |
| 12-5-07P1 | 750 | 360 | 204 | B | | 0 | 0 | 0 | 0 | 20.25 |
| 11-4-26B1 | 642 | 149 | 143 | B | * | 0 | 0 | 0 | 115.08 | 126.79 |

Table C-2. Groundwater Elevations October 2015 through October 2016

| Well Number | Well Depth | Depth to Top | Ground | Subbasin | Key Well | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Oct-15 | Jan-16 | Apr-16 | Jul-16 | Oct-16 |
| **Paicines** | | | | | | | | | | |
| SCHIELDS 4 (vineyard) | 0 | 0 | 682 | Paicines | | 627.35 | 630.22 | 0 | 621 | 623.2 |
| RIDGEMARK 7 | 0 | 0 | 692 | Paicines | | 588.26 | 590.21 | 0 | 628.42 | 627.38 |
| RFP Vineyard 3 (FRANCHIONI) | 0 | 0 | 706.67 | Paicines | | 641.72 | 644.37 | 0 | 658.16 | 657.6 |
| OAK HILL RANCH 1 | 0 | 0 | 745 | Paicines | | 653.79 | 656.26 | 0 | 0 | 0 |
| RIDGEMARK 5 | 0 | 0 | 668 | Paicines | | 630.88 | 633.11 | 0 | 586.6 | 622.85 |
| **Pacheco Creek** | | | | | | | | | | |
| 11-5-24L1 | 70 | 0 | 234 | PC | * | 174.76 | 176.53 | 177.78 | 204.19 | 206.68 |
| 11-5-24C2 | 165 | 70 | 249 | PC | * | 0 | 0 | 0 | 222.36 | 221.15 |
| 11-5-24C1 | 134 | 0 | 244 | PC | * | 0 | 0 | 0 | 210.72 | 213.26 |
| 11-5-23R2 | 118 | 43 | 230 | PC | * | 181.61 | 185.35 | 186.62 | 0 | 0 |
| 11-5-13D1 | 125 | 0 | 258 | PC | * | 209.51 | 212.77 | 213.63 | 219.42 | 221.55 |
| 11-5-25G1 | 225 | 0 | 244.33 | PC | * | 217.15 | 218.84 | 220.01 | 0 | 200.31 |
| **Tres Pinos Creek Valley** | | | | | | | | | | |
| San Justo 5 (WINDMILL) | 0 | 0 | 320 | TPCV | | 0 | 0 | 0 | 274.98 | 275 |
| WILDLIFE CENTER 5 | 0 | 0 | 766 | TPCV | | 688.74 | 686.26 | 0 | 686.55 | 702 |
| GRANITE ROCK WELL 2 | 0 | 0 | 0 | TPCV | | 306.72 | 308.74 | 309.64 | 0 | 290.61 |
| GRANITE ROCK WELL 1 | 0 | 0 | 0 | TPCV | | 282.54 | 281.76 | 281.77 | 284 | 282.7 |
| DONATI 2 | 0 | 0 | 696 | TPCV | | 637.72 | 636.26 | 0 | 648.47 | 646.37 |
| 1536 | 0 | 0 | 0 | TCPV | | 280 | 281 | 284 | 283 | 278 |
| **Llagas** | | | | | | | | | | |
| 11S04E08K002 | 0 | 0 | 178.1 | SCVWD | | 127.1 | 148.55 | 153.12 | 145.03 | 144.05 |
| 11S04E03J002 | 0 | 0 | 196 | SCVWD | | 120.42 | 148.23 | 132.8 | 110.55 | 142.27 |
| 11S04E10D004 | 0 | 0 | 169.9 | SCVWD | | 121.765 | 146.74 | 144.26667 | 123.3267 | 141.24 |
| 11S04E15J002 | 0 | 0 | 144 | SCVWD | | 112.25 | 140.03 | 131.8 | 102.325 | 130.82 |
| 11S04E17N004 | 0 | 0 | 180.1 | SCVWD | | 0 | 149.23 | 0 | 143.0433 | 145.12 |
| 11S04E21P003 | 0 | 0 | 154.9 | SCVWD | | 113.98 | 141.35 | 0 | 118.3 | 132.97 |
| 11S04E22N001 | 0 | 0 | 149.9 | SCVWD | | 109.82 | 137.47 | 0 | 109.5933 | 127.95 |
| 11S04E02N001 | 0 | 0 | 174.9 | SCVWD | | 119.87 | 145.45 | 130.4 | 98.37667 | 139 |
| 11S04E02D008 | 0 | 0 | 229 | SCVWD | | 123.56 | 147.7 | 139.65 | 117.3133 | 142.2 |
| 11S04E32R002 | 0 | 0 | 140.1 | SCVWD | | 102.02 | 130.93 | 0 | 107.8133 | 121.45 |

**Table C-3. Groundwater Change Attributes**

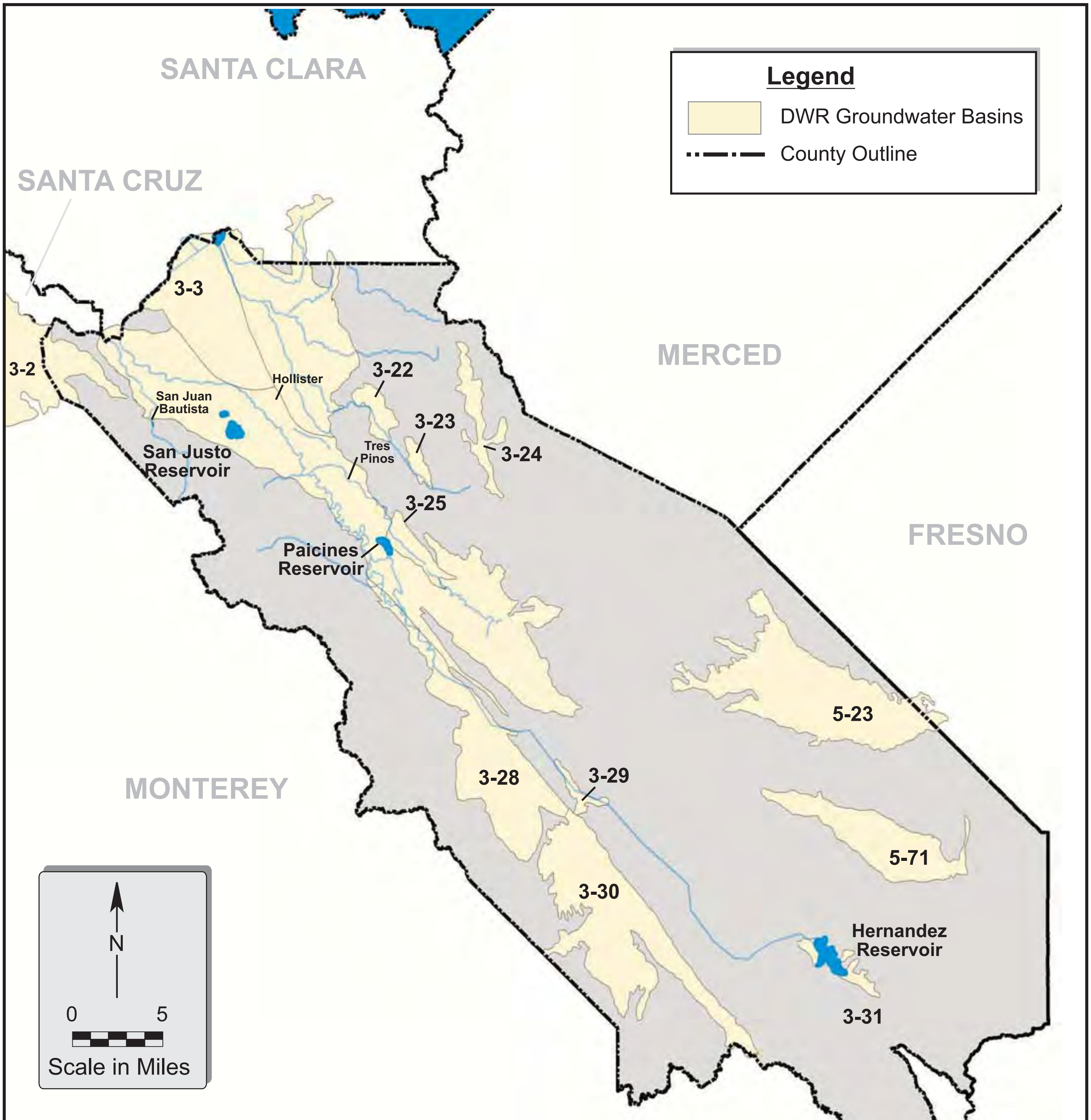
| Subbasin | Subbasin Area (Acres) | Average Storativity |
|---|---|---|
| San Juan | 11,708 | 0.05 |
| Hollister West | 6,050 | 0.05 |
| Tres Pinos | 4,725 | 0.05 |
| Pacheco | 6,743 | 0.03 |
| Northern Hollister East | 10,686 | 0.03 |
| Southern Hollister East | 5,175 | 0.03 |
| Bolsa SE | 2,691 | 0.08 |
| Bolsa | 20,003 | 0.01 |

**Table C-4. Groundwater Change in Elevation 2006-2016 (feet)**

| | Average Change in Groundwater Elevation | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Subbasin | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| San Juan | 0.87 | (4.49) | 0.29 | (0.75) | (1.39) | (0.89) | - | (10.66) | (7.95) | (9.45) | (3.56) |
| Hollister West | 3.13 | (1.69) | 3.31 | (1.43) | (1.58) | (0.66) | 2.12 | (5.72) | (17.41) | (3.60) | 0.93 |
| Tres Pinos | 2.47 | (2.34) | 0.72 | 8.10 | (10.52) | 0.97 | 2.54 | (2.48) | (6.66) | (6.68) | (6.04) |
| Pacheco | 1.93 | (4.41) | (1.36) | 8.10 | (6.60) | 1.92 | (4.36) | (2.95) | (7.37) | 1.92 | 2.98 |
| Northern Hollister East | 3.64 | (6.51) | (4.21) | 10.15 | (8.73) | 2.72 | (2.36) | 1.65 | (9.10) | 0.76 | (1.48) |
| Southern Hollister East | 3.26 | (1.46) | 5.45 | 9.39 | 4.93 | (1.94) | (2.18) | (1.14) | (6.87) | 1.61 | 8.13 |
| Bolsa SE | 1.55 | (6.78) | 11.51 | (24.80) | 25.29 | (11.65) | 0.25 | (4.27) | (10.68) | (3.34) | (9.94) |
| Bolsa | 6.79 | (3.30) | 8.97 | (16.86) | 23.15 | (11.19) | 10.72 | (3.37) | (25.56) | 4.57 | (2.89) |

**Table C-5. Groundwater Change in Storage 2006-2016 (acre-feet)**

| | Average Change in Groundwater Storage (AF) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Subbasin | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
| San Juan | 510 | (2,626) | 168 | (437) | (811) | (523) | - | (6,239) | (4,653) | (5,530) | (2,086) |
| Hollister West | 947 | (510) | 1,001 | (431) | (477) | (198) | 640 | (1,730) | (5,267) | (1,090) | 282 |
| Tres Pinos | 584 | (553) | 169 | 1,913 | (2,485) | 228 | 601 | (586) | (1,574) | (1,579) | (1,427) |
| Pacheco | 391 | (892) | (275) | 1,639 | (1,335) | 389 | (882) | (597) | (1,490) | 388 | 604 |
| Northern Hollister East | 1,167 | (2,087) | (1,350) | 3,253 | (2,798) | 870 | (757) | 528 | (2,918) | 242 | (474) |
| Southern Hollister East | 506 | (227) | 846 | 1,457 | 766 | (301) | (339) | (177) | (1,067) | 250 | 1,263 |
| Bolsa SE | 333 | (1,458) | 2,478 | (5,338) | 5,443 | (2,508) | 53 | (918) | (2,300) | (719) | (2,139) |
| Bolsa | 1,358 | (659) | 1,794 | (3,372) | 4,631 | (2,239) | 2,144 | (674) | (5,112) | 915 | (578) |




## DWR Groundwater Basins

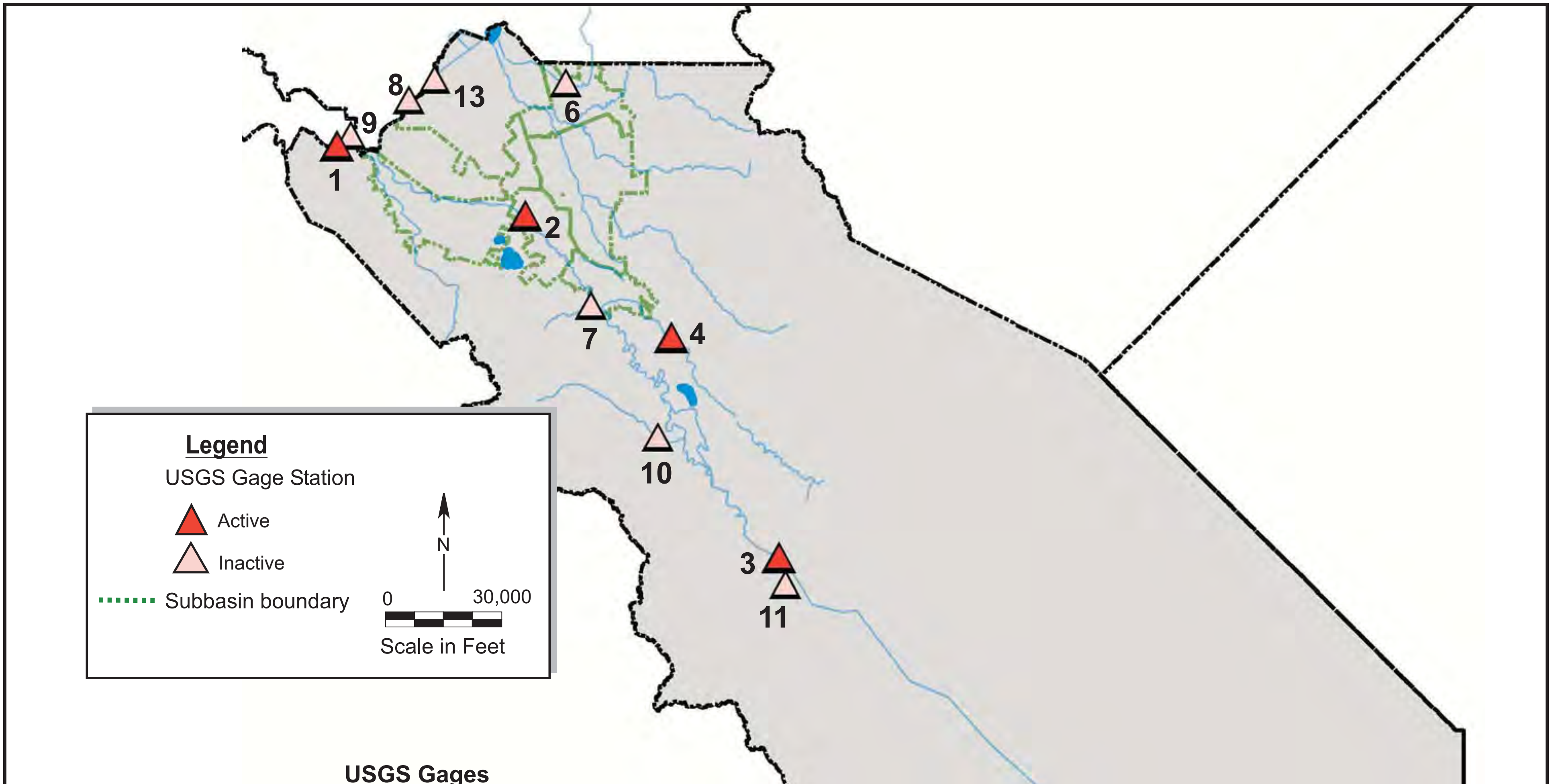
3-2 Pajaro Valley
3-3 Gilroy Hollister Valley
- 3-3.02 Bolsa Area
- 3-3.03 Hollister Area
- 3-3.04 San Juan Bautista Area

3-22 Santa Ana Valley
3-23 Upper Santa Ana Valley
3-24 Quien Sabe Valley
3-25 Tres Pinos Valley
3-28 San Benito River Valley
3-29 Dry Lake Valley
3-30 Bitter Water Valley
3-31 Hernandez Valley
5-23 Panoche Valley
5-71 Vallecitos Valley

December 2016

TODD GROUNDWATER

**Figure C-1**
**Groundwater Basins in San Benito County**




## USGS Gages

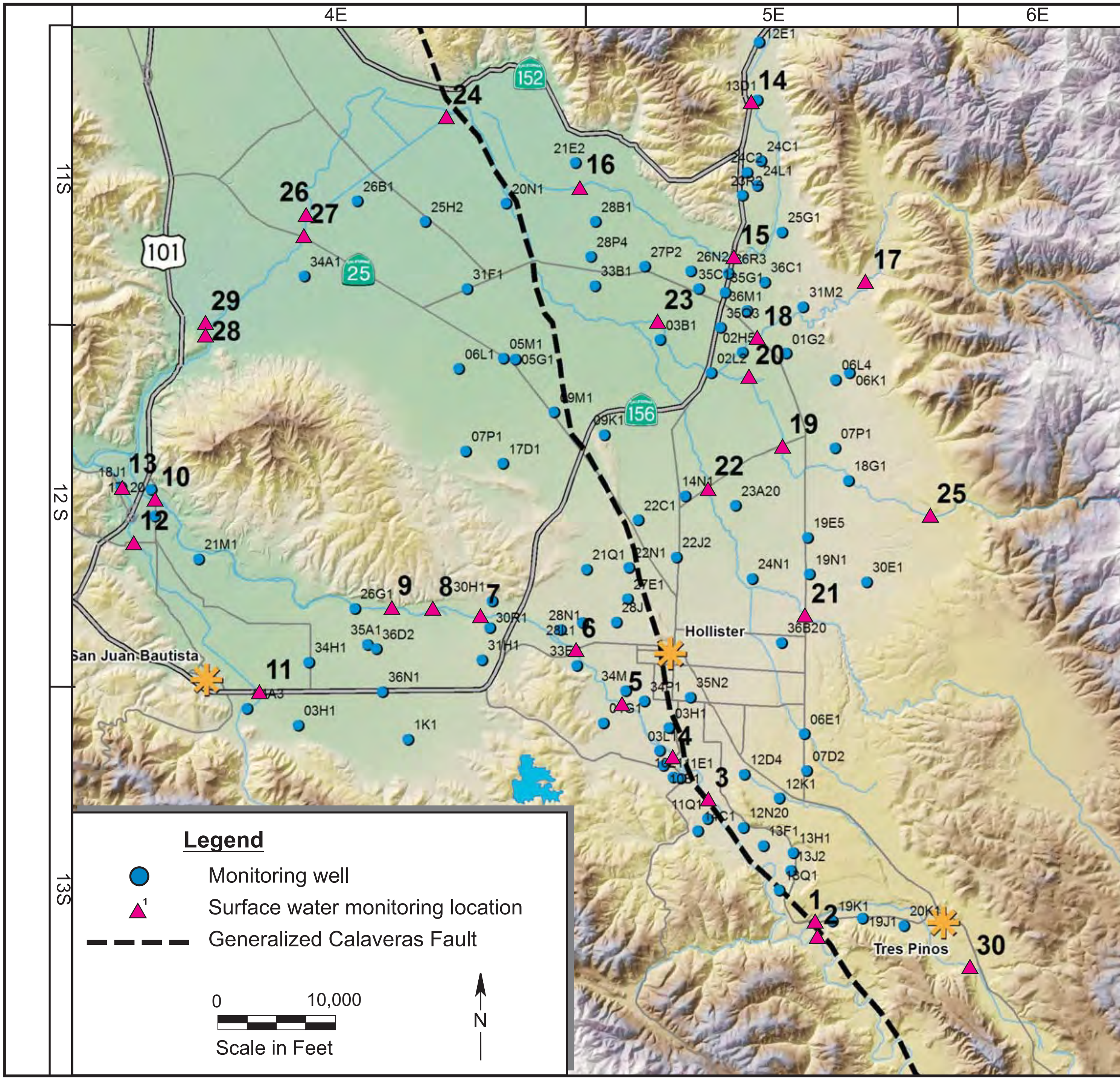
| Site ID | USGS Number | Site Name | Period of Record | |
|---|---|---|---|---|
| 1 | 11159000 | PAJARO R A CHITTENDEN CA | 10/1/1939 | Active |
| 2 | 11158600 | SAN BENITO R A HWY 156 NR HOLLISTER CA | 10/1/1970 | Active |
| 3 | 11156500 | SAN BENITO R NR WILLOW CREEK SCHOOL CA | 10/1/1939 | Active |
| 4 | 11157500 | TRES PINOS C NR TRES PINOS CA* | 12/8/1922 | Active |
| 5 | 11154700 | CLEAR C NR IDRIA CA | 10/1/1993 | Active |
| 6 | 11153040 | PACHECO C A DUNNEVILLE CA | 10/1/1981 | 9/30/1985 |
| 7 | 11158500 | SAN BENITO R NR HOLLISTER CA | 10/1/1949 | 9/30/1983 |
| 8 | 11153700 | PAJARO R NR GILROY CA | 3/1/1959 | 9/30/1982 |
| 9 | 11158900 | PESCADERO C NR CHITTENDEN CA | 9/11/1970 | 9/30/1981 |
| 10 | 11156700 | PESCADERO C NR PAICINES CA | 7/1/1959 | 10/7/1970 |
| 11 | 11156450 | WILLOW C TRIB NR SAN BENITO CA | 7/1/1964 | 9/30/1969 |
| 12 | 11156000 | SAN BENITO R BL M C NR HERNANDEZ CA | 10/1/1949 | 9/30/1963 |
| 13 | 11154500 | PAJARO R A SARGENT CA | 10/1/1940 | 9/30/1941 |

* WY 2006 data for gage height only

December 2016

TODD GROUNDWATER

**Figure C-2**
**Location of Streamflow Stations**




**Surface Water Monitoring Locations**

1. Tres Pinos Cr - Southside Road Bridge (West)
2. San Benito River - KT Road bridge
3. San Benito River - Hospital Road
4. San Benito River - Cienega Road
5. San Benito River - Nash Road
6. San Benito River - Old Highway 156
7. San Benito River - near Mitchell Road
8. San Benito River - near Flint Road
9. San Benito River - upstream of Bixby Road
10. San Benito River - Y Road
11. San Juan Creek - - Highway 156
12. San Juan Creek - Anzar Road
13. San Juan Creek - 2000 ft downstream of Highway101
14. Pacheco Creek - Walnut Avenue
15. Pacheco Creek - Highway 156
16. Pacheco Creek - Lovers Lane
17. Arroyo de las Viboras - Hawkins Ranch driveway
18. Arroyo de las Viboras - Fairview Road
19. Arroyo Dos Picachos - Fallon Road
20. Arroyo Dos Picachos - Aquistapace Road
21. Santa Ana Creek - Fairview Road
22. Santa Ana Creek - Fallon Road
23. Tequisquita Sough - San Felipe Road
24. Millers Canal - 2000 ft downstream of San Felipe Lake
25. Arroyo Dos Picachos - Lone Tree Road
26. Pajaro River - above Millers Canal
27. Pajaro River - Highway 25
28. Pajaro River - below Carnadero Creek
29. Carnadero Creek - above Pajaro River
30. Tres Pinos Creek - Bolado Park

**Figure C-3**
**Monitoring Locations**

December 2016

TODD GROUNDWATER

Path: T:\Projects\San Benito Annual 37636\2016 Annual Report\GIS\Maps\Figure C-4 - Depth to Water Map Oct 2016.mxd

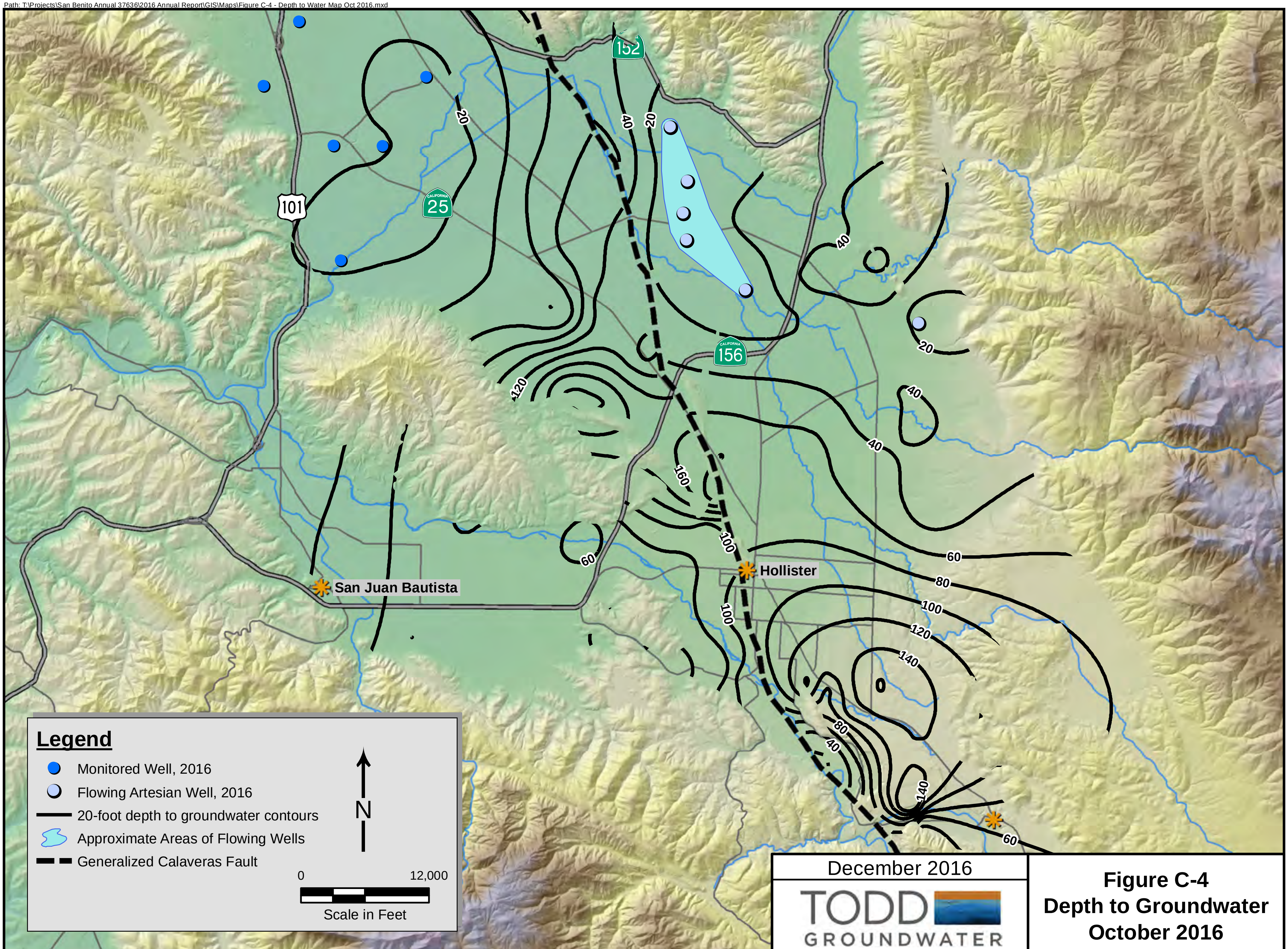
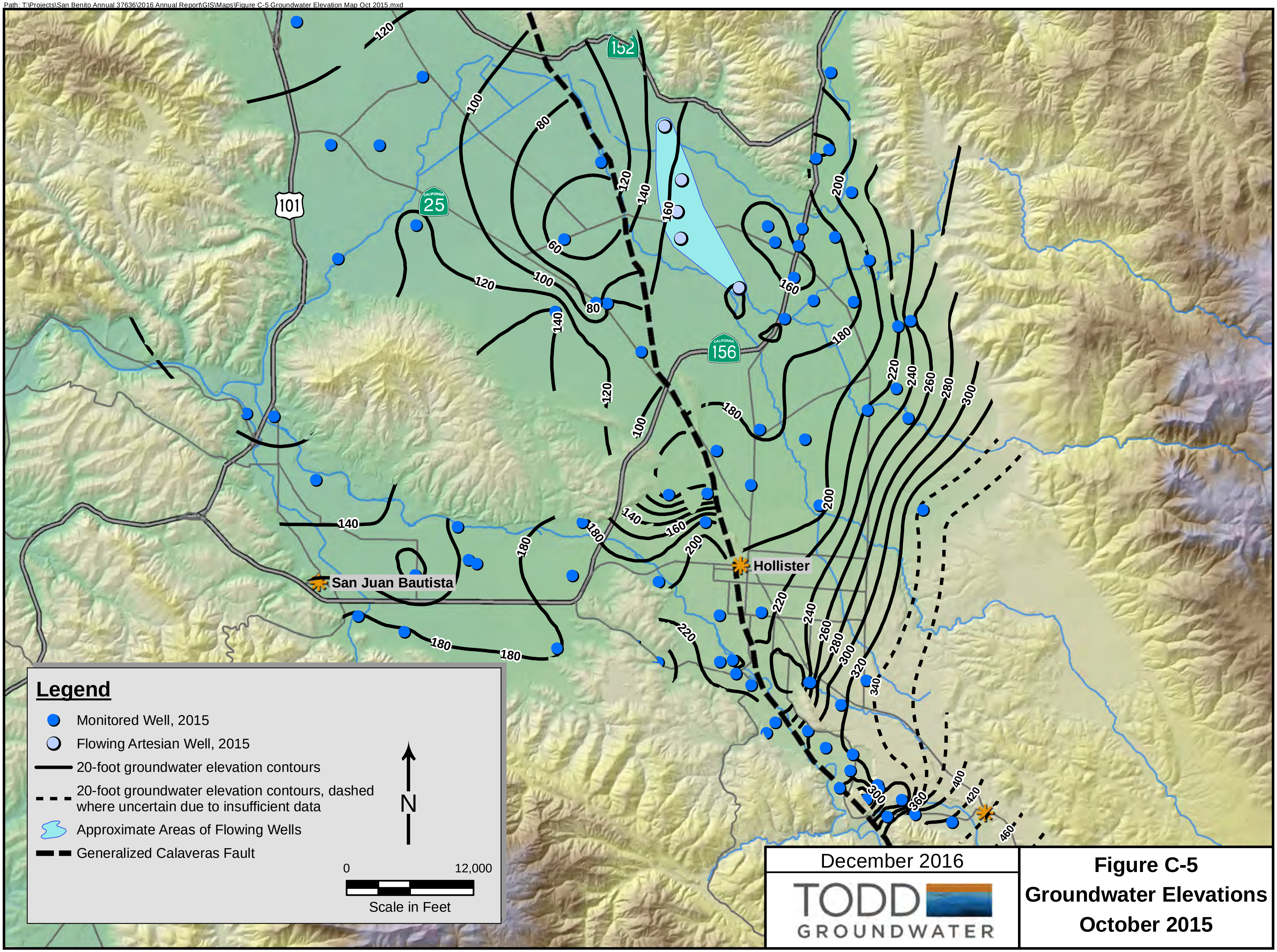



**Figure C-4**
**Depth to Groundwater**
**October 2016**

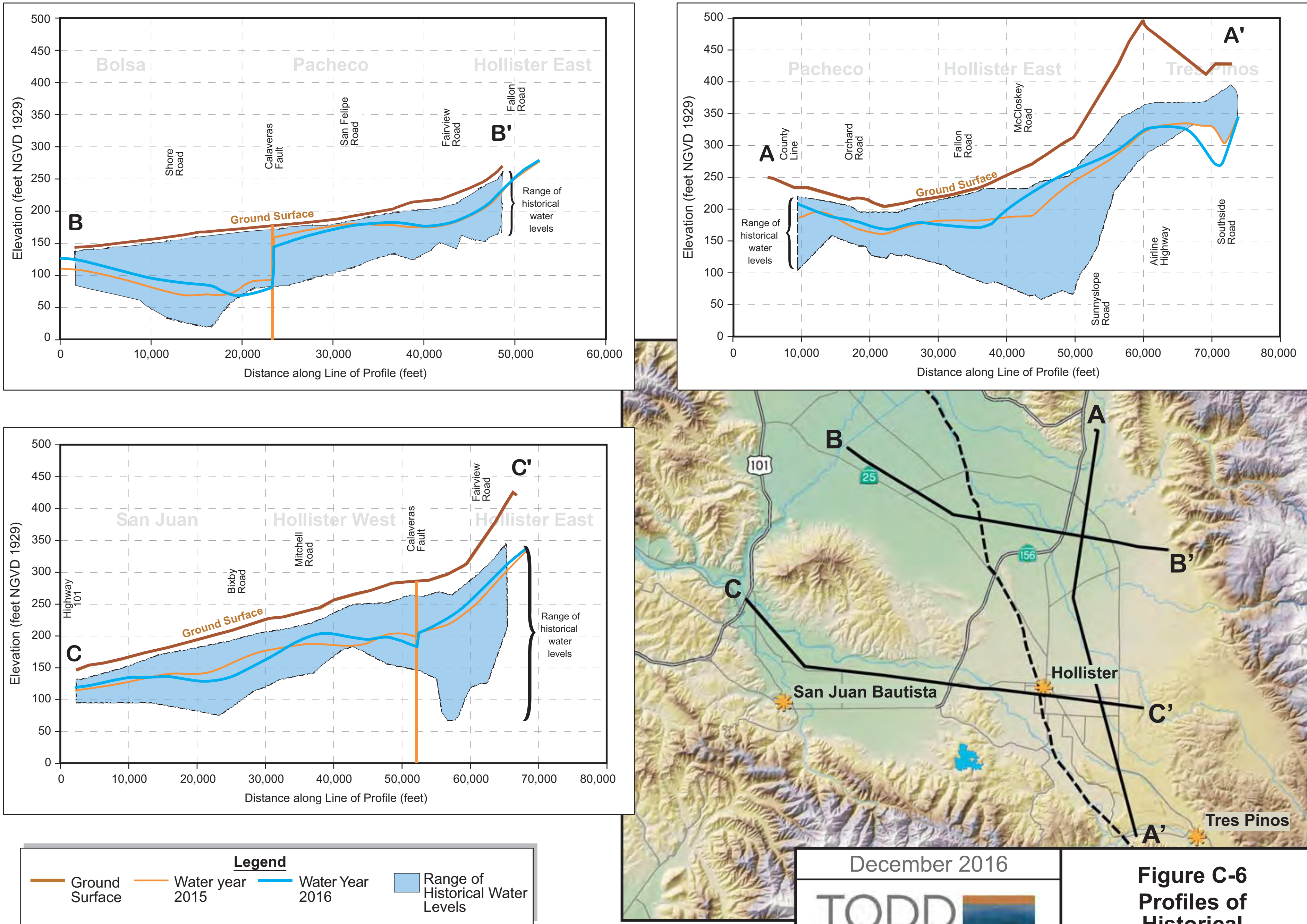
Path: T:\Projects\San Benito Annual 37636\2016 Annual Report\GIS\Maps\Figure C-5 Groundwater Elevation Map Oct 2015.mxd




December 2016

TODD GROUNDWATER

**Figure C-5**
**Groundwater Elevations**
**October 2015**




December 2016

TODD GROUNDWATER

**Figure C-6**
**Profiles of Historical Groundwater Levels**

# D PERCOLATION DATA

List of Tables and Figures

**Table D-1. Reservoir Water Budgets for Water Year 2016 (acre-feet)**

| | Hernandez | Paicines | San Justo |
|---|---|---|---|
| **Inflows** | | | |
| Rainfall | 32 | 0 | 180 |
| San Benito River | 350 | 126 | n.a. |
| Hernandez-Paicines transfer | n.a. | 0 | n.a. |
| San Felipe Project | n.a. | n.a. | 10,145 |
| **Total Inflows** | **382** | **0** | **10,325** |
| **Outflows** | | | |
| Hernandez spills | 0 | 0 | 0 |
| Hernandez-Paicines transfer | 0 | n.a. | n.a. |
| Tres Pinos Creek percolation releases | 0 | 0 | n.a. |
| San Benito River percolation releases | -925 | 0 | n.a. |
| CVP Deliveries | 0 | n.a. | -6,446 |
| Evaporation and seepage | -376 | n.a. | -834 |
| **Total Outflows** | **-1,301** | **-126** | **-7,280** |
| **Storage Change** | | | |
| Reservoir capacity | 17,200 | 2,870 | 11,000 |
| Maximum storage | 1,601 | 126 | 6,111 |
| Minimum storage | 323 | 0 | 1,834 |
| **Net water year storage change** | **0** | **0** | **2,916** |
| **Unaccounted for Water** | **-144** | **0** | **-129** |

**Table D-2. Historical Reservoir Releases (AFY)**

| WY | Hernandez | Paicines | TOTAL |
|---|---|---|---|
| 1996 | 13,535 | 6,139 | 19,674 |
| 1997 | 3,573 | 2,269 | 5,842 |
| 1998 | 26,302 | 450 | 26,752 |
| 1999 | 12,084 | 1,293 | 13,377 |
| 2000 | 13,246 | 2,326 | 15,572 |
| 2001 | 12,919 | 3,583 | 16,502 |
| 2002 | 9,698 | 310 | 10,008 |
| 2003 | 5,434 | 0 | 5,434 |
| 2004 | 3,336 | 0 | 3,336 |
| 2005 | 19,914 | 677 | 20,591 |
| 2006 | 14,112 | 196 | 14,308 |
| 2007 | 12,022 | 1,254 | 13,276 |
| 2008 | 7,646 | 495 | 8,141 |
| 2009 | 4,883 | 0 | 4,883 |
| 2010 | 8,484 | 4,147 | 12,631 |
| 2011 | 9,757 | 2,397 | 12,154 |
| 2012 | 6,341 | 1,321 | 7,662 |
| 2013 | 3,963 | 677 | 4,640 |
| 2014 | 0 | 0 | 0 |
| 2015 | 0 | 0 | 0 |
| 2016 | 925 | 0 | 925 |
| AVG | **8,961** | **1,311** | **10,272** |

**Table D-3. Historical Percolation of CVP Water (AFY)**

| Water Year | Pacheco Creek | Arroyo de las Viboras | | | Arroyo Dos Picachos | | | Santa Ana Creek | | | | Tres Pinos Creek | San Benito River | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Road | Creek 1 | Creek 2 | Fallon Road | Jarvis Lane | Creek | John Smith Road | Maranatha Road | Airline Highway | Ridgemark | | | |
| 1994 | 232 | 136 | 515 | 0 | 0 | 550 | 209 | 0 | 0 | 0 | 0 | 85 | 158 | **1,885** |
| 1995 | 444 | 238 | 770 | 2 | 0 | 654 | 622 | 73 | 0 | 0 | 0 | 809 | 2,734 | **6,345** |
| 1996 | 0 | 494 | 989 | 832 | 67 | 235 | 708 | 531 | 197 | 134 | 25 | 21 | 6,097 | **10,330** |
| 1997 | 0 | 447 | 601 | 1,981 | 77 | 0 | 200 | 17 | 353 | 286 | 29 | 1,477 | 5,619 | **11,087** |
| 1998 | 0 | 132 | 109 | 403 | 0 | 0 | 0 | 65 | 0 | 158 | 74 | 518 | 1,084 | **2,543** |
| 1999 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 256 | 48 | 141 | 10 | 452 | 413 | **1,322** |
| 2000 | 1 | 0 | 0 | 6 | 0 | 0 | 3 | 236 | 21 | 240 | 12 | 285 | 938 | **1,740** |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 161 | 17 | 186 | 1 | 703 | 1,041 | **2,110** |
| 2002 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 78 | 2 | 143 | 0 | 426 | 470 | **1,122** |
| 2003 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 119 | 9 | 172 | 0 | 163 | 605 | **1,074** |
| 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 83 | 0 | 0 | 0 | 1 | 882 | **1,018** |
| 2005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 527 | **527** |
| 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 156 | 0 | 0 | 0 | 1 | 451 | **614** |
| 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 216 | **304** |
| 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | **6** |
| 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2014 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2015 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2016 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |

**Table D-4. Percolation of Municipal Wastewater during Water Year 2016**

| | Pond Area[1] (acres) | Effluent Discharge (acre-feet) | Evaporation[2] (acre-feet) | Percolation (acre-feet) |
|---|---|---|---|---|
| Hollister - domestic* | 92.9 | 2,190 | 266 | 1,923 |
| Hollister - industrial* | 39.0 | 416 | 112 | 305 |
| Ridgemark Estates I & II | 7.2 | 174 | 21 | 154 |
| Tres Pinos | 1.8 | 26 | 5 | 21 |
| Total | 141 | 2,806 | 404 | 2,402 |

Notes:

1. Hollister pond areas are from Dickson and Kenneth D. Schmidt and Associates (1999) and include treatment ponds in addition to percolation ponds at the domestic wastewater treatment plant. Assumes 80% of total pond area in use at any time (Rose, pers. comm.). These areas should be updated as operations change.
2. Average evaporation less precip = 43 inches (56 in/yr evaporation (DWR Bulletin 73-79) less 13 in/yr precip (CIMIS)

The San Juan Bautista plant is not included because the unnamed tributary of San Juan Creek that receives its effluent usually gains flow along the affected reach and is on the southwest side of the San Andreas Fault. These conditions prevent the effluent from recharging the San Juan Subbasin.

**Table D-5. Historical Percolation of Municipal Wastewater (AFY)**

| | Hollister Reclamation Plant - Domestic | Hollister - industrial | Ridgemark Estates I & II | Tres Pinos | TOTAL |
|---|---|---|---|---|---|
| 1994 | 1,775 | 665 | 155 | 5 | 2,600 |
| 1995 | 1,935 | 610 | 180 | 10 | 2,735 |
| 1996 | 2,020 | 689 | 207 | 14 | 2,930 |
| 1997 | 1,965 | 909 | 201 | 17 | 3,092 |
| 1998 | 2,490 | 518 | 231 | 17 | 3,256 |
| 1999 | 1,693 | 1,476 | 156 | 12 | 3,337 |
| 2000 | 2,110 | 1,136 | 293 | 24 | 3,563 |
| 2001 | 1,742 | 1,078 | 303 | 24 | 3,147 |
| 2002 | 1,884 | 1,545 | 283 | 24 | 3,736 |
| 2003 | 2,009 | 1,432 | 279 | 24 | 3,744 |
| 2004 | 1,787 | 1,536 | 268 | 21 | 3,612 |
| 2005 | 1,891 | 1,323 | 227 | 26 | 3,468 |
| 2006 | 1,797 | 1,211 | 216 | 33 | 3,257 |
| 2007 | 1,740 | 1,228 | 139 | 19 | 3,126 |
| 2008 | 1,580 | 1,257 | 139 | 19 | 2,996 |
| 2009 | 1,976 | 428 | 172 | 19 | 2,594 |
| 2010 | 1,922 | 37 | 172 | 19 | 2,150 |
| 2011 | 1,807 | 466 | 183 | 19 | 2,476 |
| 2012 | 1,740 | 605 | 177 | 19 | 2,541 |
| 2013* | 889 | 332 | 188 | 21 | 1,430 |
| 2014 | 1,552 | 86 | 179 | 21 | 1,838 |
| 2015 | 1,816 | 344 | 161 | 21 | 2,342 |
| 2016 | 1,923 | 305 | 154 | 21 | 2,402 |

* Hollister WW data for 2013 updated with new data

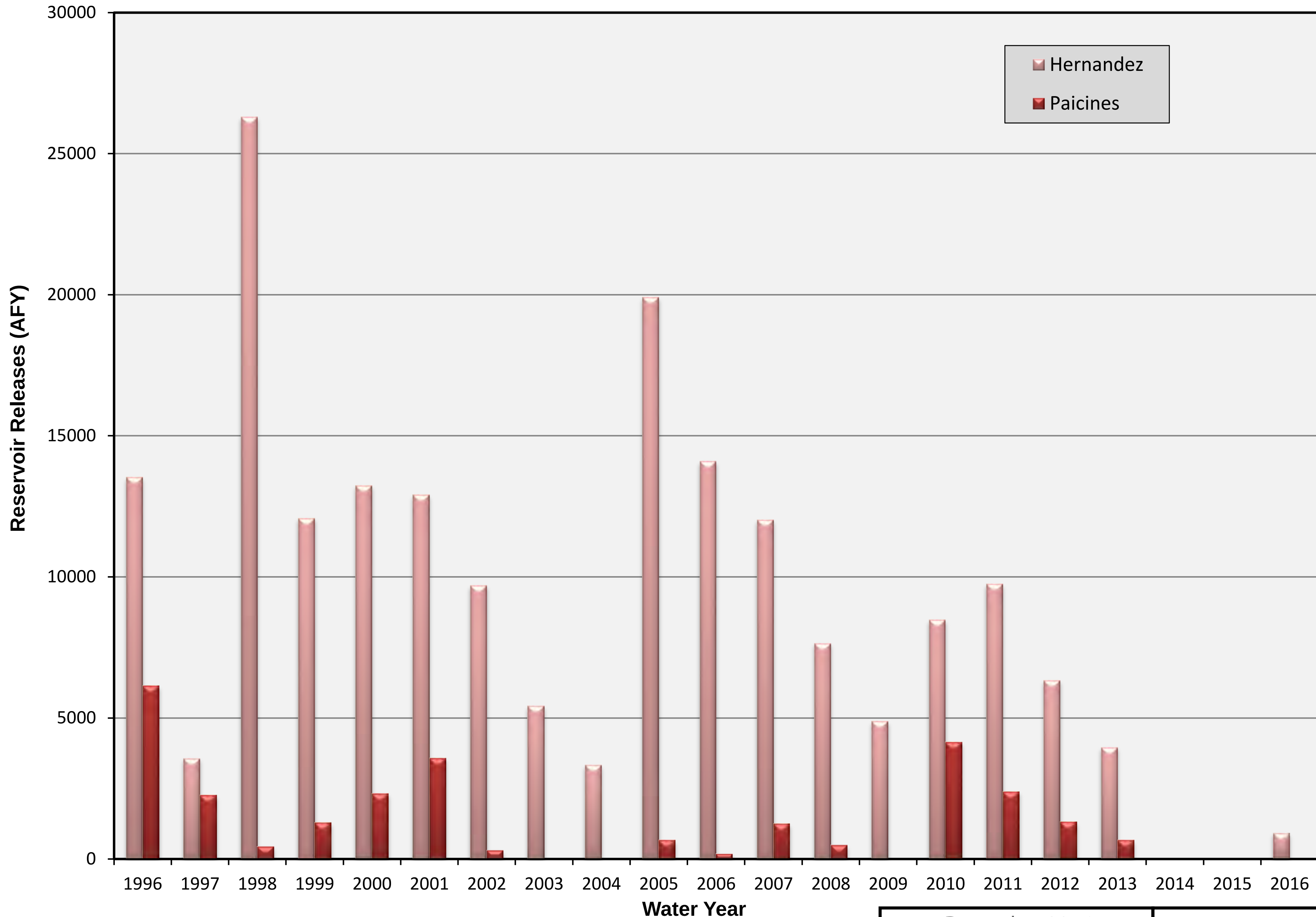



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**Figure D-1**
**Reservoir Releases for Percolation**

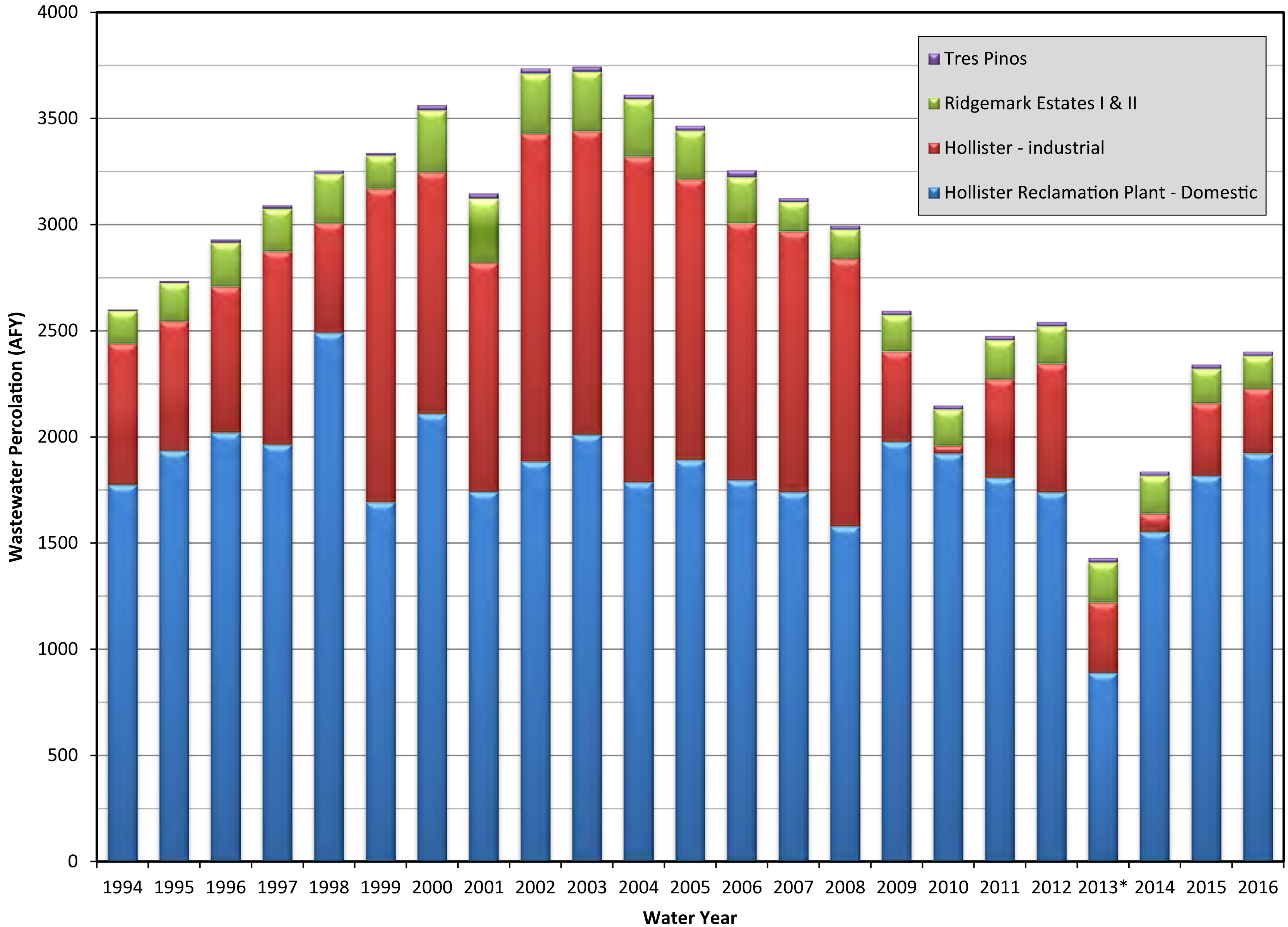


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**Figure D-2**
**Wastewater Percolation by Facility**

# E WATER USE DATA

List of Tables and Figures

**Table E-1. Recent CVP Allocation and Use**

| | Municipal and Industrial (M&I) CVP | | | | Agricultural CVP | | | |
|---|---|---|---|---|---|---|---|---|
| Water Year | Percent of Contract Allocation | Percent of Historic Average | Contract Amount Used (AF) | Contract Amount Used (%) | Percent of Contract Allocation | Percent of Contract and M&I Adjustment[1] | Contract Amount Used (AF) | Contract Amount Used (%) |
| | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | |
| **2006** | 100% | | 3,152 | 38% | 100% | | 19,840 | 56% |
| **2007** | 100% | | 4,969 | 60% | 40% | | 18,865 | 53% |
| **2008** | 37% | 75% | 2,232 | 27% | 40% | 45% | 10,514 | 30% |
| **2009** | 29% | 60% | 1,978 | 24% | 10% | 11% | 6,439 | 18% |
| **2010** | 37% | 75% | 2,197 | 27% | 45% | 50% | 10,061 | 28% |
| **2011** | 100% | | 2,433 | 29% | 80% | | 16,234 | 46% |
| **2012** | 51% | 75% | 2,683 | 33% | 40% | 40% | 17,267 | 49% |
| **2013** | 47% | 70% | 2,652 | 32% | 20% | 22% | 12,914 | 36% |
| **2014** | 34% | 50% | 1,599 | 29% | 0% | 0% | 7,545 | 21% |
| **2015** | 25% | 25% | 1,810 | 22% | 0% | 0% | 3,697 | 10% |
| **2016** | 55% | 55% | 1,914 | 23% | 5% | 0% | 4,434 | 12% |

Notes:

[1] If the M&I allocation is 75 percent or less, the difference between the M&I contract amount and M&I allocation is added to the agricultural contract amount. The agricultural percentage is multiplied by that sum to obtain the agricultural allocation.

**Table E-2. Historical Water Use by Subbasin and Water Source (AFY)**

| Subbasin | Pacheco | | Bolsa Southeast | | | San Juan | | Hollister West | | | Hollister East | | | Tres Pinos | | Total Zone 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source | GW | CVP | GW | CVP | RW | GW | CVP | GW | CVP | RW | GW | CVP | RW | GW | CVP | GW | CVP | RW |
| 1993 | 2,251 | 3,210 | 3,474 | 533 | | 9,278 | 4,300 | 7,213 | 90 | | 3,744 | 7,275 | | 5,658 | 224 | 31,618 | 15,633 | - |
| 1994 | 3,748 | 3,394 | 3,467 | 602 | | 10,859 | 3,836 | 7,327 | 87 | | 5,475 | 6,808 | | 5,294 | 263 | 36,169 | 14,990 | - |
| 1995 | 2,756 | 3,474 | 2,855 | 720 | | 9,328 | 4,554 | 7,092 | 460 | | 3,428 | 6,647 | | 4,475 | 275 | 29,935 | 16,130 | - |
| 1996 | 2,533 | 3,500 | 2,682 | 782 | | 8,726 | 5,187 | 5,717 | 679 | | 3,396 | 8,267 | | 3,695 | 408 | 26,748 | 18,823 | - |
| 1997 | 2,209 | 4,205 | 2,755 | 997 | | 9,587 | 6,191 | 7,602 | 907 | | 3,534 | 8,284 | | 4,620 | 466 | 30,307 | 21,048 | - |
| 1998 | 2,035 | 2,165 | 1,561 | 361 | | 6,963 | 4,099 | 4,991 | 591 | | 4,037 | 5,291 | | 3,751 | 289 | 23,338 | 12,796 | - |
| 1999 | 2,553 | 3,219 | 2,453 | 433 | | 9,312 | 5,990 | 7,013 | 726 | | 3,701 | 7,279 | | 4,199 | 391 | 29,231 | 18,038 | - |
| 2000 | 2,270 | 3,256 | 2,418 | 355 | | 8,681 | 6,372 | 7,590 | 869 | | 3,108 | 7,279 | | 4,006 | 542 | 28,073 | 18,673 | - |
| 2001 | 1,848 | 3,443 | 2,126 | 411 | | 7,977 | 7,232 | 7,377 | 685 | | 2,213 | 7,010 | | 3,599 | 621 | 25,140 | 19,402 | - |
| 2002 | 2,322 | 3,840 | 2,193 | 497 | | 7,571 | 7,242 | 6,577 | 706 | | 2,588 | 7,390 | | 3,994 | 737 | 25,244 | 20,411 | - |
| 2003 | 2,425 | 3,277 | 2,175 | 493 | | 7,434 | 7,127 | 6,222 | 720 | | 1,897 | 9,329 | | 2,805 | 788 | 22,958 | 21,734 | - |
| 2004 | 2,461 | 3,607 | 2,405 | 740 | | 8,121 | 7,357 | 4,971 | 614 | | 2,321 | 10,726 | | 3,204 | 966 | 23,484 | 24,010 | - |
| 2005 | 1,320 | 3,106 | 1,849 | 514 | | 6,608 | 6,245 | 5,084 | 680 | | 2,586 | 9,198 | | 2,378 | 642 | 19,825 | 20,384 | - |
| 2006 | 1,208 | 3,495 | 1,864 | 661 | | 6,741 | 7,200 | 4,633 | 579 | | 2,555 | 10,253 | | 2,537 | 803 | 19,538 | 22,992 | - |
| 2007 | 1,034 | 3,832 | 2,005 | 572 | | 7,658 | 6,160 | 5,118 | 553 | | 3,867 | 10,194 | | 2,908 | 804 | 22,590 | 22,115 | - |
| 2008 | 1,900 | 1,568 | 2,014 | 333 | | 7,796 | 3,160 | 4,375 | 399 | | 3,962 | 6,792 | | 2,743 | 493 | 22,789 | 12,745 | - |
| 2009 | 3,370 | 1,257 | 2,082 | 179 | | 11,956 | 1,605 | 4,186 | 19 | | 4,733 | 4,697 | | 2,871 | 447 | 29,199 | 8,204 | - |
| 2010 | 2,553 | 1,771 | 1,897 | 207 | | 9,561 | 3,452 | 4,081 | 10 | 151 | 4,460 | 6,056 | | 1,686 | 488 | 24,238 | 11,984 | 151 |
| 2011 | 1,992 | 2,420 | 2,781 | 229 | | 4,987 | 5,623 | 3,940 | 394 | 183 | 1,947 | 9,575 | | 2,454 | 427 | 18,102 | 18,667 | 183 |
| 2012 | 3,723 | 2,652 | 1,556 | 288 | | 5,782 | 5,976 | 4,298 | 549 | 230 | 2,004 | 9,917 | | 2,492 | 568 | 19,855 | 19,949 | 230 |
| 2013* | 4,157 | 1,976 | 2,348 | 292 | | 11,044 | 4,134 | 5,656 | 374 | 357 | 5,430 | 8,224 | | 2,452 | 565 | 31,087 | 15,566 | 357 |
| 2014 | 3,303 | 1,020 | 2,157 | 32 | | 10,018 | 1,984 | 7,227 | 233 | 262 | 4,872 | 5,490 | | 3,014 | 384 | 30,592 | 9,144 | 262 |
| 2015 | 4,279 | 555 | 2,401 | 20 | | 12,739 | 975 | 4,730 | 148 | 101 | 7,230 | 3,568 | | 2,948 | 241 | 34,327 | 5,507 | 101 |
| 2016 | 4,386 | 420 | 2,558 | 30 | 38 | 13,581 | 819 | 4,031 | 162 | 253 | 6,383 | 4,810 | 207 | 2,223 | 106 | 33,162 | 6,347 | 499 |
| AVG 03-16 | 2,722 | 2,211 | 2,149 | 328 | 38 | 8,859 | 4,415 | 4,897 | 388 | 220 | 3,875 | 7,774 | 207 | 2,623 | 552 | 25,125 | 15,668 | 127 |

GW = groundwater, CVP = Central Valley Project, RW = recycled water

* Hollister RW data updated for 2013 based on new data

**Table E-3. Recent Water Use by Subbasin and User Type, not including recycled water (AFY)**

| SUBBASIN | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Agriculture** | | | | | | | | | | | | |
| Bolsa SE | 2,352 | 2,517 | 2,570 | 2,334 | 2,252 | 2,103 | 3,004 | 1,837 | 2,635 | 2,180 | 2,417 | 2,601 |
| Hollister East | 8,543 | 9,526 | 10,685 | 8,012 | 6,860 | 8,315 | 9,067 | 9,453 | 10,832 | 8,151 | 8,464 | 8,784 |
| Hollister West | 2,128 | 1,936 | 2,145 | 1,509 | 1,708 | 1,888 | 2,190 | 2,228 | 3,324 | 2,584 | 2,750 | 2,192 |
| Pacheco | 4,190 | 4,469 | 4,573 | 3,220 | 4,304 | 4,242 | 4,279 | 6,148 | 5,990 | 4,121 | 4,658 | 4,616 |
| San Juan | 11,496 | 12,622 | 12,185 | 9,581 | 12,397 | 11,960 | 10,009 | 10,964 | 14,376 | 11,183 | 13,123 | 13,826 |
| Tres Pinos | 800 | 1,004 | 954 | 655 | 670 | 640 | 471 | 641 | 652 | 514 | 1,513 | 572 |
| TOTAL | 29,509 | 32,074 | 33,112 | 25,310 | 28,192 | 29,148 | 29,020 | 30,980 | 37,810 | 28,734 | 32,926 | 32,591 |
| **M&I** | | | | | | | | | | | | |
| Bolsa SE | 12 | 8 | 7 | 13 | 9 | 0 | 6 | 6 | 4 | 9 | 5 | 25 |
| Hollister East | 3,241 | 3,280 | 3,203 | 2,742 | 2,570 | 2,201 | 2,455 | 2,469 | 2,822 | 2,211 | 2,334 | 2,617 |
| Hollister West | 3,636 | 3,168 | 3,361 | 3,265 | 2,710 | 2,477 | 2,144 | 2,619 | 2,705 | 4,876 | 2,128 | 2,254 |
| Pacheco | 235 | 234 | 293 | 248 | 323 | 83 | 133 | 227 | 144 | 203 | 176 | 191 |
| San Juan | 1,356 | 1,320 | 1,640 | 1,375 | 1,164 | 1,053 | 601 | 793 | 803 | 820 | 590 | 574 |
| Tres Pinos | 2,220 | 2,336 | 2,748 | 2,581 | 2,648 | 3,048 | 2,410 | 2,710 | 2,365 | 2,884 | 1,676 | 1,757 |
| TOTAL | 10,700 | 10,345 | 11,252 | 10,225 | 9,424 | 8,862 | 7,749 | 8,825 | 8,843 | 11,002 | 6,909 | 7,417 |

**Table E-4. Historical Water Use by User Type (AFY)**

| WY | Agricultural | Municipal, and Industrial | Total | % Ag |
|---|---|---|---|---|
| 1988 | 45,366 | 5,152 | 50,518 | 90% |
| 1989 | 32,387 | 6,047 | 38,434 | 84% |
| 1990 | 49,663 | 5,725 | 55,388 | 90% |
| 1991 | 46,640 | 7,631 | 54,271 | 86% |
| 1992 | 32,210 | 6,912 | 39,122 | 82% |
| 1993 | 38,878 | 5,066 | 43,944 | 88% |
| 1994 | 41,854 | 7,186 | 49,040 | 85% |
| 1995 | 36,399 | 8,272 | 44,671 | 81% |
| 1996 | 39,575 | 8,338 | 47,913 | 83% |
| 1997 | 41,482 | 11,117 | 52,599 | 79% |
| 1998 | 27,526 | 8,650 | 36,176 | 76% |
| 1999 | 37,203 | 10,110 | 47,313 | 79% |
| 2000 | 36,062 | 10,811 | 46,873 | 77% |
| 2001 | 34,035 | 10,687 | 44,722 | 76% |
| 2002 | 34,354 | 11,347 | 45,701 | 75% |
| 2003 | 33,533 | 11,206 | 44,739 | 75% |
| 2004 | 35,597 | 11,944 | 47,541 | 75% |
| 2005 | 29,509 | 10,700 | 40,209 | 73% |
| 2006 | 32,074 | 10,345 | 42,419 | 76% |
| 2007 | 33,112 | 11,252 | 44,364 | 75% |
| 2008 | 25,310 | 10,225 | 35,535 | 71% |
| 2009 | 28,192 | 9,424 | 37,616 | 75% |
| 2010 | 29,148 | 8,862 | 38,010 | 77% |
| 2011 | 29,020 | 7,749 | 36,769 | 79% |
| 2012 | 31,270 | 8,825 | 40,095 | 78% |
| 2013 | 37,810 | 8,843 | 46,653 | 81% |
| 2014 | 28,734 | 11,226 | 39,960 | 72% |
| 2015 | 32,926 | 7,010 | 39,935 | 82% |
| 2016 | 32,591 | 7,417 | 40,008 | 81% |
| AVERAGE | **34,995** | **8,952** | **43,947** | **79%** |

**Table E-5. Municipal Water Use by Purveyor for Water Year 2016 (AF)**

| | WY 2016 | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Groundwater | | | | | | | | | | | | | |
| Sunnyslope CWD | **1,331** | 156 | 111 | 72 | 48 | 52 | 44 | 69 | 105 | 117 | 188 | 182 | 188 |
| City of Hollister | **1,615** | 137 | 99 | 87 | 94 | 84 | 94 | 115 | 167 | 198 | 230 | 230 | 80 |
| City of Hollister - Cienega Wells | **105** | 9 | 9 | 9 | 9 | 7 | 9 | 9 | 9 | 9 | 9 | 9 | 8 |
| San Juan Bautista | **232** | 20 | 15 | 15 | 14 | 14 | 16 | 16 | 20 | 25 | 25 | 26 | 25 |
| Tres Pinos CWD | **49** | 4 | 4 | 3 | 3 | 3 | 2 | 3 | 4 | 5 | 5 | 4 | 8 |
| **Groundwater Subtotal** | **3,332** | **326** | **238** | **186** | **168** | **160** | **165** | **212** | **306** | **354** | **457** | **450** | **310** |
| CVP Imported Water | | | | | | | | | | | | | |
| Lessalt Treatment Plant | **1,682** | 124 | 136 | 125 | 120 | 135 | 113 | 122 | 160 | 153 | 166 | 178 | 149 |
| **Imported Water Subtotal** | **1,682** | **124** | **136** | **125** | **120** | **135** | **113** | **122** | **160** | **153** | **166** | **178** | **149** |
| Municipal Total | | | | | | | | | | | | | |
| **Municipal Water Supply Total** | **5,014** | **451** | **374** | **310** | **288** | **294** | **278** | **334** | **466** | **507** | **624** | **628** | **459** |

**Table E-6. Historical Municipal Water Use by Purveyor (AFY)**

| WY | Sunnyslope CWD - GW | City of Hollister - GW | City of Hollister - Cienega Wells[1] | San Juan Bautista | Tres Pinos CWD | Lessalt Treatment Plant | Undivided Total | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 1988 | | | | | | 0 | 5,152 | **5,152** |
| 1989 | | | | | | 0 | 6,047 | **6,047** |
| 1990 | | | | | | 0 | 5,725 | **5,725** |
| 1991 | | | | | | 0 | 7,631 | **7,631** |
| 1992 | | | | | | 0 | 6,912 | **6,912** |
| 1993 | | | | | | 0 | 5,066 | **5,066** |
| 1994 | | | | | | 0 | 7,186 | **7,186** |
| 1995 | 2,167 | 2,446 | | | | 0 | | **4,613** |
| 1996 | 2,139 | 3,386 | | | | 0 | | **5,525** |
| 1997 | 2,638 | 3,848 | | | | 0 | | **6,486** |
| 1998 | 2,357 | 3,441 | | | | 0 | | **5,798** |
| 1999 | 2,820 | 3,558 | | | | 0 | | **6,378** |
| 2000 | 3,214 | 4,021 | | | | 0 | | **7,235** |
| 2001 | 3,290 | 3,851 | | | | 0 | | **7,141** |
| 2002 | 3,256 | 4,120 | | | | 21 | | **7,398** |
| 2003 | 2,053 | 2,754 | | | | 2,494 | | **7,302** |
| 2004 | 2,426 | 2,828 | | | | 2,101 | | **7,356** |
| 2005 | 1,959 | 3,147 | 123 | 247 | 49 | 1,843 | | **7,368** |
| 2006 | 1,907 | 2,801 | 123 | 150 | 49 | 1,900 | | **6,930** |
| 2007 | 2,413 | 2,758 | 123 | 47 | 49 | 1,719 | | **7,108** |
| 2008 | 2,294 | 2,746 | 123 | 417 | 47 | 1,323 | | **6,949** |
| 2009 | 2,251 | 2,503 | 123 | 373 | 47 | 1,212 | | **6,509** |
| 2010 | 1,861 | 2,194 | 108 | 308 | 47 | 1,344 | | **5,861** |
| 2011 | 2,225 | 1,651 | 80 | 292 | 47 | 1,593 | | **5,887** |
| 2012 | 2,360 | 1,761 | 130 | 267 | 45 | 1,657 | | **6,219** |
| 2013 | 1,655 | 2,655 | 120 | 281 | 46 | 1,648 | | **6,405** |
| 2014 | 2,134 | 2,646 | 114 | 285 | 49 | 979 | | **6,207** |
| 2015 | 1,348 | 1,960 | 114 | 225 | 49 | 1,364 | | **5,060** |
| 2016 | 1,331 | 1,615 | 105 | 232 | 49 | 1,682 | | **5,014** |

1. Data from Hollister Cienega Wells for 2005-2008 was estimated to be the same as WY 2009
Cells with no data indicate that the information is unavailable, while years with no use are shown explicitly as 0's.


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**Figure E-1**
**Groundwater Percentage of Total Water Use**

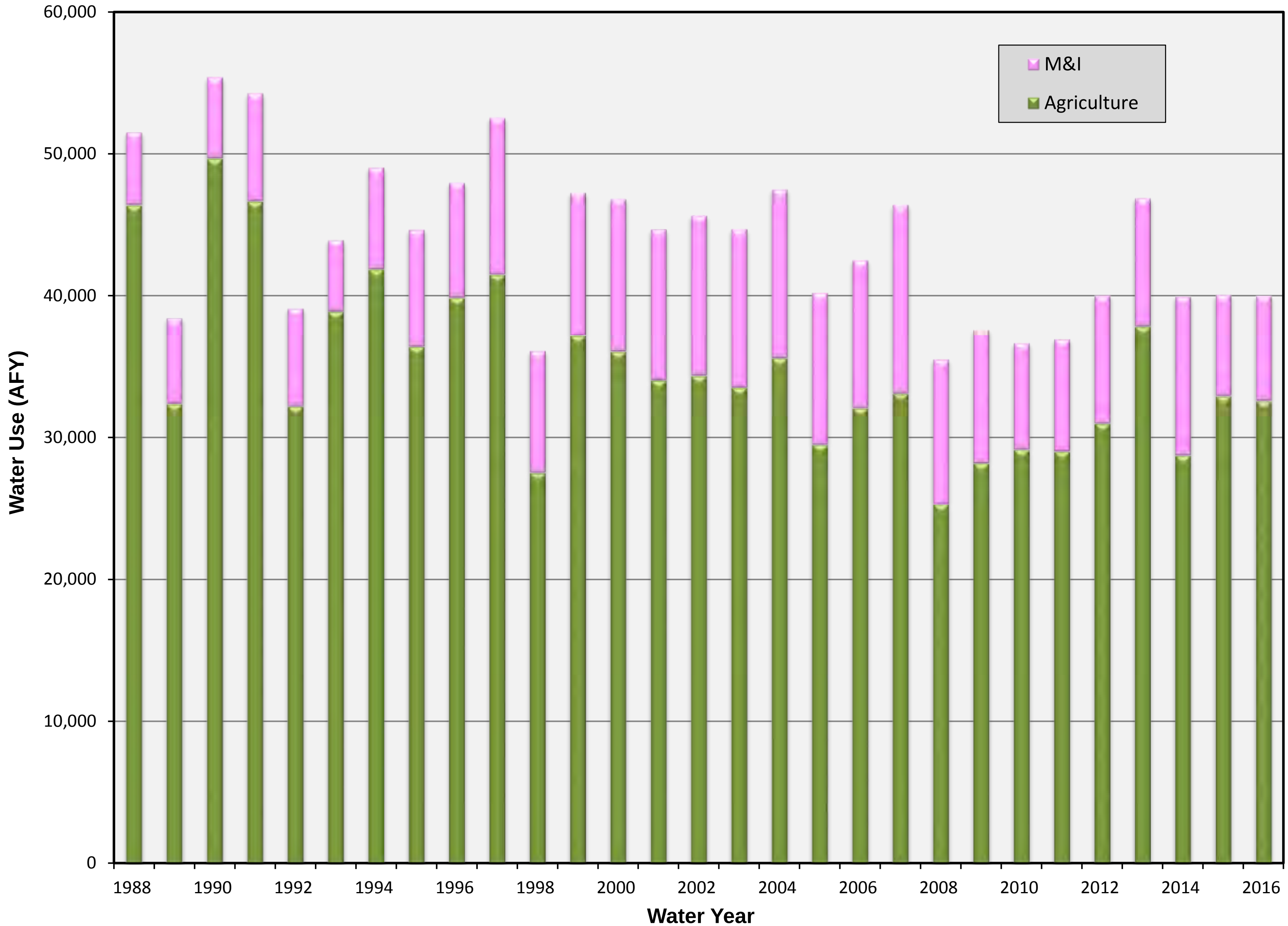


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**Figure E-2**
**Water Use in Zone 6 by User Category**

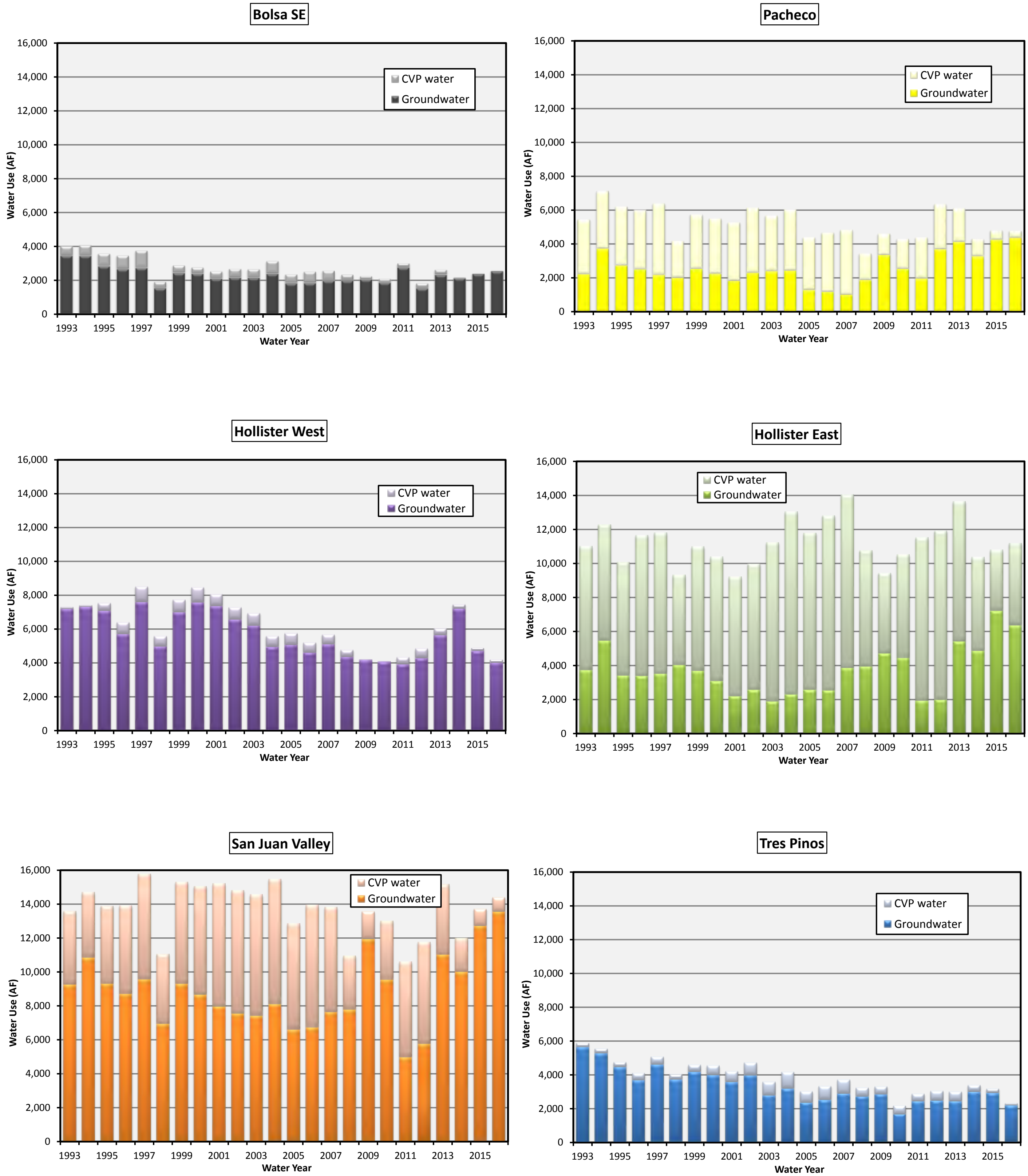


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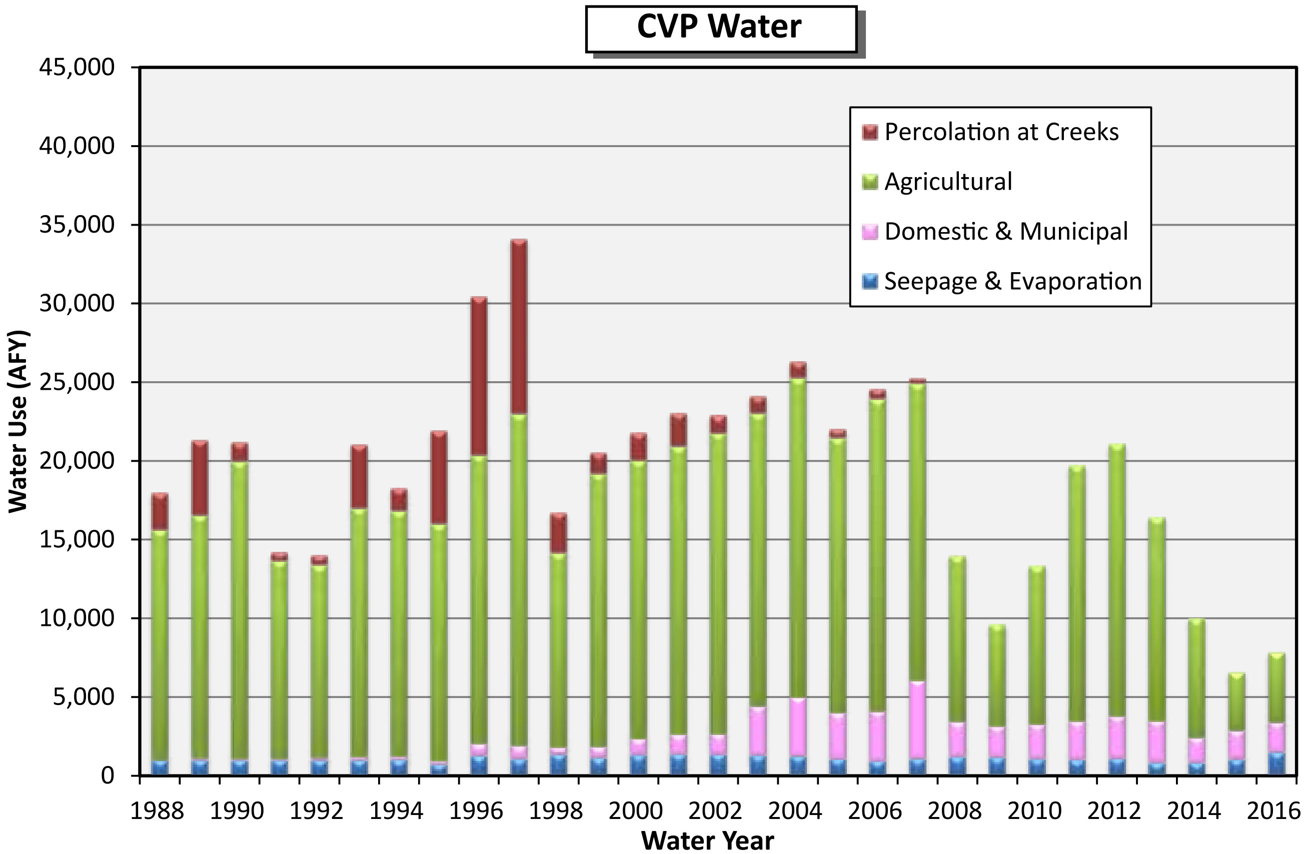
**Figure E-3**
**Total Subbasin Water Use by Water Type**



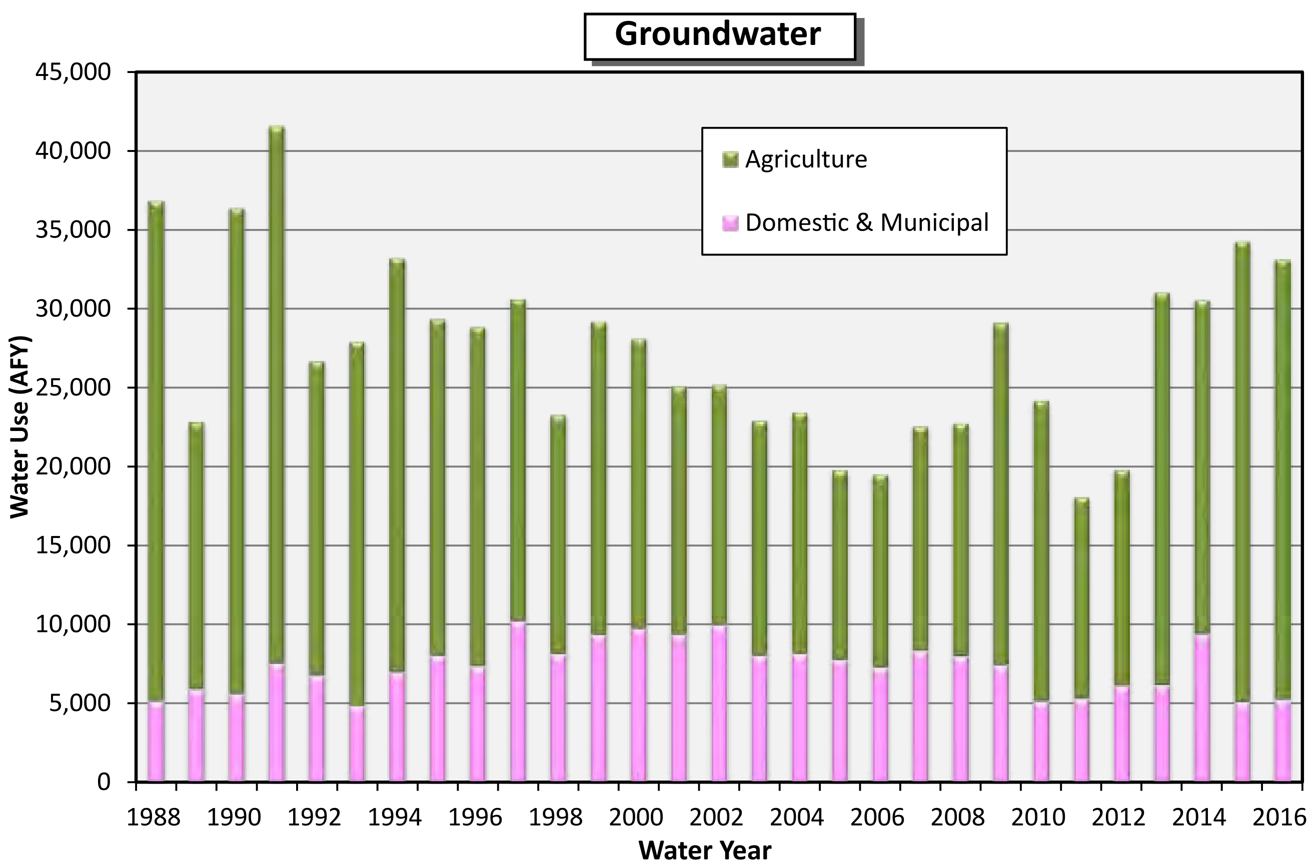




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**Figure E-4**
**Annual Total of CVP and Groundwater by Use**

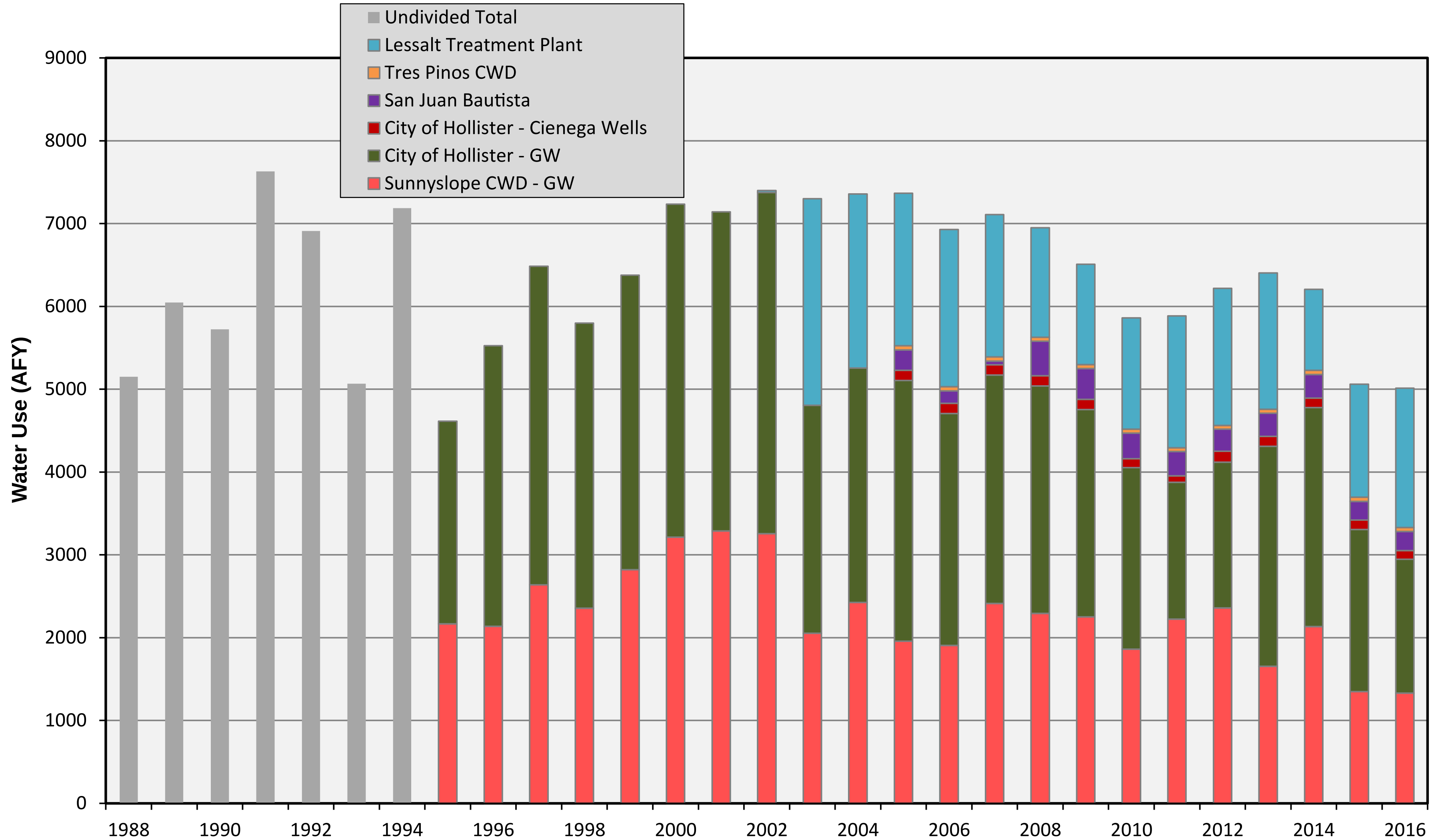


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**Figure E-5**
**Municipal Water Use by Purveyor**

# F RATES AND CHARGES

List of Tables and Figures

**Table F-1. Historical and Current San Benito County Water District CVP (Blue Valve) Water Rates (dollars/af)**

| USBR Water Year | Standby & Availability Charge (dollars/acre) | Water Charge | | Power Charge | | | | | Groundwater Charge (dollars/af) | | | Recycled Water (per AF) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agricultural | Municipal & Industrial | Distribution Subsystem | | | | | Agricultural | Municipal & Industrial | | Agricultural | Power Charge |
| | | | | 2 | 6H | 9L | 9H | Others | | | | | |
| 1987 | $8.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | | | |
| 1988 | $2.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | | | |
| 1991 | $4.00 | $38.00 | $110.00 | | | | | | $6.25 | $22.00 | | | |
| 1992 | $4.00 | $45.00 | $120.00 | | | | | | $2.00 | $10.00 | | | |
| 1994 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $5.00 | | | |
| 1995 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $15.75 | First 100 af | | |
| | | | | | | | | | | $36.70 | Next 500 af | | |
| | | | | | | | | | | $54.60 | Over 600 af | | |
| 1996 | $6.00 | $75.00 | $150.00 | | | | | | $1.50 | $33.00 | | | |
| 1997 | $6.00 | $75.00 | $157.00 | | | | | | $1.50 | $33.00 | | | |
| 1998 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $33.00 | | | |
| 2000 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $11.50 | | | |
| 2001 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $25.00 | | | |
| 2004 | $6.00 | $75.00 | $150.00 | $24.30 | $46.75 | $25.05 | $53.70 | $15.25 | $1.50 | $10.00 | | | |
| 2005 | $6.00 | $80.00 | $150.00 | $26.15 | $49.40 | $35.00 | $66.90 | $17.10 | $1.50 | $21.50 | | | |
| 2006 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | | | |
| 2007 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | | | |
| 2008 | $6.00 | $100.00 | $170.00 | $17.25 | $19.40 | $32.60 | $62.75 | $14.85 | $1.50 | $21.50 | | | |
| 2009 | $6.00 | $115.00 | $180.00 | $17.50 | $20.25 | $42.55 | $74.85 | $16.30 | $2.50 | $22.50 | | | |
| 2010 | $6.00 | $135.00 | $200.00 | $22.00 | $27.30 | $49.75 | $84.35 | $21.75 | $2.50 | $22.50 | | | |
| 2011 | $6.00 | $155.00 | $220.00 | $22.70 | $28.15 | $51.25 | $86.90 | $22.40 | $2.50 | $22.50 | | | |
| 2012 | $6.00 | $170.00 | $235.00 | $23.35 | $29.00 | $52.80 | $89.50 | $23.10 | $2.50 | $22.50 | | | |
| 2013 | $6.00 | $170.00 | $235.00 | $40.30 | $29.25 | $43.05 | $91.55 | $22.40 | $3.25 | $23.25 | | | |
| 2014 | $6.00 | $170.00 | $238.00 | $41.55 | $30.15 | $44.35 | $94.30 | $23.10 | $3.60 | $23.25 | | | |
| 2015 | $6.00 | $179.00 | $247.00 | $42.75 | $31.05 | $45.70 | $97.15 | $23.80 | $3.95 | $23.25 | | | |
| 2016 | $6.00 | $272.00 | $363.00 | $123.10 | $75.65 | $109.95 | $162.55 | $66.05 | $4.95 | $24.25 | | $182.55 | $57.70 |

Notes:

af = acre-feet.
n.c. = no classification.
n.i. = not implemented
All rates effective March 1 through following February.

**Table F-2. 2017 Recommended Groundwater Revenue Requirement/Charges**

| REVENUE REQUIREMENTS | | | | | Rates [2] | |
|---|---|---|---|---|---|---|
| | Component | Rate ($/AF) | Quantity[1] (af) | Amount | Ag | M & I |
| **Source of Supply** | | | | | | |
| Ag | Source of Supply Costs | $9.14 | 22,438 | $ 205,070 | $ 9.14 | |
| M&I | Source of Supply Costs | $27.42 | 5,725 | $ 156,970 | | $ 27.42 |
| **Percolation Costs** | | | | | | |
| Ag | CVP Water Rate[3] | $301.23 | - | $ - | $ - | |
| M&I | CVP Water Rate[3] | $411.93 | - | $ - | | $ - |
| | | | | | | |
| Ag | Power Charge for Percolation | $0.00 | - | 0 | $ - | |
| M&I | Power Charge for Percolation | $0.00 | - | 0 | | $ - |
| **Calculated Total** | | | | | $ 9.14 | $ 27.42 |
| Previous Groundwater Charge (per acre foot) | | | | | $ 4.95 | $ 24.25 |
| | | | | | | |
| **CURRENT AND RECOMMENDED CHARGES (per acre foot)** | | | | | **$ 6.45** | **$ 24.25** |

1 Assumed Volumes
Percolation (based on average of last 3 years of recharge
Groundwater Usage (based on average of past 4 years)
2 Rates=Revenue Requirement/projected usage
3 CVP water rate basis for 2017-2018 water year

Note: Section 70-7.8 (a) of the District Act states that the agricultural rate shall not exceed one-third of the rates for all water other than agricultural water.

**Table F-3. Recent US Bureau of Reclamation Charges per Acre-Foot for CVP Water**

| User Category and Cost Item | Irrigation[1] | | | | | | Municipal & Industrial | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cost of service (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] | Cost of service[2] (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] |
| 1994 | $71.68 | $6.20 | n.a. | | $77.88 | $17.21 | $165.67 | $12.40 | n.a. | | $178.07 | $85.86 |
| 1995 | $66.47 | $6.35 | n.a. | | $72.82 | $17.21 | $132.90 | $12.69 | n.a. | | $145.59 | $85.86 |
| 1996 | $65.63 | $6.53 | n.a. | | $72.16 | $27.46 | $127.40 | $13.06 | n.a. | | $140.46 | $85.86 |
| 1997 | $69.57 | $6.70 | n.a. | | $76.27 | $27.46 | $143.27 | $13.39 | n.a. | | $156.66 | $85.86 |
| 1998 | $61.58 | $6.88 | $5.00 | | $73.46 | $27.46 | $130.88 | $13.76 | $5.00 | | $149.64 | $85.86 |
| 1999 | $60.30 | $6.98 | $2.73 | | $70.01 | $27.46 | $127.91 | $13.96 | $2.73 | | $144.60 | $85.86 |
| 2000 | $64.24 | $7.10 | $6.43 | | $77.77 | $27.46 | $129.59 | $14.20 | $6.43 | | $150.22 | $85.86 |
| 2001 | $69.50 | $7.28 | $2.65 | | $79.43 | $27.46 | $129.40 | $14.56 | $4.15 | | $148.11 | $85.86 |
| 2002 | $68.71 | $7.54 | $6.61 | | $82.86 | $24.30 | $130.32 | $15.08 | $6.61 | | $152.01 | $79.13 |
| 2003 | $72.20 | $7.69 | $5.46 | | $85.35 | $24.30 | $129.07 | $15.38 | $5.46 | | $149.91 | $79.13 |
| 2004 | $74.52 | $7.82 | $6.61 | | $88.95 | $24.30 | $134.86 | $15.64 | $6.61 | | $157.11 | $79.13 |
| 2005 | $77.10 | $7.93 | $7.99 | | $93.02 | $24.30 | $132.01 | $15.87 | $7.99 | | $155.87 | $79.13 |
| 2006 | $91.13 | $8.24 | $9.31 | | $108.68 | $30.93 | $214.41 | $16.49 | $9.31 | | $240.21 | $77.12 |
| 2007 | $93.53 | $8.58 | $9.99 | $0.11 | $112.21 | $30.93 | $215.32 | $17.15 | $9.99 | $0.11 | $242.46 | $80.08 |
| 2008[6] | $28.12 | $8.79 | $10.95 | $0.07 | $47.93 | $30.93 | $33.34 | $17.57 | $10.95 | $0.07 | $61.68 | $33.34 |
| 2009 | $30.20 | $9.06 | $11.49 | $0.07 | $50.82 | $30.20 | $32.77 | $18.12 | $11.49 | $0.07 | $62.45 | $32.77 |
| 2010 | $33.27 | $9.11 | $11.91 | $0.11 | $54.40 | $33.27 | $36.11 | $18.23 | $11.91 | $0.11 | $66.36 | $36.11 |
| 2011 | $38.92 | $9.29 | $9.51 | $0.05 | $57.77 | $38.92 | $42.58 | $18.59 | $9.51 | $0.05 | $70.73 | $42.58 |
| 2012 | $39.71 | $9.39 | $15.20 | $0.05 | $64.35 | $39.71 | $37.95 | $18.78 | $15.20 | $0.05 | $71.98 | $37.95 |
| 2013 | $40.39 | $9.79 | $17.29 | $0.05 | $67.52 | $39.91 | $38.71 | $19.58 | $17.29 | $0.05 | $75.63 | $40.92 |
| 2014 | $46.87 | $9.99 | $28.81 | $0.23 | $85.90 | $46.87 | $29.70 | $19.98 | $28.81 | $0.23 | $78.72 | $29.70 |
| 2015 | $53.82 | $10.07 | $30.66 | $0.23 | $94.78 | $53.82 | $34.74 | $20.14 | $30.66 | $0.23 | $85.77 | $34.74 |
| 2016 | $85.12 | $10.21 | $23.71 | $0.30 | $119.40 | $38.28 | $61.24 | $20.41 | $23.71 | $0.30 | $105.66 | $23.42 |

Notes:

(1) Total USBR rate given for non-full cost users only, as they represent the majority of water users.

(2) Cost-of-service for agricultural and municipal and industrial users includes a capital repayment rate and an operation and maintenance (O&M) rate. For municipal and industrial customers, cost-of-service also includes a deficit charge, which includes interest on unpaid O&M and interest on capital and on unpaid deficit.

(3) Restoration fund charges apply October 1 through September 30.

(4) Beginning in 1998, the San Luis-Delta Mendota Water Authority instituted this charge to "self-fund" costs associated with maintaining the Delta-Mendota Canal and certain other facilities, which were formerly funded directly by the Bureau of Reclamation. SLDMWA issues preliminary rates in December for the upcoming contract year (March-February). These rates are used for rate-setting purposes; actual rates may vary.

(5) The contract rate is the minimum rate CVP contractors are allowed to pay. To the extent that the contract rate does not cover interest plus actual operation and maintenance costs, a contractor deficit is accumulated that is charged interest at the current-year treasury borrowing rate.

(6) Per the amendatory contract with the USBR "out of basin" capital costs that were previously included in the cost of service are now under a separate repayment contract.

(7) Cost of service rates are inclusive of USBR direct pumping and Project Use Energy costs.

# G WATER QUALITY

List of Attachments

**Table G-1. SBCWD Monitoring Well Water Quality Data - Nitrate as NO3 mg/L**

| Date | Brian's Nested Well | | | | | MW 11 | MW 12 | MW 17 | MW 18 | MW 19 | MW 21 | MW 24 | MW 28 | MW 31 | MW 36 | MW 39 | MW 41 | MW 42 (Tri Cal) | MW 43 | MW 45 | MW 46 | MW 47 | MW 48 | MW 49 | MW 51 | MW 52 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | | | | | | | | | | | | | | | | | | | | | |
| | NITRATE (AS NO3) | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apr-97 | | | | | | | | | | | 32 | 170 | | | | | | | | | | | | | | |
| Aug-98 | | | | | | | 7 | 6 | 12 | | 46 | 220 | | | | | | | | 16 | | | | | | |
| Sep-01 | | | | | | 15 | 14 | 3 | 17 | 16 | 83 | 228 | 2 | | 8 | 15 | 4 | 31 | 3 | 24 | 3 | | 12 | | | |
| Oct-01 | | | | | | | | | | | | | | 57 | | | | | | | | 86 | | | | |
| Jan-02 | | | | | | 21 | 13 | 2 | | | | 242 | 2 | 53 | 8 | 12 | 2 | 30 | 2 | 20 | 2 | 124 | | 106 | | |
| Mar-02 | | | | | | | | | | | | | | | | | | | | | | | 32 | | | |
| Apr-02 | | | | | | 19 | 13 | 3 | | 80 | 33 | 3 | 3 | 53 | 7 | 10 | 3 | 28 | 3 | 21 | 3 | 114 | 10 | 112 | | |
| Jul-02 | | | | | | 17 | 14 | 3 | | 15 | 37 | 199 | 3 | 54 | 9 | 16 | 3 | 30 | 3 | 24 | 3 | 122 | | 111 | | |
| Oct-02 | | | | | | 20 | 18 | 2 | | 15 | 80 | | 3 | 55 | 9 | 16 | | 35 | 3 | 28 | 3 | 129 | 13 | 112 | | |
| Jan-03 | | | | | | 17 | 17 | 4 | | 4 | 66 | 336 | 4 | 56 | 11 | 13 | 4 | 35 | 4 | 22 | 4 | 122 | 13 | 104 | | |
| Apr-03 | | | | | | 21 | 20 | 3 | | 11 | 83 | 327 | 4 | 69 | 9 | 12 | 3 | 36 | 3 | 27 | 3 | 114 | 13 | 116 | | |
| Jul-03 | | | | | | 20 | 17 | 3 | | 3 | 37 | 108 | 3 | 57 | 7 | 15 | 3 | 33 | 3 | 22 | 3 | 123 | 3 | 98 | | |
| Aug-03 | | | | | | | | | | | | | | | | 19 | | | | | | | | | | |
| Oct-03 | | | | | | 19 | 18 | 3 | | 5 | 75 | 228 | 3 | 53 | 8 | 14 | 3 | 33 | 4 | 25 | 3 | 120 | 8 | 94 | | |
| Jan-04 | | | | | | 15 | 15 | 2 | 24 | | 33 | 513 | 2 | 44 | 13 | 14 | 5 | 31 | 3 | 22 | | | 17 | 81 | | |
| Nov-04 | | | | | | 16 | 19 | 2 | 8 | | 61 | 259 | 2 | 44 | 5 | 7 | 2 | 35 | 2 | 20 | 2 | 101 | | 82 | | |
| May-05 | | | | | | 21 | 24 | 2 | 10 | | 45 | 161 | 2 | 44 | 6 | 9 | 2 | 34 | 3 | 24 | 3 | 110 | | 88 | | |
| Nov-05 | | | | | | 19 | 23 | 3 | 14 | 9 | 57 | 321 | 4 | 47 | 7 | 10 | 3 | 33 | 3 | 23 | 4 | 103 | 11 | 78 | | |
| Apr-06 | | | | | | 24 | | 4 | 24 | | 82 | 393 | 4 | 63 | 12 | 12 | 4 | 43 | 3 | 35 | 4 | 120 | | 94 | | |
| Oct-06 | | | | | | 22 | 18 | 5 | 22 | 76 | 47 | 501 | 3 | 53 | 8 | 14 | 4 | 35 | 4 | 25 | 5 | 140 | 14 | | | |
| Feb-07 | 7 | 1 | 1 | 1 | 5 | | | | | | | | | | | | | | | | | | | | | |
| Apr-07 | | | | | | 20 | | 2 | 14 | | | 321 | 2 | 49 | 6 | 10 | 2 | 32 | 3 | 26 | 2 | 98 | | | | |
| Nov-07 | | | | | | 23 | | 5 | 14 | | 42 | 295 | 4 | 31 | 9 | 12 | 4 | 33 | 3 | 29 | 3 | 128 | | 74 | | |
| Apr-08 | | | | | | 26 | | | | | | | 5 | 31 | | | | 31 | 4 | | 5 | | | | | |
| May-08 | | | | | | | | | | | 36 | 225 | | | 17 | 15 | | | | 25 | | 99 | | | | |
| Nov-08 | | | | | | 26 | | 8 | | | | 332 | 3 | 216 | 20 | 17 | 40 | 42 | 5 | 36 | | 73 | | 6 | | |
| Oct-09 | | | | | | 30 | 2 | 7 | | 19 | 23 | 3 | | 175 | 8 | 27 | 44 | 32 | 2 | 7 | 12 | 53 | | | 7 | 2 |
| Nov-09 | 2 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | |
| Apr-10 | | | | | | 19 | 19 | 8 | | 35 | 4 | 3 | 3 | 208 | 3 | | | 41 | | 29 | | 3 | | 65 | 9 | 3 |
| Oct-10 | | 4 | 4 | 5 | 4 | 30 | | 13 | | 10 | 5 | 301 | 5 | 225 | | 11 | | 39 | 5 | 27 | 4 | 36 | | | 10 | 4 |
| Apr-11 | | | | | | 29 | 17 | 10 | | 3 | 4 | 230 | 4 | 179 | 10 | 15 | | 36 | 4 | 3 | 24 | 67 | | 44 | 8 | 3 |
| Jun-11 | 4 | 3 | 17 | 4 | 7 | | | | | | | | | | | | | | | | | | | | | |
| Nov-11 | | | | | | | | 11 | | 5 | | | 4 | 170 | | | | 33 | 4 | 26 | 4 | | | 4 | 5 | 5 |
| Dec-12 | | | | | | 18 | 17 | 11 | | | 5 | 23 | 4 | 74 | 9 | | | 24 | 5 | 17 | 5 | 7 | | | 10 | 5 |
| Jun-13 | 6 | 25 | 5 | 5 | 6 | 28 | | 19 | | | 6 | 180 | 31 | 211 | 9 | 14 | | 36 | 5 | | | | | 31 | 14 | 6 |
| Dec-13 | | | | | | 30 | | 17 | | | | 283 | 3 | 222 | | 4 | | | 3 | 27 | 3 | 42 | | 30 | 12 | 3 |
| Jan-14 | 3 | 15 | 2 | 3 | 3 | | | | | | | | | | | | | | | | | | | | | |
| May-14 | 3 | 18 | 2 | 3 | 3 | 30 | 16 | 18 | | | 2 | 302 | 2 | 212 | | 3 | | 35 | 3 | 24 | | | | 13 | 3 | |
| Nov-14 | 7 | 18 | 7 | 6 | 6 | | | 13 | | | | 247 | 6 | 205 | | | | 29 | 7 | 21 | 25 | | | | 12 | 7 |
| May-15 | 5 | 19 | 8 | 5 | 5 | 26 | 18 | 13 | | | 5 | | 5 | 215 | | 5 | | 23 | | 25 | | | | | | 6 |
| May-16 | 3 | 4 | 6 | 3 | 3 | 29 | 89 | 11 | | 4 | 4 | 38 | 102 | 198 | | 19 | | 17 | | | 4 | | | | 12 | 4 |

Note: Shading indicates values that exceed the primary maximum contaminent limit (MCL) for drinking water, 45 mg/L

**Table G-2. SBCWD Monitoring Well Water Quality Data - Total Dissolved Solids mg/L**

| Date | Brian's Nested Well A | B | C | D | E | MW 11 | MW 12 | MW 17 | MW 18 | MW 19 | MW 21 | MW 24 | MW 28 | MW 31 | MW 36 | MW 39 | MW 41 | MW 42 (Tri Cal) | MW 43 | MW 45 | MW 46 | MW 47 | MW 48 | MW 49 | MW 51 | MW 52 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOTAL DISSOLVED SOLIDS | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apr-97 | | | | | | | | | | | 1,500 | 2,300 | | | | | | | | | | | | | | |
| Aug-98 | | | | | | 1,010 | 1,160 | 600 | 800 | | 1,720 | 2,780 | | | | | | | | 840 | | | | | | |
| Sep-01 | | | | | | 1,175 | 1,220 | 543 | 810 | 1,168 | 2,100 | 2,482 | 875 | | 1,173 | 852 | 2,135 | 347 | 493 | 845 | 593 | | 1,098 | | | |
| Oct-01 | | | | | | | | | | | | | | 1,360 | | | | | | | | 2,032 | | | | |
| Jan-02 | | | | | | 1,156 | 1,292 | 538 | | | | 2,786 | 948 | 1,376 | 1,178 | 816 | 2,032 | 360 | 564 | 836 | 582 | 1,774 | | 1,084 | | |
| Mar-02 | | | | | | | | | | | | | | | | | | | | | | | 1,078 | | | |
| Apr-02 | | | | | | 1,180 | 1,266 | 538 | | 1,398 | 1,630 | 538 | 926 | 1,352 | 1,152 | 782 | 1,964 | 368 | 726 | 824 | 582 | 1,760 | 1,090 | 932 | | |
| Jul-02 | | | | | | 1,216 | 1,216 | 542 | | 1,114 | 1,676 | 2,506 | 926 | 1,386 | 1,170 | 868 | 2,014 | 354 | 724 | 806 | 594 | 1,996 | | 1,078 | | |
| Oct-02 | | | | | | 1,178 | 1,186 | 570 | | 1,120 | 2,052 | | 926 | 1,326 | 1,178 | 1,014 | | 394 | 532 | 834 | 628 | 1,862 | 1,084 | 1,020 | | |
| Jan-03 | | | | | | 1,056 | 1,086 | 516 | | 966 | 2,024 | 2,448 | 870 | 1,198 | 1,094 | 838 | 1,970 | 346 | 470 | 768 | 550 | 1,548 | 1,046 | 746 | | |
| Apr-03 | | | | | | 1,182 | 1,294 | 514 | | 1,140 | 2,072 | 2,736 | 914 | 1,444 | 1,132 | 900 | 2,092 | 362 | 528 | 818 | 598 | 1,892 | 1,076 | 976 | | |
| Jul-03 | | | | | | 1,244 | 1,312 | 542 | | 1,084 | 1,640 | 2,692 | 950 | 1,376 | 1,180 | 888 | 2,144 | 372 | 546 | 802 | 610 | 2,004 | 856 | 1,004 | | |
| Aug-03 | | | | | | | | | | | | | | | | 1,000 | | | | | | | | | | |
| Oct-03 | | | | | | 1,188 | 1,164 | 556 | | 1,110 | 2,110 | 3,064 | 892 | 1,424 | 1,200 | 942 | 2,144 | 394 | 526 | 836 | 628 | 1,888 | 966 | 948 | | |
| Jan-04 | | | | | | 1,218 | 1,316 | 528 | 774 | | 1,766 | 2,910 | 870 | 1,282 | 1,156 | 844 | 2,074 | 380 | 502 | 798 | | | 1,058 | 902 | | |
| Nov-04 | | | | | | 1,302 | 1,372 | 544 | 740 | | 1,936 | 3,470 | 946 | 1,336 | 1,202 | 888 | 2,128 | 368 | 540 | 854 | 568 | 2,194 | | 1,012 | | |
| May-05 | | | | | | 1,168 | 1,308 | 518 | 706 | | 1,574 | 2,250 | 886 | 1,178 | 1,112 | 866 | 2,092 | 374 | 542 | 874 | 580 | 1,964 | | 768 | | |
| Nov-05 | | | | | | 1,246 | 1,398 | 532 | 774 | 1,114 | 1,874 | 3,544 | 888 | 1,390 | 1,232 | 982 | 2,110 | 386 | 562 | 854 | 590 | 2,208 | 1,034 | 876 | | |
| Apr-06 | | | | | | 1,184 | | 528 | 818 | | 2,006 | 3,120 | 902 | 1,280 | 1,178 | 922 | 2,076 | 372 | 548 | 902 | 592 | 1,958 | | 904 | | |
| Oct-06 | | | | | | 1,292 | 1,294 | 666 | 786 | 1,460 | 1,090 | 2,826 | 1,012 | 1,374 | 1,074 | 940 | 1,924 | 440 | 630 | 758 | 628 | 1,772 | 676 | | | |
| Feb-07 | 1,372 | 1,410 | 1,128 | 1,302 | 2,440 | | | | | | | | | | | | | | | | | | | | | |
| Apr-07 | | | | | | 1,088 | | 526 | 762 | | | 2,486 | 664 | 1,242 | 1,096 | 980 | 2,030 | 264 | 528 | 780 | 566 | 1,848 | | | | |
| Nov-07 | | | | | | 882 | | 476 | 616 | | 1,256 | 2,024 | 656 | 900 | 886 | 782 | 1,434 | 316 | 466 | 696 | 512 | 1,414 | | 654 | | |
| Apr-08 | | | | | | 1,076 | | | | | | | 810 | 970 | | | | 370 | 546 | | 562 | | | | | |
| May-08 | | | | | | | | | | | 1,462 | 2,528 | | | 1,102 | 872 | | | | 814 | | 1,782 | | | | |
| Nov-08 | | | | | | 1,064 | | 560 | | | | 3,036 | 856 | 2,152 | 868 | 1,116 | 2,400 | 372 | 568 | 860 | | 1,536 | | 400 | | |
| Apr-09 | | | | | | 1,112 | 916 | 528 | | | 312 | 2,780 | 848 | 2,068 | 2,428 | 1,100 | 860 | 346 | | 780 | 568 | 1,772 | | 728 | 644 | |
| Oct-09 | | | | | | 1,024 | 548 | 576 | | 1,092 | 360 | 2,864 | | 2,088 | 848 | 1,444 | 1,040 | 352 | 528 | 656 | 1,008 | 1,436 | | | 656 | 768 |
| Nov-09 | 1,160 | 1,148 | 1,108 | 1,140 | 1,136 | | | | | | | | | | | | | | | | | | | | | |
| Apr-10 | | | | | | 955 | 955 | 555 | | 422 | 343 | 1,783 | 850 | 2,032 | 330 | | | 363 | | 815 | | 1,812 | | 688 | 695 | 794 |
| Oct-10 | | 753 | 1,000 | 887 | 1,105 | 1,168 | | 528 | | 967 | 352 | 2,683 | 335 | 1,928 | | 1,057 | | 368 | 528 | 815 | 572 | 1,215 | | | 703 | 843 |
| Apr-11 | | | | | | 1,192 | 1,168 | 524 | | 944 | 348 | 2,752 | 868 | 1,784 | 732 | 1,120 | | 376 | 532 | 560 | 848 | 1,600 | | 660 | 704 | 764 |
| Jun-11 | 644 | 724 | 2,764 | 1,028 | 772 | | | | | | | | | | | | | | | | | | | | | |
| Nov-11 | | | | | | | | 532 | | 932 | | | 848 | 1,648 | | | | 368 | 468 | 796 | 548 | | | 232 | 320 | 704 |
| Dec-12 | | | | | | 1,096 | 1,580 | 516 | | | 288 | 1,348 | 824 | 1,648 | 720 | | | 376 | 508 | 892 | 512 | 1,760 | | | 788 | 1,032 |
| Jun-13 | 624 | 2,784 | 936 | 600 | 796 | 1,124 | | 500 | | | 348 | 2,444 | 1,028 | 1,820 | 480 | 964 | | 368 | 520 | | | | | 1,028 | 712 | 840 |
| Dec-13 | | | | | | 1,012 | | 524 | | | | 2,520 | 320 | 1,704 | | 916 | | | 536 | 800 | 544 | 1,344 | | 552 | 708 | 744 |
| Jan-14 | 992 | 2,868 | 1,112 | 792 | 928 | | | | | | | | | | | | | | | | | | | | | |
| May-14 | 1,004 | 2,880 | 1,564 | 568 | 808 | 1,208 | 1,232 | 536 | | | 352 | 2,756 | 712 | 1,720 | | 912 | | 388 | 556 | 856 | | | | 540 | 840 | |
| Nov-14 | 888 | 2,880 | 1,816 | 820 | 900 | | | 548 | | | | 2,904 | 704 | 2,000 | | | | 1,484 | 532 | 876 | 1,212 | | | | 724 | 740 |
| May-15 | 856 | 2,860 | 1,696 | 812 | 916 | 1,160 | 1,204 | 560 | | | 356 | | 708 | 1,960 | | 992 | | 798 | | 868 | | | | | | 900 |
| May-16 | 520 | 2,788 | 1,592 | 652 | 832 | 1,152 | 2,276 | 540 | | 960 | 332 | 1,184 | 1,252 | 1,696 | | 1,192 | | 420 | | | 564 | | | | 720 | 1,304 |

Note: Shading indicates values that exceed water quality goals (yellow > 500 mg/L and drak green > 1,000 mg/L)

**Table G-3. Water Quality Goals and Standards**

| Constituents of Concern | Units | Drinking Water Standards Maximum Contaminant Levels (MCLs) | | | | Other Standards | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | State Water Resources Control Board | | USEPA | | California DHS | | | RWQCB Basin Plan Water Quality Objectives for Irrigation | |
| | | Primary | Secondary | Primary | Secondary | Public Health Goal (PHG) | Action Level (AL) | Agricultural Water Quality Limits | Irrigation Supply | Livestock Watering |
| **MAJOR CATIONS:** | | | | | | | | | | |
| calcium | mg/L | – | – | – | – | – | – | – | – | – |
| magnesium | mg/L | – | – | – | – | – | – | – | – | – |
| sodium | mg/L | – | – | – | – | – | – | 69 | – | – |
| potassium | mg/L | – | – | – | – | – | – | – | – | – |
| **MAJOR ANIONS:** | | | | | | | | | | |
| chloride | mg/L | – | 250 | – | 250 | – | – | 106 | – | – |
| sulfate | mg/L | – | 250 | 500 | 250 | – | – | – | – | – |
| bicarbonate | mg/L | – | – | – | – | – | – | – | – | – |
| carbonate | mg/L | – | – | – | – | – | – | – | – | – |
| **MINOR IONS:** | | | | | | | | | | |
| hydroxide (as CaCO3) | mg/L | – | – | – | – | – | – | – | – | – |
| iron | mg/L | – | 0.3 | – | 0.3 | – | – | 0.5 | 5 | – |
| manganese | mg/L | – | 0.05 | – | 0.05 | – | 0.5 | 0.2 | 0.2 | – |
| fluoride* | mg/L | 2 | – | 4 | 2 | 1 | – | 1 | 1 | 2 |
| nitrate as NO3 – | mg/L | 45 | – | – | – | – | – | – | – | – |
| nitrate as nitrogen | mg/L | – | – | 10 | – | 10 | – | – | – | – |
| nitrite (NO2 – ) as nitrogen | mg/L | 1 | – | 1 | – | 1 | – | – | – | 10 |
| nitrate + nitrite as nitrogen | mg/L | 10 | – | 10 | – | 10 | – | – | – | 100 |
| **PHYSICAL PROPERTIES:** | | | | | | | | | | |
| apparent color | Color Units | – | 15 | – | 15 | – | – | – | – | – |
| conductivity | micromohs/cm | – | 900 | – | – | – | – | 700 | – | – |
| odor | TON@60°C | – | 3 | – | 3 | – | – | – | – | – |
| total alkalinity (as CaCO3) | mg/L | – | – | – | – | – | – | – | – | – |
| total dissolved solids (TDS) | mg/L | – | 500 | – | 500 | – | – | 450 | – | – |
| total hardness (as CaCO3) | mg/L | – | – | – | – | – | – | – | – | – |
| turbidity | NTU | 1/5** | 5 | 1/5** | – | – | – | – | – | – |
| pH | SU | – | – | – | 6.5 to 8.5 | – | – | 6.5 to 8.4 | 5.5 to 8.3 | – |
| **TRACE IONS:** | | | | | | | | | | |
| aluminum | mg/L | 1 | 0.2 | – | 0.050 to 0.2 | 0.6 | – | 5 | 5 | 5 |
| antimony | mg/L | 0.006 | – | 0.006 | – | 0.02 | – | – | – | – |
| arsenic | mg/L | 0.05 | – | 0.01 | – | 0.000004 | – | 0.1 | 0.1 | 0.2 |
| barium | mg/L | 1 | – | 2 | – | 2 | – | – | – | – |
| beryllium | mg/L | 0.004 | – | 0.004 | – | 0.001 | – | 0.1 | 0.1 | – |
| boron | mg/L | – | – | – | – | – | 1 | 0.700/0.750† | 0.5 | 5 |
| cadmium | mg/L | 0.005 | – | 0.005 | – | 0.00004 | 0.00007 | – | 0.01 | 0.05 |
| chromium vi | ug/L | 10 | | 0.1 | | 0.02 | | | 0.1 | 1 |
| cobalt | mg/L | | | | | | | | 0.05 | 1 |
| copper | mg/L | 1.3 | | 1.3 | 1 | 0.3 | | 0.2 | | |
| lead | mg/L | 1.015 | | 0.015 | | 0.0002 | | 5 | 5 | 0.1 |
| lithium | mg/L | | | | | | | | 2.5 | |
| mercury | mg/L | 0.002 | | 0.002 | | 0.0012 | | | | |
| molybdenum | mg/L | | | | | | | | 0.01 | 0.5 |
| nickel | mg/L | 0.1 | | | | 0.012 | | 0.2 | 0 | |
| selenium | mg/L | 0.05 | | 0.5 | | | | 0.002 | | |
| silver | mg/L | | | | 0.1 | | | | 0.02 | 0.05 |
| thallium | mg/L | 0.002 | | 0.002 | | 0.0001 | | | | |
| vanadium | mg/L | – | – | – | – | – | 0.05 | 0.1 | 0.1 | 0.1 |
| zinc | mg/L | – | 5 | – | 5 | – | – | 2 | 2 | 25 |
| **VOCs:** | | | | | | | | | | |
| 1,1,1-trichloroethane | mg/L | 1000 | – | 0.2 | – | 200 | – | – | – | – |
| ,1,2-trichloro-1,2,2-trifluoroethan | mg/L | 4000 | – | 1.2 | – | 1200 | – | – | – | – |
| 1,1,2-trichloroethane | mg/L | 5 | – | 0.005 | – | 0.3 | – | – | – | – |
| 1,1-dichloroethane | mg/L | 5 | – | 0.005 | – | 3 | – | – | – | – |
| 1,1-dichloroethene | mg/L | 6 | – | 0.006 | – | 10 | – | – | – | – |
| 1,2,3-trichlorobenzene | mg/L | – | – | 0 | – | – | – | – | – | – |
| 1,2,4-trichlorobenzene | mg/L | – | – | 0.005 | – | – | – | – | – | – |
| 1,2-dichlorobenzene | mg/L | 0.5 | – | 0.6 | – | 0.4 | – | – | – | – |
| 1,2-dichloroethane | mg/L | – | – | 0.0005 | – | – | – | – | – | – |
| 1,2-dichloropropane | mg/L | – | – | 0.005 | – | – | – | – | – | – |
| 1,3-dichlorobenzene | mg/L | – | – | 0.6 | – | – | 0.6 | – | – | – |
| chlorobenzene | mg/L | – | – | 0.07 | – | – | – | – | – | – |
| di(2-ethylhexyl)phthalate | mg/L | – | – | 0.004 | – | – | – | – | – | – |
| dichlorodifluoromethane | mg/L | – | – | 1 | – | – | – | – | – | – |
| PCE | mg/L | – | – | 0.005 | – | – | – | – | – | – |
| TCE | mg/L | 0.005 | – | 0.005 | – | 0.0017 | – | – | – | – |
| trans-1,2-dichloroethene | mg/L | – | – | 0.01 | – | – | – | – | – | – |
| trichlorofluoromethane | mg/L | – | – | 0.15 | – | – | – | – | – | – |
| vinyl chloride | mg/L | 0.5 | – | 0.0005 | – | 0.05 | – | – | – | – |
| **BTEX:** | | | | | | | | | | |

**Table G-3. Water Quality Goals and Standards**

| Constituents of Concern | Units | Drinking Water Standards Maximum Contaminant Levels (MCLs) | | | | Other Standards | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | State Water Resources Control Board | | USEPA | | California DHS | | | RWQCB Basin Plan Water Quality Objectives for Irrigation | |
| | | Primary | Secondary | Primary | Secondary | Public Health Goal (PHG) | Action Level (AL) | Agricultural Water Quality Limits | Irrigation Supply | Livestock Watering |
| MTBE | mg/L | – | – | 0.013 | – | – | – | – | – | – |
| Benzene | mg/L | – | – | 0.001 | – | – | – | – | – | – |
| Toluene | mg/L | 150 | – | 0.15 | – | 150 | – | – | – | – |
| Ethylbenzene | mg/L | 300 | – | 0.7 | – | 300 | – | – | – | – |
| Total xylenes | mg/L | 1750 | – | 1.75 | – | 1800 | – | – | – | – |
| **OTHER:** | | | | | | | | | | |
| MBAS (Surfactants) | mg/L | – | 500 | – | 500 | – | – | – | – | – |
| perchlorate | mg/L | 6 | – | – | – | 1 | 0.006 | 0.006 | – | – |

Notes:
All concentrations in milligrams per liter (mg/L) or parts per million (ppm) except where noted.
Dash (– ) indicates no current standard or no available information.
USEPA = U.S. Environmental Protection Agency.
California DHS = California Department of Health Services, now Department of Public Health
MBAS = Methylene Blue Active Substances.
NTU = Nephalometric Turbidity Units.
TON = Threshold Odor Number.
SU = Standard Units
* Optimal fluoride level and (range) vary with average of maximum daily temperature:
50.0 to 53.7 degrees F – 1.2 (1.1 to 1.7) mg/L; 53.8 to 58.3 degrees F – 1.1 (1.0 to 1.7) mg/L
58.4 to 63.8 degrees F – 1.0 (0.9 to 1.5) mg/L; 63.9 to 70.6 degrees F – 0.9 (0.8 to 1.4) mg/L
70.7 to 79.2 degrees F – 0.8 (0.7 to 1.3) mg/L; 79.3 to 90.5 deg

** Systems that use conventional or direct filtration may not exceed 1 NTU at any time or 0.3 NTU for 95th percentile value; systems that use other “alternative” filtration systems may not exceed 5 NTU at any time or 1 NTU for 95th percentile value.

† USEPA recommended agricultural limit for boron is 0.750 mg/L.
References:
Current USEPA and California DHS drinking water standards from California

**Table G-4. Summary of Samples Exceeding Water Quality Standards from 2013-2016**

| Constituent | Report Units | Minimum Water Quality Standard | Source of Standard | Number of Samples Exceeding Water Quality Standard | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Bolsa | Bolsa SE | Hollister East | Hollister West | Pacheco | San Juan | Tres Pinos | Paicines | Out of Basin |
| **MAJOR CATIONS:** | | | | | | | | | | | | |
| Sodium | MG/L | 69 | Agricultural WQ Limits | 6 | | 50 | 100 | 10 | 73 | 25 | 2 | 25 |
| **MAJOR ANIONS:** | | | | | | | | | | | | |
| Chloride | MG/L | 106 | Agricultural WQ Limits | 1 | 1 | 46 | 79 | 7 | 63 | 20 | | 14 |
| **MINOR IONS:** | | | | | | | | | | | | |
| Iron | UG/L | 300 | RWQCB Basin Plan Irrigation Supply & Agricultural WQ Limits & DDW Secondary & USEPA Secondary | 1 | | 41 | 14 | 4 | 21 | 1 | | 59 |
| Manganese | UG/L | 50 | USEPA Secondary & DDW Secondary | 2 | | 60 | 24 | 54 | 152 | 7 | | 207 |
| Nitrate (As No3) | MG/L | 45 | DDW Primary | | 42 | 4 | 22 | 1 | 33 | | | |
| Nitrate + Nitrite (As N) | MG/L | 10 | DDW Primary & USEPA Primary | | 2 | 3 | 8 | 3 | 16 | 5 | 2 | 17 |
| NITRATE As N | MG/L | 10 | USEPA Primary & DDW PHG | | | 2 | 3 | 1 | 5 | | | |
| Nitrite (As N) | MG/L | 1 | DDW PHG & USEPA Primary | | | | 3 | 1 | | | | 7 |
| **PHYSICAL PROPERTIES:** | | | | | | | | | | | | |
| Color | UNITS | 15 | DDW Secondary & USEPA Secondary | | | 13 | | | 4 | | | 9 |
| Odor Threshold @ 60 C | TON | 3 | DDW Secondary & USEPA Secondary | | | 19 | | 2 | | | | 5 |
| Specific Conductance | US | 700 | Agricultural WQ Limits | 6 | | 55 | 82 | 28 | 125 | 28 | 2 | 47 |
| Total Dissolved Solids | MG/L | 450 | Agricultural WQ Limits | 5 | | 51 | 97 | 16 | 109 | 25 | | 38 |
| Turbidity, Laboratory | NTU | 5 | DDW Primary & USEPA Primary & DDW Secondary & DDW Primary | 1 | | 35 | 4 | 5 | 18 | 1 | | 25 |
| **TRACE IONS:** | | | | | | | | | | | | |
| Antimony | UG/L | 6 | DDW Primary & USEPA Primary | | | | | | | | | |
| Aluminum | UG/L | 200 | USEPA Secondary & DDW Secondary | | | 1 | 3 | 2 | | | | 3 |
| Arsenic | UG/L | 0.004 | DDW PHG | 4 | | 251 | 7 | 33 | 19 | 2 | | 112 |
| Barium | UG/L | 700 | DDW PHG | | | 7 | | | | | | |
| Boron | UG/L | 750 | RWQCB Basin Plan Irrigation Supply & Agricultural WQ Limits | 2 | | 36 | 33 | 3 | 8 | 18 | | |
| Cadmium | UG/L | 0 | DDW AL | 2 | | 10 | 1 | 3 | 3 | 1 | | |
| Chromium VI | UG/L | 10 | DDW PHG | | | 13 | 37 | | | 24 | | |
| Copper | UG/L | 170 | DDW PHG | | | | | | 1 | | | |
| Lead | UG/L | 2 | DDW PHG | | | | | | | | | |
| Mercury | UG/L | 1 | DDW PHG | 2 | | 8 | 1 | 2 | 3 | 1 | | |
| Molydbendum | UG/L | 10 | RWQCB Basin Plan Irrigation Supply | | | | | | | | | |
| Nickel | UG/L | 0 | RWQCB Basin Plan Irrigation Supply | | | | 1 | | 1 | | | |
| Selenium | UG/L | 2 | Agricultural WQ Limits | | | | 1 | | | | | 1 |
| Silver | UG/L | 20 | RWQCB Basin Plan Irrigation Supply | | | | | | | | | |
| Sulfate | MG/L | 250 | DDW Secondary & USEPA Secondary | 1 | 1 | 11 | 42 | | 48 | 3 | | 3 |
| Thallium | UG/L | 0 | DDW PHG | | | | | | | | | |
| Zinc | UG/L | 2000 | Agricultural WQ Limits & RWQCB Basin Plan Irrigation Supply | | | | | | | | | |
| **OTHER:** | | | | | | | | | | | | |
| Total Trihalomethanes | UG/L | 0 | | | | 24 | 9 | 9 | 6 | 2 | 2 | 51 |
| Perchlorate | UG/L | 1 | | | | | | | 27 | | | |

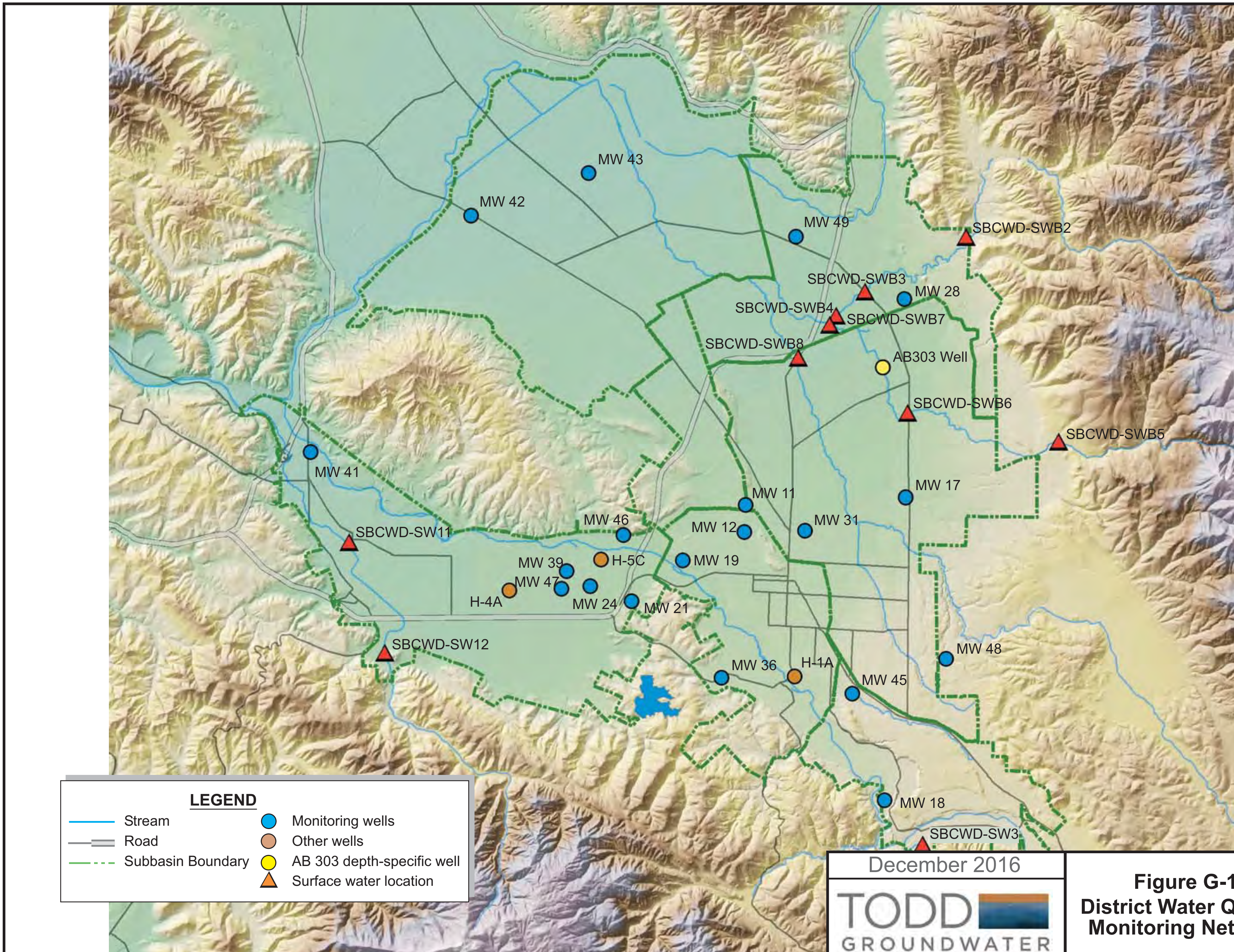
l for each constituent is the one with the lowest allowable concentration.
lic health goal; AL = action level; WQ = water quality

**Table G-5a. List of Regulated Facilities with Recent Water Quality Data**

| Name | Current or Former Operations | # of Wells | Potential Water Quality Problems | Order Number | Notes |
|---|---|---|---|---|---|
| Aromas-San Juan USD (Anzar High School) | High school with a wastewater treatment facility | 3 | salinity, nitrogen species | 96-36 | |
| BAE Systems (United Defense) | Ballistics Testing | 64 | perchlorate, nitrogen species | R3-2055-0113 | |
| CEMEX Ready Mix Plant San Juan Bautista | | 2 | | | |
| Chervon 9-1898 | Gas station with a leaking underground storage tank | 10 | | | |
| Chevron 9-9156 | Gas station with a leaking underground storage tank | 1 | BTEX | 00-68 | |
| Cielo Vista Estates | Housing development with a wastewater treatment facility | 3 | TDS, Na, Cl, Nitrogen | | |
| Crop Production Services (Western Farm Service) | Fertilizer and Pesticide storage | 6 | pesticides, nitrogen species, salinity | 01-052 | |
| El Toro | Leaking underground storage tank | 14 | BTEX | | |
| Hollister Domestic WWTP | Domestic wastewater treatment facility for the | 13 | salinity, nitrogen species | 87-47 | |
| Hollister Industrial WWTP | Industrial wastewater treatment facility for the City of Hollister | 7 | salinity, nitrogen species | 00-020 | |
| John Smith Landfill | Waste disposal | 19 | organic, inorganic, metals | R3-2002-001 | |
| McCormick Teledyne | Explosive products for the aerospace and automotive safety industries | 38 | perchlorate, nitrogen species, metals, salinity | | |
| MK Ballistics (United Defense) | Ballistics Testing | 9 | perchlorate | CU-06-00123 | |
| NH3 Service Company | Fertilizer and Pesticide storage | 1 | pesticides, nitrogen species, salinity | | |
| PSEMC (former PacSci) | | 11 | | | |
| Sambrailo Packaging | | 6 | BTEX | | |
| San Juan Bautista WWTP | Wastewater disposal | 3 | salinity, nitrogen species | R3-2003-0087 | |
| Sunnyslope WWTP | Wastewater disposal | 3 | salinity, nitrogen species | | |
| Tres Pinos WWTP | Wastewater disposal | 4 | salinity, nitrogen species | 99-101 | |
| Whittaker Ordinance | Manufacturing | 199 | perchlorate | 99-006 | |
| | | | | | |

**Table G-5b. List of Regulated Facilities with Historical Water Quality Data**

| Name | Current or Former Operations | # of Wells | Potential Water Quality Problems | Order Number | Notes |
|---|---|---|---|---|---|
| Betabel Valley RV Resort | Recreational vehicle camp with a wastewater treatment facility | 2 | salinity, nitrogen species | 88-23 | No recent information |
| Biosystems Management | Biosolids waste disposal | 4 | salinity, nitrogen species, metals | | closed |
| Blossom Hill Winery | Winery | 6 | hardenss, salinity | | |
| Casa De Fruta | Fruit stand/tourist attraction with a wastewater treatment facility | 5 | salinity, nitrogen species | | |
| Chevron 9-1898 | Gas station with a leaking underground storage tank | 9 | BTEX, MTBE | | closed |
| E Ranch Milk | Gas station with a leaking underground storage tank | 23 | BTEX and other organics, pH, EC | 98-68 | |
| El Modeno Gardens | Commercial nursery irrigation runoff | 4 | salinity, nitrogen species | 99-050 | |
| GAF Leatherback Industries Warehouse Facility | Former Saturator | 4 | VOCs, Petroleum products | | Ceased Operations in 2007, RWQCB Site Opened April 2009 |
| Gibson Farms Inc. | Fruit producer (processing wastes) | 1 | salinity, nitrogen species | R3-2004-0066 | |
| Granite Rock Co | Sand and gravel quarry | 6 | turbidity | R3-2005-0063 | |
| Laverone Property (BK Towing) | Leaking underground storage tank | 14 | BTEX | 92-101 | |
| Natural Food Selection/ Earthbound Farms | Fruit and Vegetable processing wastes | 11 | salinity, nitrogen species | R3-2004-006 | |
| Nyland Ranch Warehouse | Leaking underground storage tank | 4 | salinity, boron | | closed |
| PG &E / City of Hollister Fire Department | Leaking underground storage tank | 4 | BTEX | | Closed 7/21/92 |
| Rancho Justo Company | Golf course with domestic wastewater disposal | 3 | salinity, nitrogen species | | |
| San Juan Bautista City Yard | Underground storage tanks | 6 | BTEX | | No recent information |
| San Juan Oaks Golf Club | Golf course with domestic wastewater disposal system | 2 | salinity, nitrogen species | | |
| TOSCO Facility #3738 | | 3 | BTEX | | Soil samples only |
| Victory Gas and Food | Gas station | 13 | BTEX | | No recent information |
| Wilbur-Ellis | Agricultural products and chemicals marketer and distributor | 3 | salinity, nitrogen species | | |




December 2016

TODD GROUNDWATER

**Figure G-1**
**District Water Quality Monitoring Network**

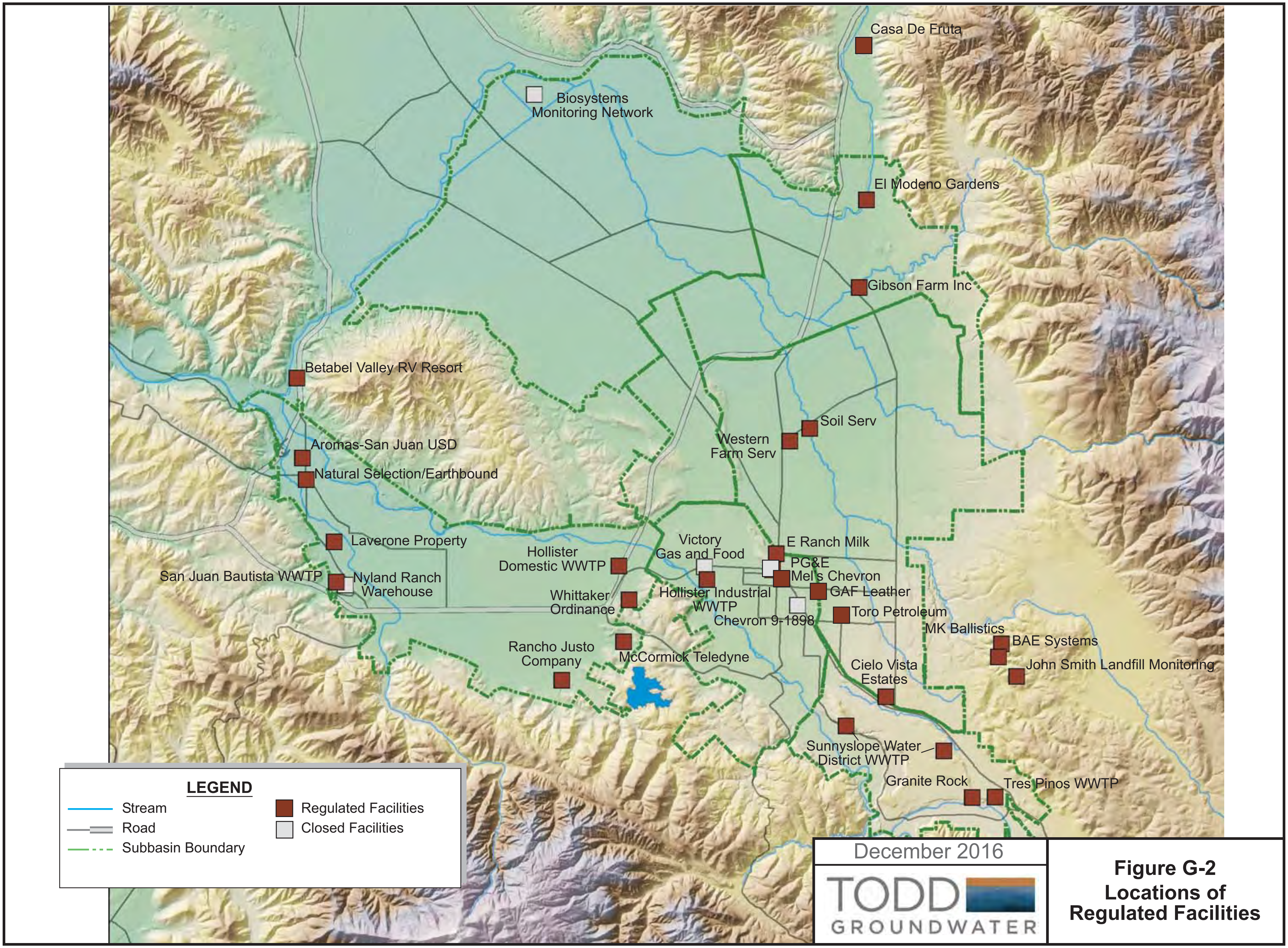



**Figure G-2**
**Locations of Regulated Facilities**

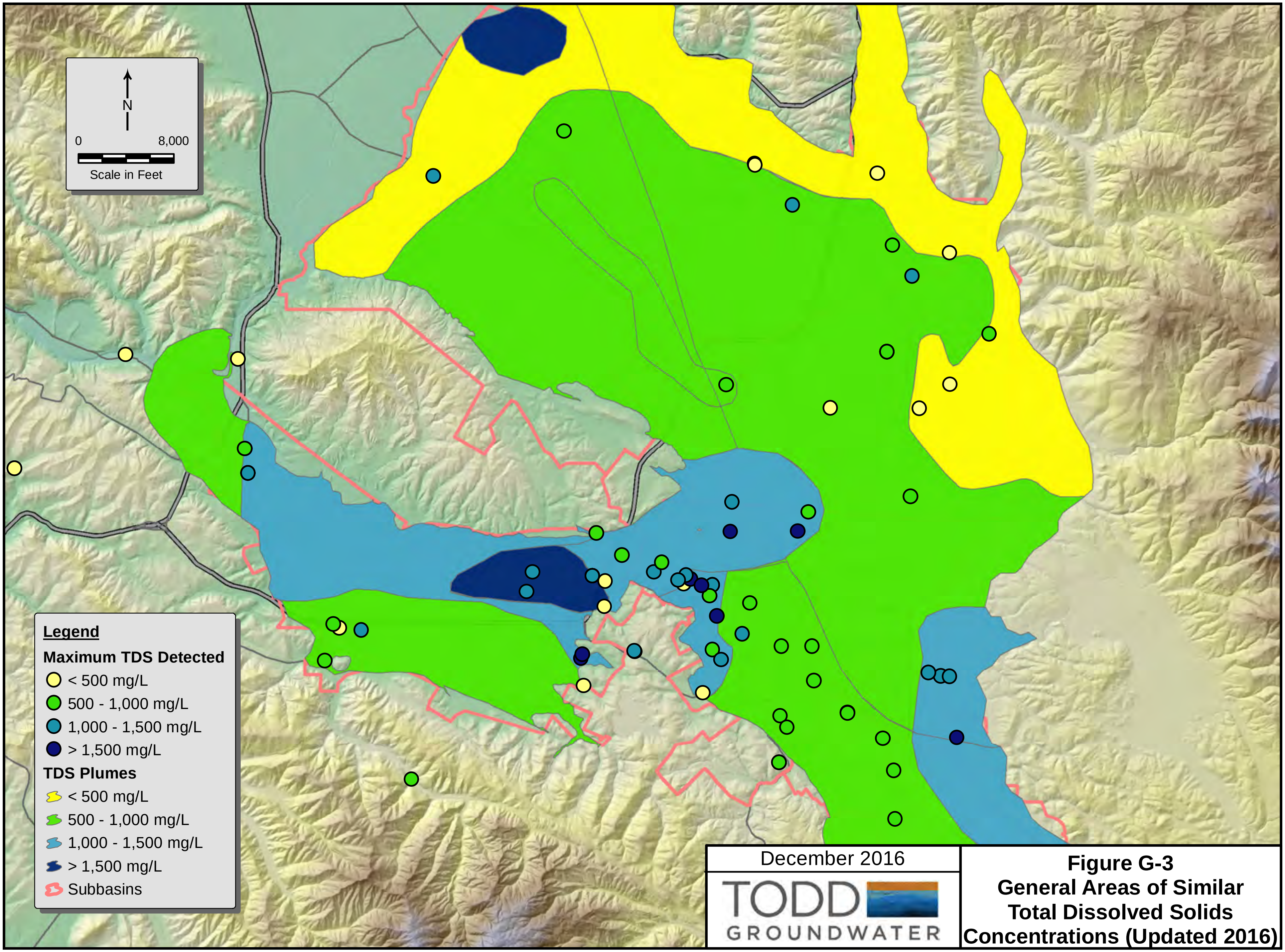



**Figure G-3**
**General Areas of Similar Total Dissolved Solids Concentrations (Updated 2016)**

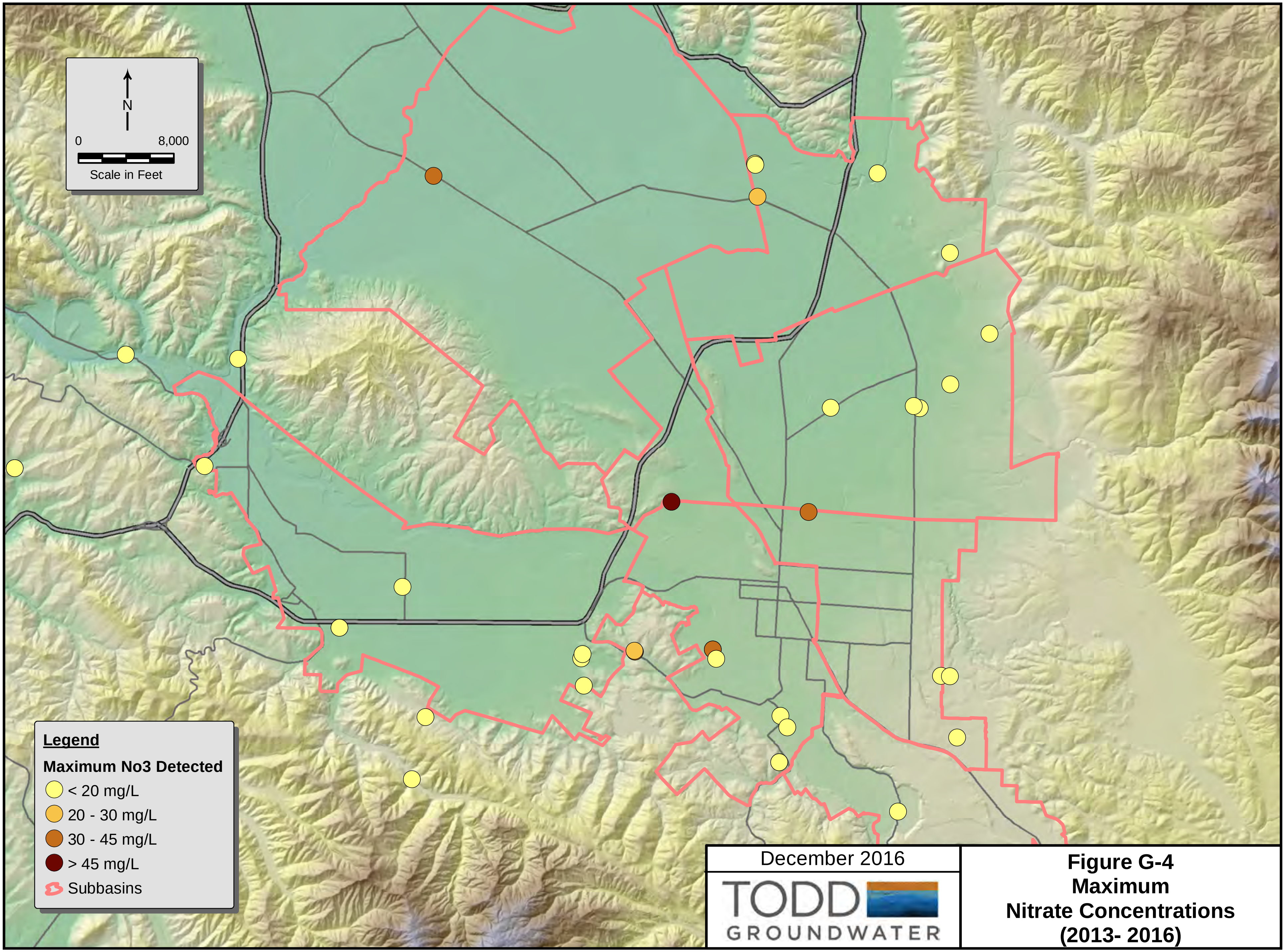
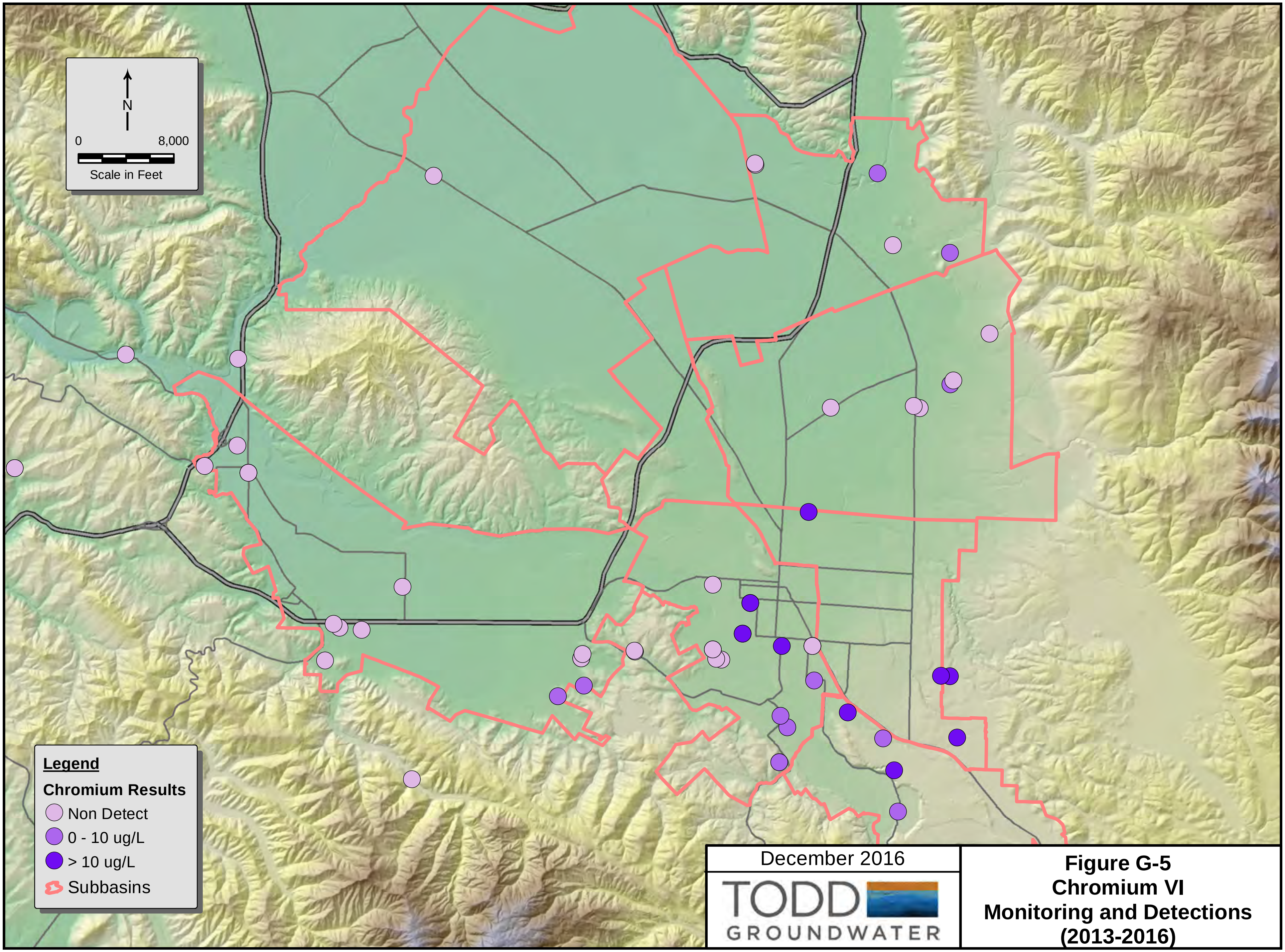



**Figure G-4**
**Maximum**
**Nitrate Concentrations**
**(2013- 2016)**




December 2016

TODD GROUNDWATER

**Figure G-5**
**Chromium VI**
**Monitoring and Detections**
**(2013-2016)**

# H LIST OF ACRONYMS

| | |
|---|---|
| AF | acre-foot |
| AFY | acre-foot per year |
| ag | agriculture |
| CASGEM | California Statewide Groundwater Elevation Monitoring |
| CDHSPH | California Department of Public Health |
| CEQA | California Environmental Quality Act |
| cfs | cubic feet per second |
| CIMIS | California Irrigation Management Information System |
| COC | Constituent Of Concern |
| CVP | Central Valley Project |
| District or SBCWD | San Benito County Water District |
| DWR | California Department of Water Resources |
| DWTP | Domestic Wastewater Treatment Plant |
| ET | evapotranspiration |
| ft | feet |
| gpd | gallons per day |
| GSA | Groundwater Sustainability Agency |
| GSP | Groundwater Sustainability Plan |
| gw | groundwater |
| IRWMP | Integrated Regional Water Management Plan |
| ITRC | Irrigation Training and Research Center, California Polytechnic State University |
| IWTP | Industrial Wastewater Treatment Plant |
| M&I | Municipal And Industrial |
| MGD | million gallons per day |
| OCR | Optical Character Recognition |
| pdf | Adobe Acrobat Portable Document Format |
| PVWMA | Pajaro Valley Water Management Agency |
| RW | recycled water |
| RWQCB | Regional Water Quality Control Board |
| SCVWD | Santa Clara Valley Water District |
| SEIR | Supplemental Environmental Impact Report |
| SGMA | Sustainable Groundwater Management Act |
| SLDMWA | San Luis & Delta-Mendota Water Authority |
| SSCWD | Sunnyslope County Water District |
| USBR | U.S. Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| WRA | Water Resources Association of San Benito County |
| WTP | Water Treatment Plant |
| WWTP | Wastewater Treatment Plant |
| WY | water year |

# San Benito County Water District

## Annual Groundwater Report 2017

TODD GROUNDWATER

# ANNUAL GROUNDWATER REPORT

## WATER YEAR 2017

DECEMBER 2017

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# WATER YEAR 2017

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# ES EXECUTIVE SUMMARY

This Annual Groundwater Report for San Benito County Water District (District) describes groundwater conditions in the San Benito County portion of the Gilroy-Hollister basin. It documents water sources and uses, groundwater elevations and storage, and management activities for water year 2017. 2017 was a wet year; precipitation was the highest since 1998 and the imported water allocation was 100 percent of contract, the first time since 2006. The District used this available imported water, providing it to agricultural users, treating CVP water in the newly expanded Lessalt and newly completed West Hill Treatment Plants for municipal users, and—for the first time since 2007—percolating CVP water in off-stream ponds.

The District is continuing with long term water resource management planning, including compliance with the Sustainable Groundwater Management Act (SGMA). In May 2017, the District became the Groundwater Sustainability Agency (GSA) for the San Juan Bautista, Hollister, and Bolsa subbasins within San Benito County. The District will initiate preparation of a Groundwater Sustainability Plan (GSP) for these subbasins in 2018, beginning with outreach to stakeholders and the public. The District will also apply to the Department of Water Resources (DWR) for consolidation of these subbasins into a single groundwater basin; if approved, this will streamline the GSP process. GSP preparation must be completed by January 2022; subsequently, annual reports will continue to provide technical support for groundwater management and information to the public. The Annual Reports over the next few years will evolve through the GSP process to fulfill the annual reporting requirements of SGMA.

This year, a special section addresses the water balance, providing a summary of the last three years. The recovery of the basins over the past three years is clearly shown through the water balance. Most notably, from 2015 to 2017, inflows almost doubled and outflows decreased substantially, reflecting increased precipitation and CVP availability. Future water balances will be evaluated according to SGMA guidelines and with reference to DWR-defined basin boundaries, and will be presented in each GSP annual report. In addition, GSP preparation will include development of a refined hydrogeologic conceptual model, which describes how the groundwater system works and includes a water balance.

The District and Hollister Urban Area (HUA) partners continue to implement programs and projects that  allow the available water supply to be used with efficiency. The West Hills Water Treatment Plant (WH WTP) is now operational. It increases the local capacity to treat imported CVP water for municipal use and allows the water agency partners to maximize imported water use when imported water is available. Recycled water continues to be delivered for landscape and agricultural irrigation, providing a consistent source of supply to augment groundwater pumping when imported water is not available.

Fewer wells were monitored in 2017 for both the groundwater elevation and water quality networks. The decreasing coverage and consistency of monitoring data has persisted for several years, with ramifications for tracking groundwater conditions. The District, committed to expanding the network of monitored wells (groundwater elevation and quality), recently took steps to stabilize the monitoring program in terms of consistency and areal coverage.

# 1 INTRODUCTION

The San Benito County Water District (District) was formed in 1953 by a special act of the State with responsibility and authority to manage groundwater. The special act allows the Board of Directors to require an annual investigation and report on groundwater conditions of the District and, as documented in Appendix A, specifies the minimum content of the report should the District choose to prepare one. Annual Reports focus on portions of the Gilroy-Hollister Basin within San Benito County. Consistent with the 2014 Sustainable Groundwater Management Act (SGMA), the District is the exclusive Groundwater Sustainability Agency (GSA) for these areas. The District, at its discretion, has also directed that specific Annual Reports include focused discussion of selected topics; this year, the focused topic is an update on the water balance.

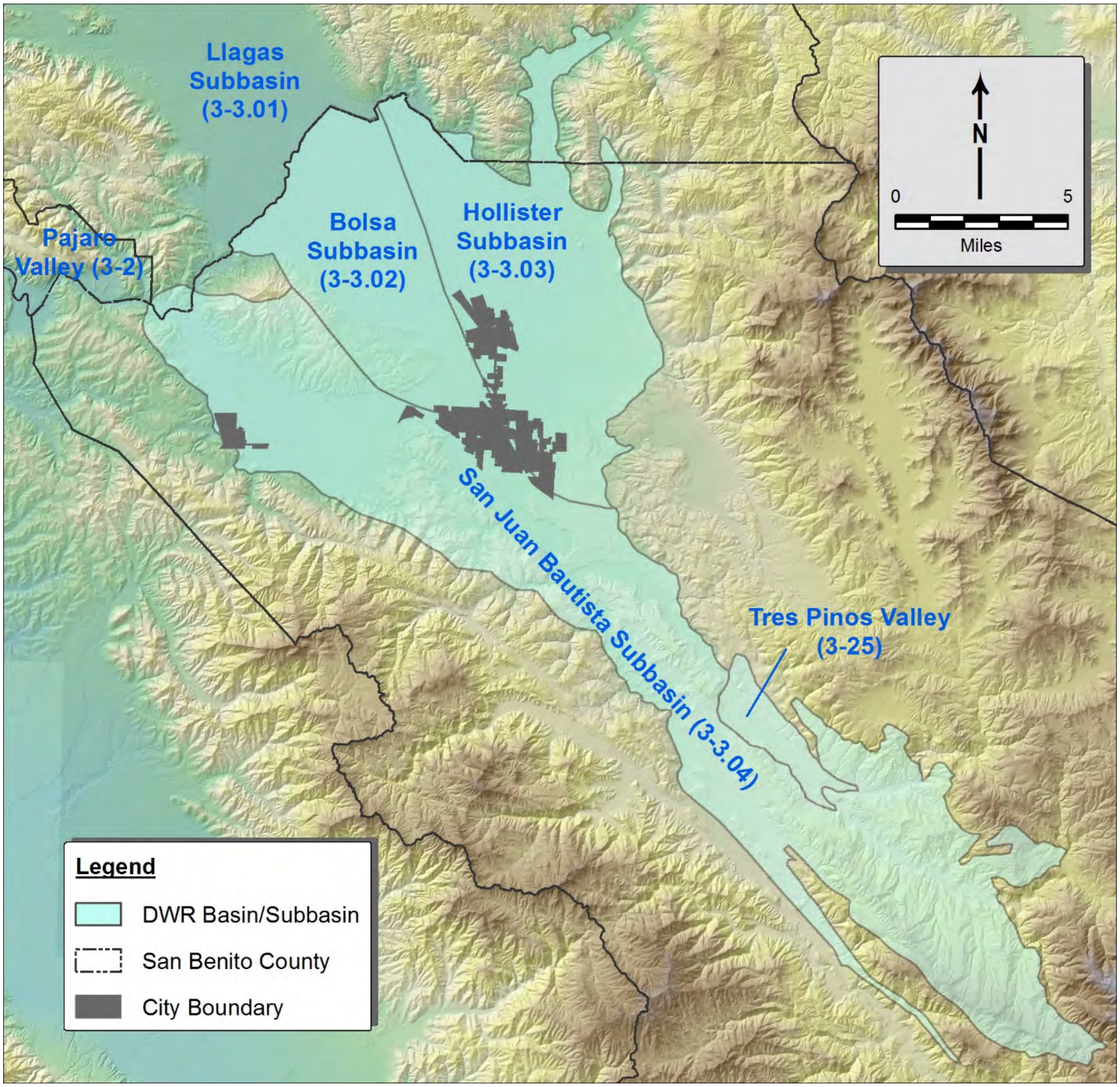
This Annual Report, prepared at the request of the District, documents water supply sources and use, groundwater elevations and storage, and District management activities from October 2016 through September 2017. It presents an overview of the state of the groundwater basin. It also conveys considerable information, including tables and figures, which are provided largely in Appendices B through E. Appendix F provides information on water rates and charges, Appendix G provides information on the methodology behind the water balance, Appendix H contains important SGMA documents, and Appendix I contains a list of acronyms.

Throughout this report, water volumes and changes in storage are shown to the nearest acre-foot (AF). These values are accurate to one to three significant digits (depending on the measurement). All digits are retained in the text to maintain as much accuracy as possible during subsequent calculations, but results should be rounded appropriately.


## Acknowledgments

This report was prepared by Iris Priestaf, PhD, Maureen Reilly, PE, Chad Taylor, PG, CHg, and Gus Yates, PG, CHg of Todd Groundwater. We appreciate the assistance of San Benito County Water District staff, particularly Jeff Cattaneo, Garrett Haertel, Dustin Franco, and David Macdonald.

**Figure 1. DWR Defined Basins and Subbasins.**




## Geographic Areas

This report focuses on the northern San Benito County portions of the Gilroy-Hollister groundwater basin, including the Bolsa, Hollister, and northern San Juan Bautista subbasins (Figure 1). The San Benito part of the basin encompasses the City of Hollister, City of San Juan Bautista, unincorporated residential areas, rangeland, and expansive areas of irrigated agriculture. The basin extends into southern Santa Clara County, where it includes the Llagas Subbasin and portions of the San Juan Bautista and Hollister subbasins. Santa Clara Valley

Water District (SCVWD) is the GSA for the basins within its jurisdiction. As respective GSAs, the District and SCVWD have agreed to collaborate in the SGMA management of the shared San Juan Bautista and Hollister subbasins, including preparation of a Groundwater Sustainability Plan (GSP).

The Department of Water Resources (DWR) originally defined the boundaries of the Bolsa, Hollister, and San Juan Bautista Subbasins largely based on geology (e.g., extent of alluvium). SGMA has established a process for boundary revision, which includes an application for local agencies to request revision of groundwater basin boundaries. The initial round of basin boundary modifications was conducted in 2016 with results published in *California's Groundwater* – Bulletin 118, Interim Update 2016. The next round is scheduled to begin January 1, 2018. The District is seeking consolidation of the three subbasins, and on September 20, 2017 passed Resolution No. 2017-17 to initiate the request process. This consolidation into one basin would be consistent with the intent of the District and SCVWD for collaborative management. This consolidation would continue the historical integrated management of these basins within San Benito County and formally extend this integrated management into SCVWD areas.

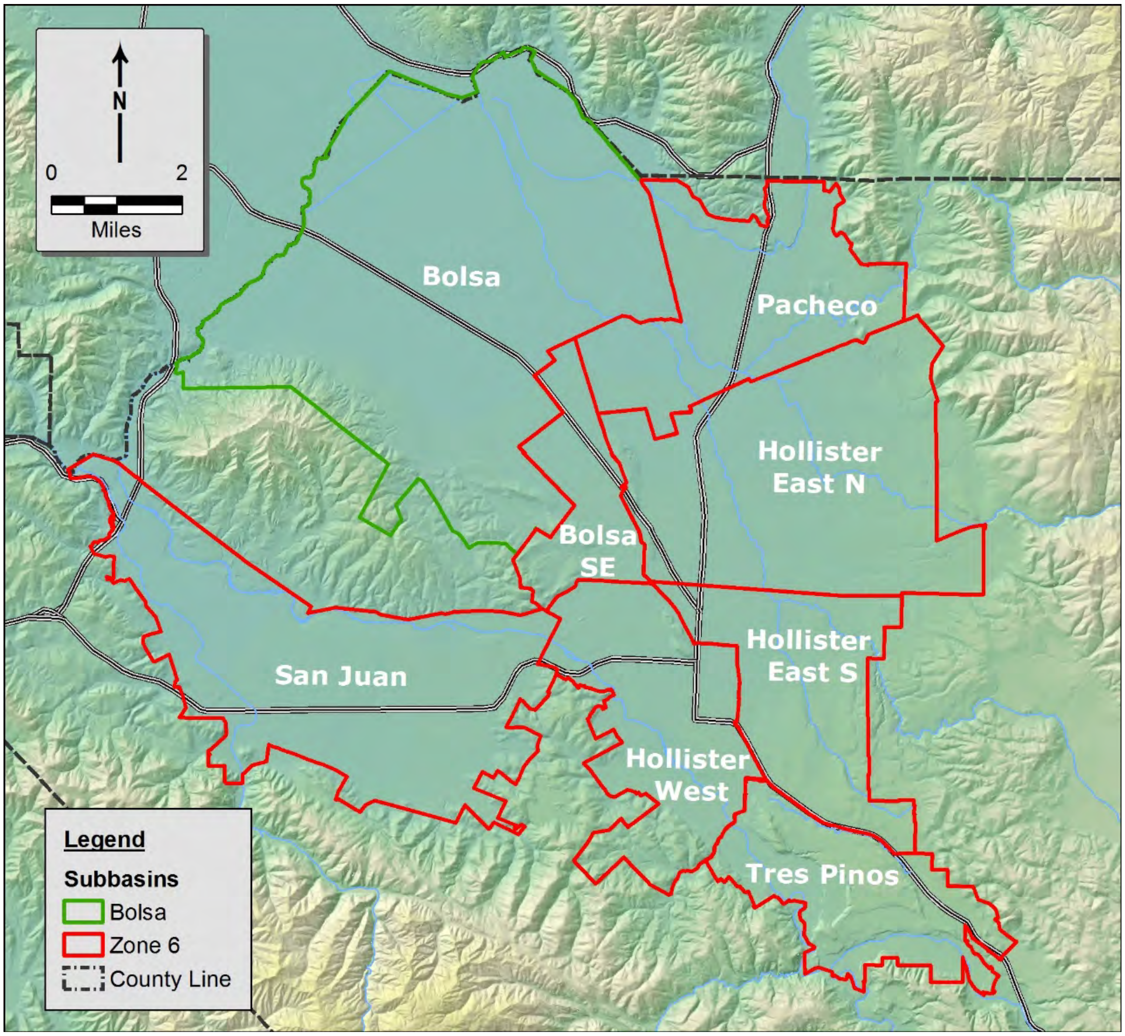
The jurisdiction of the District encompasses all of San Benito County, including all or portions of fourteen groundwater basins (see **Appendix C**). District management of water resources is focused on three Zones of Benefit, listed in **Table 1**.

For the purposes of District groundwater management and annual reporting, seven subbasins of the Gilroy-Hollister Basin were delineated in 1996: Bolsa, Bolsa Southeast (SE), Pacheco, Hollister East (North and South), Tres Pinos, Hollister West, and San Juan subbasins (**Figure 2**). These subbasins were defined based on hydrogeologic and significant local factors (i.e., Zone 6 boundaries) and used effectively for management and data collection for the past 19 years. Of the subbasins shown on **Figure 2**, only the Bolsa subbasin receives no CVP deliveries and relies entirely on local groundwater.

**Table 1. District Zones of Benefit**

| Zone | Area | Provides |
|---|---|---|
| 1 | Entire County | Specific District administrative expenses |
| 3 | San Benito River Valley (Paicines to San Juan) and Tres Pinos River Valley (Paicines to San Benito River) | Operation of Hernandez and Paicines reservoirs and related groundwater recharge and management activities |
| 6 | San Juan, Hollister East, Hollister West, Pacheco, Bolsa SE, and Tres Pinos subbasins | Importation and distribution of CVP water and related groundwater management activities |

**Figure 2. Locations of SBCWD Subbasins**



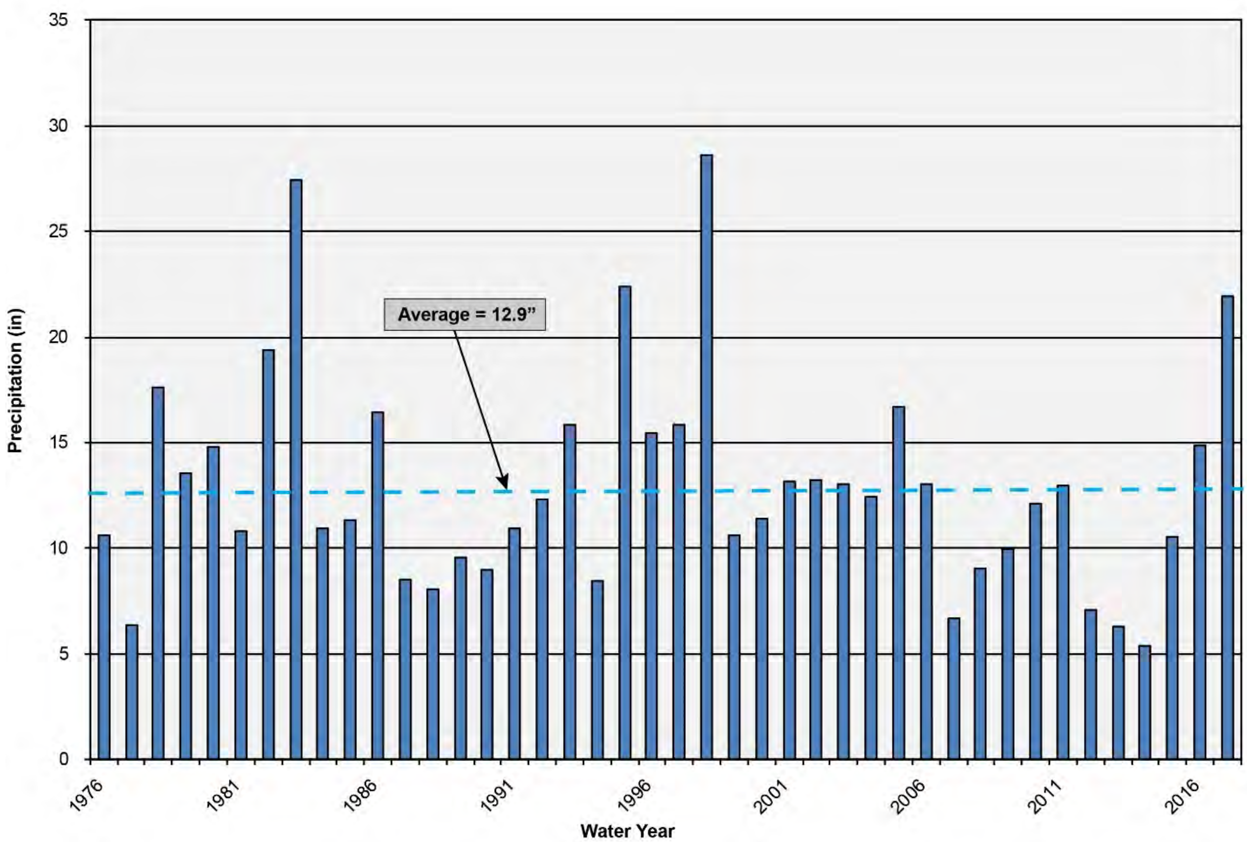

The 1996 subbasins differ from the subbasins defined by DWR and identified for compliance with SGMA. Upcoming GSP preparation will be accomplished in terms of the DWR defined basins and subbasins, recognizing that the Bolsa, Hollister, and San Juan Bautista subbasins may be consolidated. For GSP preparation and subsequent annual reporting, the water supply and demand information and groundwater data will need to be collected and presented consistent with DWR-defined basins.

## Climatic Conditions

Assessment of climatic conditions includes collection of climate data (rainfall and evapotranspiration), which are included in Appendix B. Local rainfall is compiled on a monthly basis and reviewed as an important and variable factor, affecting specific basin inflows (e.g., deep percolation) and outflows (groundwater pumping). Recognizing that drought often is extensive across California, local dry years also may be indicative of regional drought and reduced CVP allocations. Accordingly, dry years often are characterized by increased groundwater pumping for agricultural irrigation to offset lack of rainfall and reduced CVP allocations.

In 2017, overall precipitation was 21.92 inches as shown in **Figure 3** and documented in **Appendix B**. This is the highest precipitation since 1998, amounting to 170 percent of the long-term average (1875-2017) of 12.9 inches. In addition, 2017 was only the second above-average rainfall year since 2011. As shown in **Figure 3**, most years have been below- or near-average rainfall and relatively few years have abundant rainfall, especially since 1998. These few years represent the best opportunity to recover from previous drought through replenishment of groundwater storage and to prepare for the next drought.

**Figure 3. Annual Precipitation in Hollister, 1976 – 2017**




Recovery of groundwater storage from previous drought has been accomplished historically with increased use of available imported water (with increased return flows) and with direct recharge (percolation) of local surface water. As documented later in this report, in 2017 CVP allocations were 100 percent, the first time since 2006, leading to significant groundwater elevation recovery.

# 2 MANAGEMENT ACTIVITIES

District water management activities, in addition to import and distribution of CVP water, include water resources planning, water conservation, and managed percolation of local surface water to augment groundwater. To track groundwater basin conditions, the District maintains a comprehensive monitoring program, including regular measurement of groundwater pumping, annual evaluation of groundwater storage change, and assessment of regional water quality.

## Water Resources Planning

In 2017, the District was engaged in various projects, programs and planning efforts that address water supply and demand, water quality, and wastewater management.

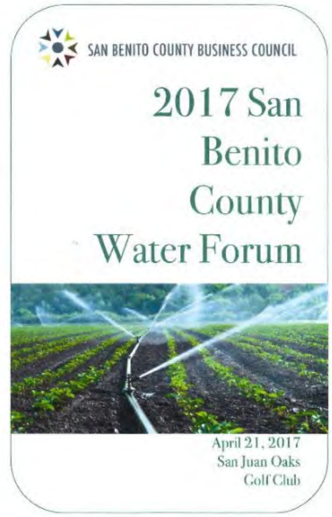
Hollister Urban Area
Water Project
*Improving Our Water Future*

**West Hills Water Treatment Plant (WTP)**. The Hollister Urban Area Water Project (HUAWP) is a collaborative effort with local agencies to provide a secure and stable water supply to the region. As part of HUAWP, the provision of water treatment allows increased direct use of CVP for municipal and industrial (M&I) purposes; it also allows delivery of improved quality water to customers. West Hills WTP is the second surface water treatment plant to treat CVP imports and allows delivery to urban areas currently not served by the Lessalt Water Treatment Plant. West Hills came online in August 2017, with a design capacity of 4.5 MGD. The new WTP will increase the amount of treated M&I CVP water available to the Hollister Urban Area by 2,520 AFY to a total of 4,760 AFY. Eventually, these two facilities will have a combined capacity capable of treating the entire volume of the M&I CVP contract.


Image Source: Benitolink.org

**Urban Water Management Plan, Hollister Urban Area.** The Urban Water Management Plan (UWMP), prepared through the collaborative effort of the District, Sunnyslope County Water District (SSCWD) and the City of Hollister, was completed in 2016 and submitted to DWR**.** In September 2017, the HUA agencies received official notice from DWR that the UWMP had been reviewed and found to meet all requirements. The UWMP provides detailed information on the current and future water supply and demand for the Hollister Urban Area, and provides a comparison of supply and demand in normal years plus single-year and multi-year droughts. As documented in the UWMP, the Hollister Urban Area has adequate supplies to meet demands. The UWMP also documents local water conservation measures (see below).

**Recycled Water Project**. The District has worked cooperatively for years with the County, City of Hollister, and SSCWD to implement recycled water use. Current recycled water use includes City of Hollister landscape irrigation. In June 2016, recycled water also was delivered to agricultural users in the Hollister East subbasin area. A total of 366 AF was delivered in Water Year 2017 for landscape and agricultural irrigation.




**Water Forum.** In April 2017, the District participated in the 2017 San Benito County Water Forum. The Forum, convened by the San Benito County Business Council, included speakers from the Farm Bureau, local water agencies, political representatives, and more. This collaborative effort facilitates communication among a diversity of basin stakeholders and supports outreach for the SGMA process.

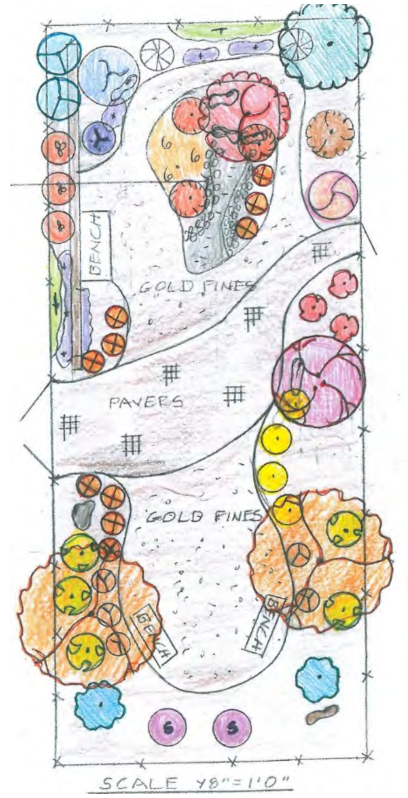
## Water Conservation

Water conservation is an important tool to manage demands on the groundwater basin. During the most recent drought, the state mandated that water retailers reduce their demand. This state-ordered demand reduction, together with the expansion of ongoing water conservation efforts, successfully lowered water demand. Water conservation efforts in San Benito County are conducted mostly through the Water Resources Association (WRA), composed of representatives from the District, City of Hollister, City of San Juan Bautista, and Sunnyslope County Water District.

**Ongoing Conservation.** The State has lifted mandatory water demand reductions for agencies; nonetheless, the Hollister Urban Area continues voluntary demand reductions. The managers at Hollister and SSCWD plan to maintain water demand reductions; their goal for total usage is 15 percent less than 2013 demands. Currently, the Hollister Urban Area is exceeding this goal with about 22 percent less than 2013 demands.

**Water Shortage Contingency Plan (WSCP)**. As part of the Urban Water Management Plan (UWMP), Hollister, SSCWD, and the District developed a joint WSCP. The plan includes many permanent prohibitions on water waste (including using water to clean paved surfaces and watering lawns within 48 hours of rain). In addition, the plan details what water conservation measures are triggered during drought conditions.

**Irrigation Education.** The District, in collaboration with the WRA, continues to offer a series of classes on irrigation efficiency and other agriculture practices. Since 2009, these workshops provide concepts, tools, and examples for optimizing irrigation and nitrogen management efficiency in row, tree, and greenhouse crop production.




**Water Wise Demonstration Garden and Plans.** WRA maintains a demonstration garden at Dunne Park in downtown Hollister (corner of 6th & Powell) (see right inset). Their website offers a landscape design and brochure to help educate visitors on drought resistant landscaping. The WRA website also provides three sample Water Efficient Landscape Plans available for download.

**Turf Removal Program.** The WRA no longer offers Turf removal programs but encourages customers to participate in the State's Save Our Water turf programs.

**Public Outreach.** WRA continues to educate the public about the regional water system and water use efficiency. Its website is regularly updated and for example, currently includes a video that summarizes the history of local water development, the role of the local groundwater basin, and the benefits of the Hollister Urban Area Water Project. WRA has given presentations to local school and lead school groups to the local WTP and WWTP, reaching over 400 students in autumn 2016 alone. Other outreach programs have provided water conservation outreach to 75 high school students this year.

Other ongoing water conservation programs involve irrigation rebates, toilet replacements, education program and outreach. These water conservation programs, while successfully reducing water demand, are being continued and diversified to encourage the public to continue to use water wisely.

## Managed Percolation

**Percolation of Local Surface Water.** In most years, local surface water released from Hernandez and Paicines Reservoirs is percolated along the San Benito River and Tres Pinos Creek. Releases are managed to maximize percolation along the stream channels of the San Benito River and Tres Pinos Creek and to avoid any losses out of the basin.

In 2017, the District completed preparation of an operations planning tool to create annual plans for operation of SBCWD's Hernandez and Paicines Reservoirs and for re-diversion of Hernandez Reservoir releases to Paicines Reservoir at the San Benito River Diversion. This tool standardizes and facilitates the annual effort to plan Hernandez operations under differing hydrologic and water supply conditions and provides for coordinated management of surface water storage and groundwater storage.

Hernandez Reservoir was filled to near-capacity in 2017 and releases in 2017 were the highest since 1998 with 23,191 AF released. Releases from Paicines were 2,407 AF, the highest since 2010.

**Percolation of Wastewater.** Wastewater is percolated by the City of Hollister at its Domestic and Industrial plants, by SSCWD at its Ridgemark Facilities, and by Tres Pinos Water District. Recent changes in operation of the wastewater facilities (including increased water recycling) and decreased municipal water use have decreased the volume percolating to the groundwater. Information about the amount of groundwater recharged from these wastewater facilities is found in Appendix D.

**Percolation of CVP Water.** In 2017, the District percolated CVP imports for the first time since 2008, using two off-stream basins. The Union Road pond (located near the San Benito River in Hollister West subbasin) percolated 2,209 AF beginning in March 2017, while the Frog Pond in Pacheco subbasin was used to percolate 340 AF April through September.

In the past, CVP percolation was used regularly to recharge the groundwater basin. CVP percolation peaked in 1997 and was reduced subsequently in response to the successful recovery of the groundwater basin from overdraft. In 2017, the available groundwater storage, on-hand CVP imports, and suitable off-stream ponds provided a good opportunity to resume percolation activities. Direct in-stream recharge of CVP water is not planned because of concerns for release of invasive Dreissenid mussels. A table of historical percolation is found in Appendix D.

# 3 SGMA

The Sustainable Groundwater Management Act (SGMA), the most significant groundwater legislation in California history, requires sustainable management by local agencies of DWR-defined groundwater basins. In San Benito County, the basins subject to SGMA are the three subbasins of the Gilroy-Hollister Basin (Bolsa, Hollister and San Juan Bautista subbasins, respectively DWR Nos. 3-3.02, 3-3.03, and 3-3.04) and the Pajaro Valley Groundwater Basin (DWR No. 3-2, mostly in Santa Cruz and Monterey counties; see Figure 1).

The Gilroy-Hollister subbasins must have Groundwater Sustainability Plans (GSPs) in place by 2022, while the Pajaro Valley Basin, which has been designated as critically overdrafted, has a GSP due date of 2020. Pajaro Valley Water Management Agency (PVWMA) historically has managed the Pajaro Valley Basin and has submitted its Basin Management Plan Update to DWR as an alternative plan to fulfill SGMA. The Basin Management Plan Update contains a suite of projects and programs intended to halt seawater intrusion and balance the entire Pajaro Valley Groundwater Subbasin prior to the 2040 SGMA deadline for sustainability.

With regard to the three Gilroy-Hollister subbasins, the District has been actively preparing for SGMA since 2015 and in 2017 made significant progress toward SGMA compliance. The District became the Groundwater Sustainability Agency (GSA) for the Bolsa, Hollister and San Juan Bautista subbasins within San Benito County, developed an agreement with SCVWD for GSP preparation, and applied to DWR for grant funding to support GSP preparation, among other efforts.

## San Benito County Water District GSA

On February 8, 2017, the Board of Directors convened a special hearing regarding the District's decision to become the GSA for the Bolsa, Hollister and San Juan Bautista subbasins within San Benito County and approved Resolution No. 2017-03 for the District to become the GSA. The resolution, reproduced in **Appendix H**, summarizes the authority of the District to be a GSA and its continuing commitment to manage surface water and groundwater resources within its jurisdiction.

On February 24, the District posted its notice to become a GSA (including the resolution and other required information) on DWR's SGMA Portal (http://sgma.water.ca.gov/portal/gsa/print/89) and after a required 90-day waiting period, was established as the exclusive GSA for the Bolsa, Hollister and San Juan subbasins within San Benito County.

Similarly, PVWMA is exclusive GSA for its jurisdiction in Pajaro Valley Groundwater Basin and SCVWD is exclusive GSA for groundwater basins in its jurisdiction, including the Llagas Basin (DWR No. 3-3.01) and portions of the Hollister and San Juan Bautista subbasins in Santa Clara County.

## Agreement with Santa Clara Valley Water District

As noted above, the District is the GSA for the Bolsa Subbasin. It is also the GSA for the Hollister and San Juan Bautista Subbasins within San Benito County, while SCVWD is the GSA for the portions of the Hollister and San Juan Bautista subbasins in Santa Clara County. On July 5, 2017, the District and SCVWD executed a Memorandum of Understanding (MOU), which establishes their respective roles and responsibilities in preparing a GSP for the two shared subbasins (termed therein as Common Basins). The MOU, attached in **Appendix H,** is important in providing for cooperative management of the subbasins and ensuring that the entirety of the subbasins is within one GSA or the other; this is one of the requirements of SGMA.

While management of the Hollister and San Juan Bautista Subbasins is shared, the Bolsa Subbasin and Llagas Subbasin are neighboring basins that are managed respectively by the District and SCVWD, with ongoing cooperation and data sharing. For example, groundwater elevation data along the Bolsa-Llagas boundary are regularly shared to analyze groundwater flow across the boundary. Regarding SGMA, the District and SCVWD also shared information about basin boundary modifications requested by SCVWD for Llagas Basin and DWR modifications along the San Benito-Santa Clara county line.

## Grant Funding

In November 2017, the District applied for a Sustainable Groundwater Management Planning (SGWP) Grant for GSP preparation that would address the three subbasins as defined by DWR (see Figure 1). However, historical groundwater management has focused on highly developed areas that were defined locally as subbasins in 1996 (Figure 2). Comparison of Figures 1 and 2 indicate that use of DWR-defined basins instead of SBCWD-defined basins will effectively double the managed area. The geographic expansion means that funding is needed for extension of the following:

- Data Management System, including GIS mapping and data sets (e.g., soils, land use, wells, climate)
- Water resources monitoring program (e.g., groundwater elevations, pumping, quality)
- Groundwater analyses and maps of historical/current conditions (e.g., change in groundwater storage)
- Numerical groundwater flow model
- Outreach to stakeholders, including DACs who have not yet been engaged in management
- Consideration of issues, objectives, activities, and funding mechanisms for areas not addressed previously.

In addition, while historical management provides a good foundation for a GSP, SGMA entails a quite rigorous, systematic process with significant requirements. Because SGMA is new and necessary and because more extensive basin areas will be involved, collaboration and outreach will need to be amplified. Accordingly, the District applied for a SGWP Grant to assist this effort. The District should be notified of the grant application status as early as December 2017.

## Application for Groundwater Basin Consolidation

The three subbasins (Bolsa, Hollister and San Juan Bautista) are defined officially by DWR as separate subbasins, each of which needs to be addressed with a GSP. While recognizing these subbasins, and using its own subbasins for management purposes, the District historically has managed these basins in a unified and comprehensive manner. This recognizes that the subbasins are not only contiguous, but hydraulically connected and linked by management actions that pass over subbasin boundaries. Moreover, the jurisdictions of two major water retailers, City of Hollister and SSCWD, overlap subbasin boundaries. Accordingly, the 1998 and 2004 Groundwater Management Plans (prepared by the District in collaboration with local organizations) addressed the three basins together, with comprehensive and coordinated analyses, monitoring, management, reporting, and outreach. The District's annual groundwater reporting also has addressed the three subbasins in unified reports. Given that historical management that has been effective for decades, preparation of a single GSP for all three subbasins would be consistent with historical management and cost-effective.

Accordingly, on September 20, 2017 the District Board of Directors passed Resolution No. 2017-17 to begin the process of a Basin Boundary Modification Request to DWR for consolidation of the three subbasins into one basin. This process will continue into 2018; the period for submitting a request is open on January 1 for six months, followed by a 30-day public comment period, and decisions by DWR in Fall 2018. Consistent with SGMA, the District is planning preparation of three concurrent GSPs, but will be able to consolidate its GSP preparation if the three basins are united.

The definition of subbasins within a single basin can be useful; it recognizes local conditions and concerns. In fact, the District historically has used such subbasins, as shown in the Annual Reports (see Figure 2). Similarly, SGMA recognizes the importance of local conditions and concerns and thus allows definition of *Management Areas* that can be operated with area-specific minimum thresholds and management objectives, provided basic consistency across the basin. Such management areas will be considered as part of the GSP.

## SGMA Concepts

This and previous Annual Groundwater Reports have provided information on the overall process required by SGMA in terms of the identification of groundwater basins subject to SGMA (i.e., the medium-priority Bolsa, Hollister, and San Juan Bautista subbasins), the overall process (e.g., establishing a GSA and preparing a GSP), and the timeline (i.e., preparing the first GSP by 2022, with annual reports and updates on a five-year schedule thereafter). This section introduces basic SGMA concepts about what sustainability is and how it is defined, so that the GSA, local agencies, and stakeholders know what it is, how it is measured, and when it is achieved and maintained.

This is a very brief introduction, and for more information, the interested reader is directed to the Department of Water Resources website http://www.water.ca.gov/groundwater/sgm/index.cfm and the Best Management Practice (BMP) document regarding Sustainable Management Criteria: http://www.water.ca.gov/groundwater/sgm/pdfs/BMP_Sustainable_Management_Criteria_2017-11-06.pdf. This BMP document currently is draft and is the topic of a series of DWR workshops, but provides useful definitions, which are summarized below.

First, SGMA defines ***sustainable groundwater management*** as the management and use of groundwater in a manner that can be maintained without causing undesirable results. ***Undesirable results*** are defined as one or more of the six effects illustrated on the following page. All six are shown, but it is recognized that seawater intrusion is not applicable to the inland Gilroy-Hollister subbasins.

A ***minimum threshold*** is the quantitative value that represents the groundwater conditions at a representative monitoring site that, when exceeded individually or in combination with minimum thresholds at other monitoring sites, may cause an undesirable result(s) in the basin. GSP preparation will need to set minimum thresholds at representative monitoring sites for each applicable sustainability indicator after considering the interests of beneficial uses and users of groundwater, land uses, and property interests in the basin. Minimum thresholds will be set at levels that do not impede adjacent basins (i.e., Llagas) from meeting their sustainability goals.

The six icons represent ***sustainability indicators***, which are the effects caused by groundwater conditions occurring throughout the basin that, when significant and unreasonable, become undesirable results. The significant and unreasonable occurrence of any of the six sustainability indicators constitutes an undesirable result; a GSP must define and document the conditions at which each of the six sustainability indicators become significant and unreasonable, including the reasons for those definitions. Sustainability indicators are subject to quantification and the respective metrics are defined in the GSP Regulations.

**Sustainability Indicators**

Chronic lowering of **groundwater levels** indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon. Groundwater decline during drought is not considered chronic if extractions and groundwater recharge are managed to ensure that reductions in groundwater levels or storage during drought are offset by increases during other periods. This is measured by groundwater levels.

Significant and unreasonable reduction of **groundwater storage**; the metric is volume of groundwater storage.

Significant and unreasonable **seawater intrusion**, measured by a chloride concentration isocontour.

Significant and unreasonable degraded **water quality**, including the migration of contaminant plumes that impair water supplies. This is measured by the migration of plumes, number of water supply wells affected, the volume of contaminated groundwater, and/or the location of a contaminant isocontour.

Significant and unreasonable land **subsidence** that substantially interferes with surface land uses; this is measured as the rate and extent of land subsidence.

Depletions of **interconnected surface water** that have significant and unreasonable adverse impacts on beneficial uses of the surface water. The metric is the volume or rate of surface water depletion.

***Measurable objectives*** are quantitative goals that reflect the basin's desired groundwater conditions and allow the GSA to achieve the sustainability goal within 20 years. Measurable objectives are set for each sustainability indicator at the same representative monitoring sites and using the same metrics as minimum thresholds. Avoidance of the defined undesirable results must be achieved within 20 years of GSP implementation. SGMA recognizes that some basins may experience undesirable results within the 20-year period (particularly if the basin has existing undesirable results as of January 1, 2015); however, that does not, by itself, necessarily indicate that a basin is not being managed sustainably, or that it will not achieve sustainability within the 20-year period. Nonetheless, GSPs must clearly define a planned pathway to reach sustainability in the form of interim milestones, and show actual progress in annual reporting.

In addition to the measurable objective, ***interim milestones*** must be defined in five-year increments at each representative monitoring site using the same metrics as the measurable objective. These interim milestones are used by GSAs and DWR to track progress toward meeting the basin's sustainability goal. Interim milestones will be coordinated in the GSP with projects and management actions proposed by the GSA to achieve the sustainability goal.

A GSA may wish to define ***management areas*** for portions of its basin to facilitate groundwater management and monitoring. Management areas may be defined by natural or jurisdictional boundaries, and may be based on differences in water use sector, water source type, geology, or aquifer characteristics. Management areas may have different minimum thresholds and measurable objectives than the basin at large and may be monitored to a different level. However, GSAs in the basin must provide descriptions of why those differences are appropriate for the management area.

Lastly, the ***sustainability goal***, developed as part of the GSP, will succinctly state the management objectives and desired conditions of the groundwater basin, how the basin will get to that desired condition, and why the measures planned will lead to success.

## Agency Coordination and Public Outreach

Recognizing the collaborative nature of SGMA, the District has continued its discussion of SGMA issues with other agencies, including water retailers in San Benito County (City of Hollister, Sunnyslope County Water District, City of San Juan Bautista, Aromas Water District, and Pacheco Pass Water District), GSAs in nearby basins (e.g., SCVWD and PVWMA), and the San Benito County Board of Supervisors, among others. The District website at www.sbcwd.com provides announcements, reports, newsletters, and basic information on San Benito County water resources. Public outreach included the preparation and presentation of the 2016 Annual Groundwater, discussions with non-governmental organizations such as the San Benito County Farm Bureau, and presentations as part of the San Benito County Water Forum, a regular gathering sponsored by the San Benito County Business Council. The April 21, 2017 Forum included presentations on Our Groundwater, Groundwater Sustainability Planning, and the Hollister Urban Area Water Project.

## Groundwater Sustainability Plan (GSP) Preparation

The District has developed a work plan, schedule, and budget for systematic GSP preparation in collaboration with local water providers, SCVWD, stakeholders and the public. This will be a multi-year effort that will begin in early 2018. The main elements of a GSP will include:

**Outreach and Stakeholder Engagement**. A Communication Plan will describe how the District will make decisions as part of the GSP, engage and inform the public, and recognize beneficial uses and users in relation to the GSP. This is planned to include creation of a SGMA website and establishment of a SGMA Advisory Forum (SAF). In addition, a series of public workshops is planned to engage the larger community.

**Compilation and Review of Data.** The District has been collecting and compiling groundwater data annually including groundwater elevations, water quality, and water use for the Annual Groundwater Reports. These data are compiled in a relational database, including capabilities for queries to quickly check and summarize data. The effort for the GSP will be to review and update the current data management system (with respect to SGMA requirements and DWR Best Management Practices), to identify data gaps, and to support the GSP monitoring program. Available information will support the entire GSP including analysis of the hydrologic setting, groundwater conditions, sustainability criteria, and potential projects and management actions.

**Hydrogeologic Conceptual Model.** The hydrogeologic conceptual model (HCM) provides a description of the structural and physical characteristics that govern groundwater occurrence, flow, storage, and quality. In brief, the HCM describes how the local surface water-groundwater system works. The HCM and an accompanying analysis of current groundwater conditions will address the entire area of the three subbasins (Bolsa, Hollister, and San Juan Bautista).

**Water Budget.** Water budgets will be quantified for historical and current conditions per SGMA regulations. This will involve use of past studies, the existing numerical model, and recent monitoring data and investigations. Water balances developed by SCVWD for the adjacent Llagas Basin also will be reviewed to promote a consistent approach. The GSP Water Budget will build on past Annual Report water balances and include use of available data and best available science to quantify inflows, outflows, and change in storage, including sustainable yield and potential overdraft.

**Update and Extension of Existing Groundwater Model**. SGMA recognizes that groundwater models are valuable tools to explore how the groundwater systems works, to assess potential management actions and projects, and to demonstrate how a GSP will achieve sustainable basin operation. The District has a numerical model that has been developed, periodically updated, and used for various scenarios (Yates, 2001). This existing MODFLOW model (and linked surface hydrology model and pre-processing utility programs) will be updated, expanded to entirely cover all three subbasins, and improved for application in the GSP.

**Sustainability Criteria**. While the District has a long history of groundwater management, such management has not included systematic quantification of undesirable results, minimum thresholds, or measurable objectives to the extent required by SGMA. Defining these specific sustainability criteria, eliciting input from the SGMA Advisory Forum and stakeholders, and creating a detailed plan for future sustainability will be a focused effort.

**Describe Management Actions and Projects.** As part of the GSP process, the District will describe management policies, programs, and projects for sustainable management. Already recognized and proposed/planned actions and projects will be summarized in terms of applicability to sustainability criteria. Additional actions and projects likely will be identified through the GSP process as local agencies and stakeholders consider undesirable results and thresholds.

**Develop Monitoring Networks and Protocols.** This District will establish the GSP monitoring network and protocols that will: 1) provide data to the hydrogeologic conceptual model and water budget and future model updates, 2) provide tracking and early warning regarding groundwater conditions and undesirable results, and 3) demonstrate progress toward and achievement of sustainability. Consistent with monitoring BMPs, the monitoring network will collect data of sufficient quality, distribution, and frequency to characterize groundwater and related surface water conditions and to track changes, including short-term, seasonal, and long-term trends. The overall approach will involve development of a comprehensive monitoring program that can be subdivided by subbasin if required for evaluation.

# 4 WATER USE

## Water Supply Sources

Four major sources of water supply are available for municipal, rural, and agricultural land uses. These are summarized below; for more data and graphs see Appendix E.

- **Local Groundwater.** Groundwater is pumped by private irrigation and domestic wells and by public water supply retailers. The District does not directly produce or sell groundwater, but has the responsibility and authority to manage groundwater throughout San Benito County. This report focuses on the portion of the Gilroy-Hollister groundwater basin (DWR Basin 3-3) within San Benito County and, consistent with previous Annual Reports, addresses the six District-defined subbasins (San Juan, Bolsa SE, Pacheco, Hollister East and West, and Tres Pinos) with measured supplies. Bolsa Subbasin relies solely on groundwater, which is not measured there.
- **Imported Water.** The District purchases Central Valley Project (CVP) water from the U.S. Bureau of Reclamation (USBR). The District has a 40-year contract (extending to 2027) for a maximum of 8,250 AFY of M&I water and 35,550 AFY of agricultural water.
- **Recycled Water.** Water recycling began in 2010 with landscape irrigation at Riverside Park. Recycled water currently is provided to selected landscape irrigation and agricultural users and recycled water use amounted to 366 AF in WY 2017. This source is reliable during drought and helps secure a sustainable water supply.
- **Local Surface Water.** Surface water is not used directly for potable or irrigation use in the basin, but creek percolation is a significant source of groundwater recharge. Releases from the District's Hernandez and Paicines reservoirs were substantial in 2017. Stormwater capture is effectively limited to some diversion to the Hollister Industrial WWTP (via a combined sewer system) with subsequent treatment and discharge to percolation and evaporation ponds. This is included in percolation totals in Appendix D.

## Available Imported Water

The District distributes CVP water to agricultural and M&I customers in Zone 6. For USBR contract year 2017 (March 2017 - February 2018), both agriculture and M&I customers were provided the full contract allocation, for the first time since 2006. **Table 2** shows the contract entitlements and recent allocations (SLDMWA 2017). Note that USBR contract years are March through February, so water year 2017 overlapped two contract years.

**Table 2. CVP Entitlements and Allocations, USBR Contract Years 2016-2017**

March 2016 - February 2017

| | Contract Amount | % Allocation | Allocation Volume (af) |
|---|---|---|---|
| Agriculture | 35,550 | 5% | 1,912 |
| M&I | 8,250 | 55% | 4,538 |
| **TOTAL** | **43,800** | | **6,450** |

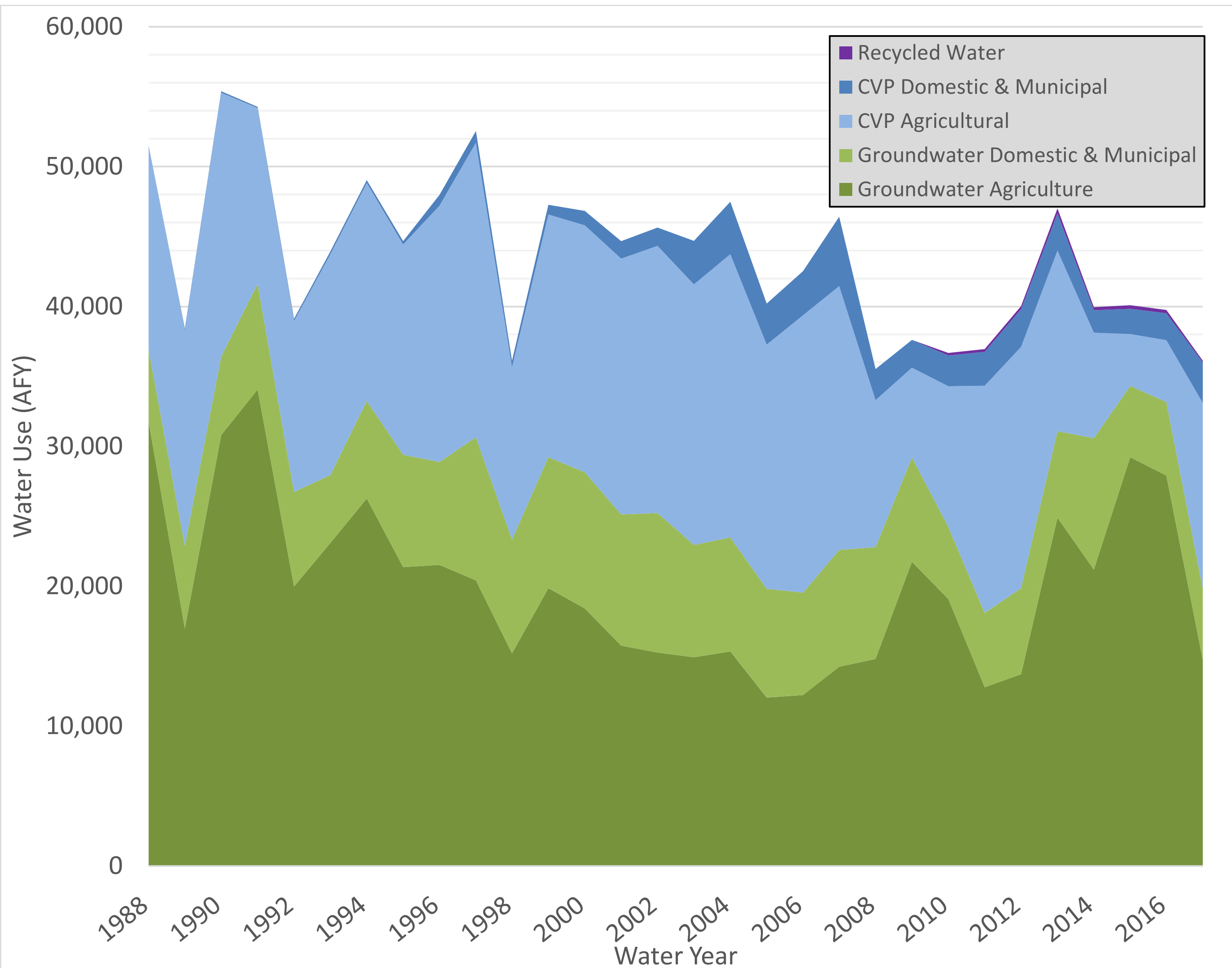
March 2017 - February 2018

| | Contract Amount | % Allocation | Allocation Volume (af) |
|---|---|---|---|
| Agriculture | 35,550 | 100% | 35,550 |
| M&I | 8,250 | 100% | 8,250 |
| **TOTAL** | **43,800** | | **43,800** |

## Water Use

In 2017, Zone 6 total water use decreased from water year 2016, most likely due to higher-than-average precipitation and lower evapotranspiration. Total water use was 36,378 AF, a nine percent decline from 2016. **Figure 4** shows significant changes in the portion of supply from imported water and groundwater in recent years. For example, in 2016 only 16 percent of supply was from CVP, and in 2017, CVP supply increased to 45 percent. Such changes are expected and represent conjunctive use of supplies, as groundwater pumping by agricultural users increases during dry years when import allocations are low and decreases in wet years when imported water is available.

**Figure 4. Total Zone 6 Water Use by Source and Use 1988-2017 (AFY)**



## Distribution of Demand by Source and Use

Water year 2017 saw a significant increase in the use of CVP water, increasing to 2.5 times last year's total volume. Recycled water deliveries remained generally consistent at one percent of total supply. **Table 3** shows the total Zone 6 water supplied by CVP, groundwater, and recycled water sources.

**Table 3. Total Zone 6 Water Use by Source for Water Years 2016 and 2017 (AF)**

| | CVP | | Groundwater | | Recycled Water | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 2016 | 2017 | 2016 | 2017 | 2016 | 2017 | 2016 | 2017 |
| Agriculture | 4,434 | 13,288 | 27,912 | 14,727 | 246 | 258 | 32,591 | 28,273 |
| M&I | 1,914 | 2,909 | 5,251 | 5,088 | 253 | 108 | 7,417 | 8,105 |
| **TOTAL** | **6,347** | **16,197** | **33,162** | **19,815** | **499** | **366** | **40,008** | **36,378** |

Agricultural water use declined slightly. Municipal and domestic use increased slightly, but remained lower than the average over the period of record, mostly because of water conservation. In 2017, groundwater represented 54 percent of total supply, mostly reflecting increases in CVP imports for agricultural use. **Figure 5** illustrates that since 1993, groundwater has averaged 62 percent of supply with periodic increases due to drought and reduced CVP allocations.

**Figure 5. Percent of Supply by Source, 1993- 2017**

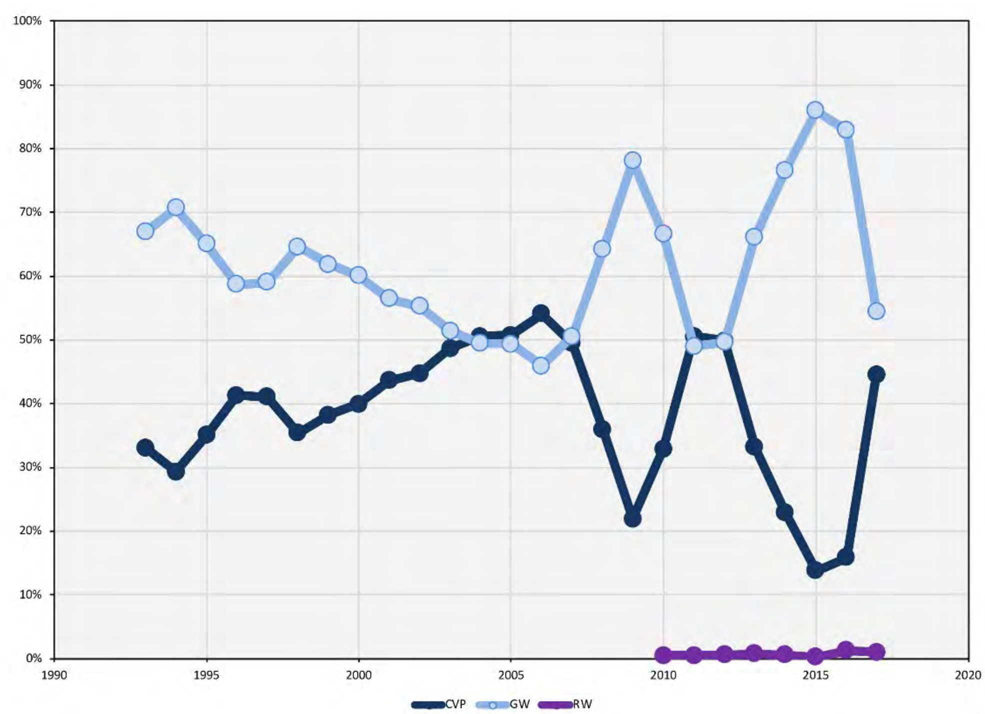
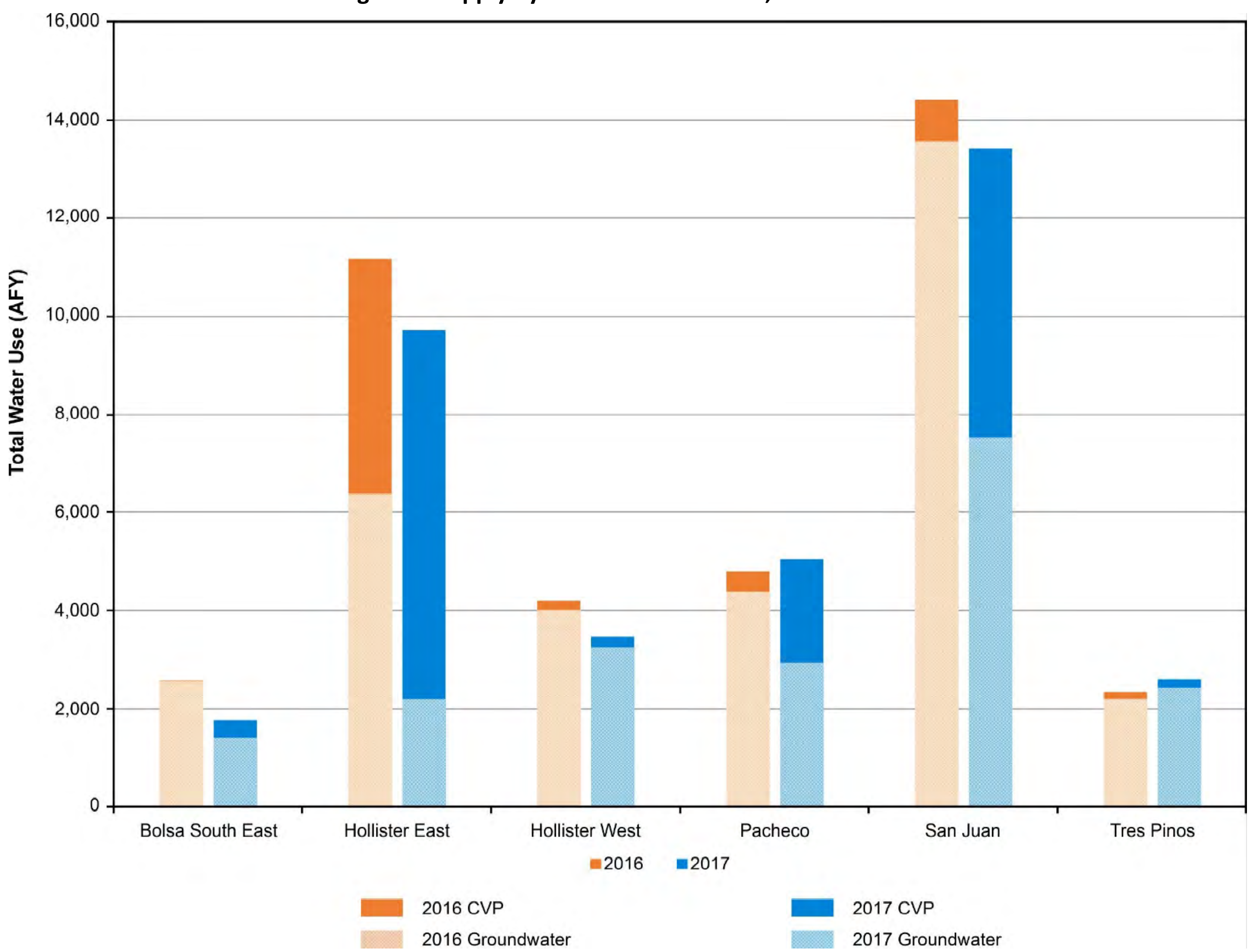


**Figure 6** illustrates the change from 2016 to 2017 in water supply source by subbasin. The Bolsa Subbasin is not depicted because its sole source is groundwater and is not measured. The orange bars represent water supply for water year 2016 and the blue bars represent water supply for 2017. The lower portion of each bar represents groundwater as a source of supply and the upper portion is CVP supply. Recycled water is a relatively limited supply and is not included in this graph. In 2016, when CVP allocations were lower, groundwater made up 84 percent of total supply. In 2017, when CVP allocations were 100 percent of contract, many subbasins show a high portion of supply from CVP imports. This change in the source of supply is particularly evident in Hollister East and San Juan, two intensively farmed subbasins. Both subbasins saw a significant decrease in groundwater levels during the drought when growers relied on the groundwater supply to make up for the limited CVP imports. In wet years when imports are available, these basins should maximize CVP use; this type of conjunctive use, termed "in-lieu recharge," allows the groundwater reserves to replenish.

**Figure 6. Supply by Source and Subbasin, 2016 and 2017**



## Distribution by Subbasin

Relative water use in the six subbasins remained similar as in previous years, with groundwater making up a large portion of supply in Bolsa Southeast, San Juan, and Tres Pinos subbasins. **Table 4** shows the water use by user, and water type for each subbasin. Graphs showing total water use by water source are available in Appendix E.

**Table 4. Zone 6 Water Use in Water Year 2017 (AF)**

| | CVP Water | | Groundwater | | Recycled Water | |
|---|---|---|---|---|---|---|
| Subbasin | Agriculture | Domestic & Municipal | Agriculture | Domestic & Municipal | Agriculture | Landscape Irrigation |
| Bolsa Southeast | 365 | 0 | 1,399 | 14 | 66 | 0 |
| Hollister East | 5,372 | 2,115 | 2,192 | 17 | 192 | 0 |
| Hollister West | 14 | 203 | 1,324 | 1,931 | 0 | 108 |
| Pacheco | 2,060 | 36 | 2,904 | 45 | 0 | 0 |
| San Juan | 5,354 | 499 | 6,562 | 980 | 0 | 0 |
| Tres Pinos | 121 | 56 | 347 | 2,100 | 0 | 0 |
| **TOTAL** | **13,288** | **2,909** | **14,727** | **5,088** | **258** | **108** |

# 5 GROUNDWATER ELEVATIONS

In October 2017, groundwater elevations increased in most areas of the basin, for the first time since 2008. While some subbasins showed small groundwater elevation decreases, overall groundwater in storage increased. Groundwater elevation increases were greatest in the Bolsa, Pacheco, Bolsa SE, and Hollister West subbasins.

In reviewing groundwater elevations and trends, it is important to recognize the conjunctive use of imported water and groundwater supplies and the role of groundwater storage. In dry years, like 2012 through 2015 with reduced CVP imports, groundwater pumping provides most of the supply, but groundwater storage is reduced. In the less-frequent wet years, like 2017, the District must replenish groundwater reserves to prepare for the next drought. This has been achieved since the 1970s mostly through provision of imported CVP water instead of groundwater pumping (in-lieu recharge) and through the District's percolation activities. However, CVP water is likely to become less dependable (for example, due to climate change), which presents a challenge to long-term sustainability.

To track groundwater storage changes, the analysis of groundwater elevations depends on a consistent network of reliable wells. The number of wells in the District's groundwater monitoring program for the autumn was at an all-time low, increasing the uncertainty of a subbasin-wide storage change calculations. In addition, the set of wells monitored was different from that monitored in previous years in some key locations. This means that storage change cannot be computed reliably. The District currently is assessing the monitoring network and increasing efforts to record groundwater elevations in a stable network of wells on a quarterly basis. In 2018, along with SGMA outreach, the District will begin searching for new wells to add to the network in areas not currently managed by the District. If for some reason, wells are no longer part of the network, they should be replaced as soon as possible with a nearby, comparably-constructed well that can serve as a permanent addition to the network.

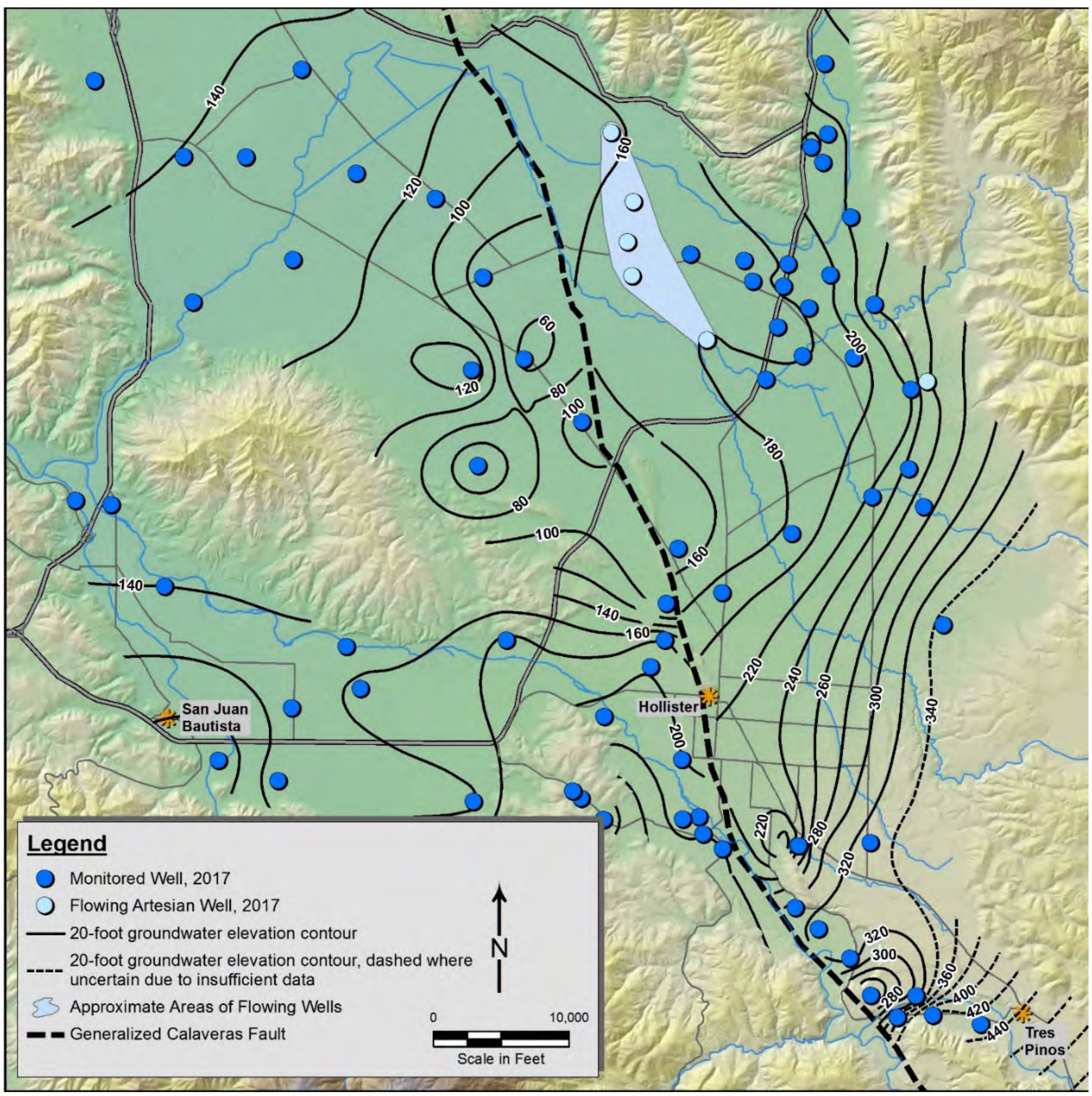
The District should continue to manage groundwater resources for substantial and rapid recovery in wet years, recognizing that most years are average to dry and wet years are much less frequent (see Figure 3). Additional information on groundwater elevations (including profiles of basin cross sections and depth to water contours) are included in Appendix C.

## Groundwater Elevations

Groundwater elevation data were examined from 91 wells in the District's quarterly groundwater elevation monitoring program. Generally, October groundwater elevation data are used for preparing groundwater elevation contour maps. However, this year some of the measurements were collected in early November. Groundwater elevations in the fall, including those shown in **Figure 7**, are assumed to represent the lowest levels for the water year. As in previous years, the groundwater elevation contouring methods incorporate the effects of the Calaveras Fault on groundwater elevations by splitting the area into eastern and western portions and then generating contours for each. The resulting contours are then evaluated for consistency and reasonableness and any necessary refinements are made. The contours indicate a general flow from southeast to northwest in San Benito County and a flow from Llagas Subbasin in Santa Clara County toward the Bolsa.

Profiles of historical groundwater elevations are provided in Figure C-5 in Appendix C. These profiles show groundwater elevations for 2017 and 2016 plus historic groundwater lows and the range of historical groundwater elevations. Review of Figure C-5 indicates a new localized historic low in the Bolsa (Profile B-B’). Previous annual reports (2014, 2015, 2016) also indicated new historic lows. Additional groundwater elevation data are presented in Appendix C, including maps, summary tables, and groundwater elevation data.

**Figure 7. Groundwater Elevations, October 2017**



The relative changes in groundwater elevations from October 2016 to October 2017 are shown on **Figure 8.** The map was prepared by calculating and contouring the differences between mapped groundwater elevations for the two periods. The accuracy of this map was checked by examining groundwater elevation changes in individual wells that were monitored in the fall quarter of both years. **Figure 9** shows the cumulative drawdown over the recent drought to present (2011 through 2017). The groundwater elevation changes over this period are uneven, and there are some areas where elevations were higher in 2017 than in 2011. However, on average groundwater elevations in all subbasins were still 10 feet lower in the fall of 2017 compared to the fall of 2011.

**Figure 8. Change in Groundwater Elevations 2016-2017**

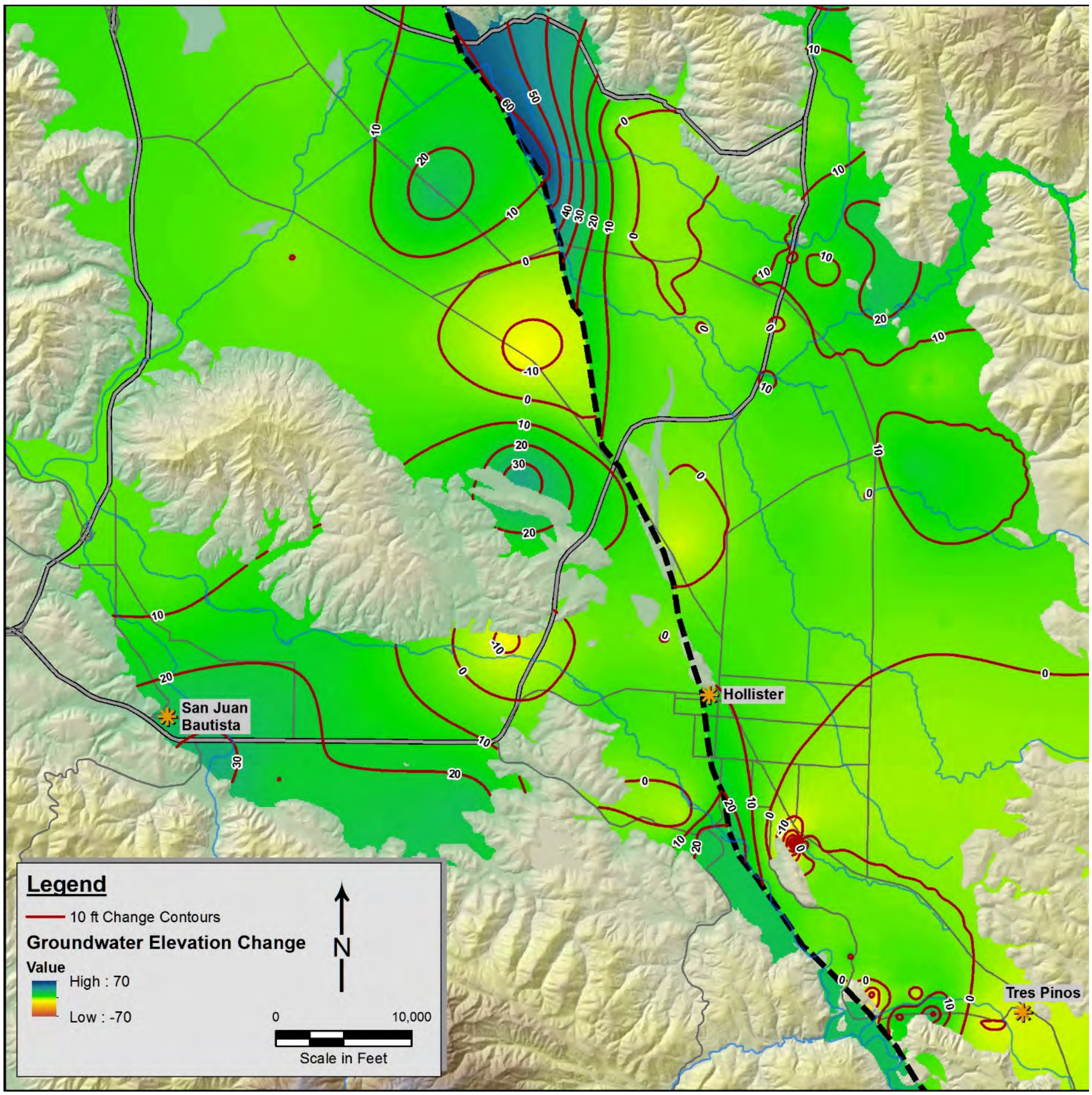
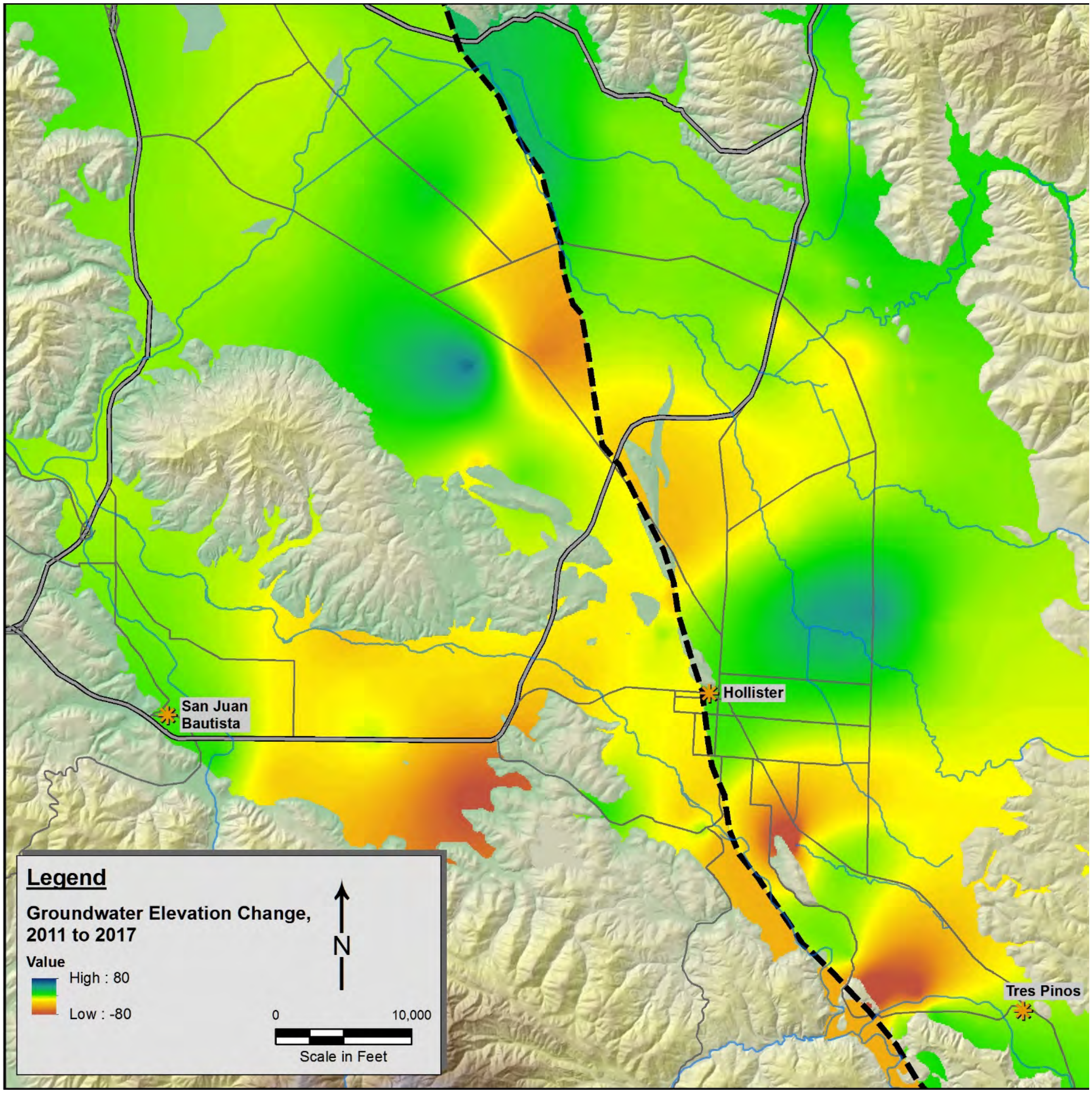


**Figure 9. Cumulative Change in Groundwater Elevations 2011-2017**



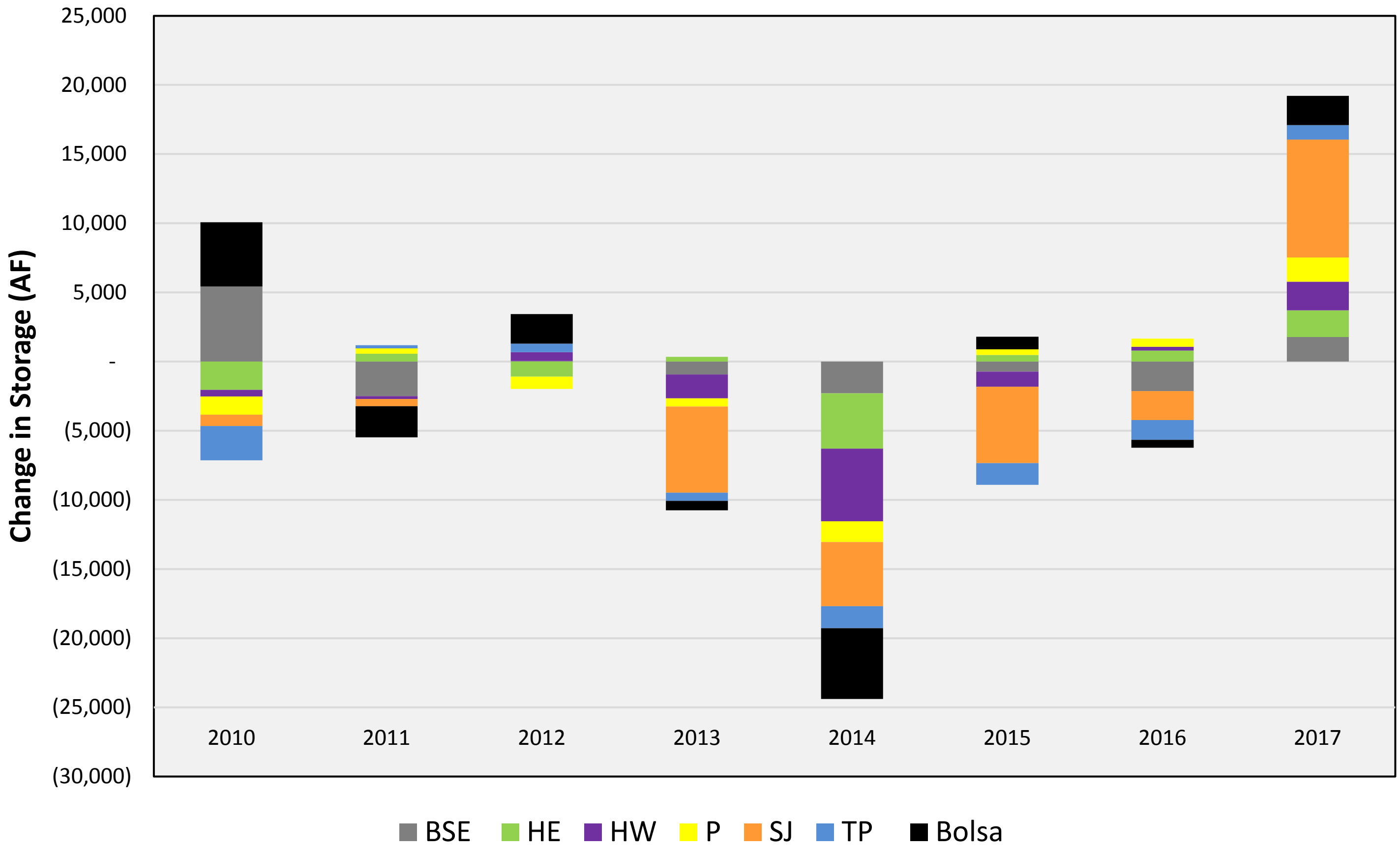
## Change in Storage

Groundwater elevation changes from October 2016 to October 2017 were used to determine the change in storage, which is the net volume of water added to or removed from the basin over the water year. The change in storage was calculated using the change in groundwater elevations (feet) and multiplying by the total area (acres) to determine the total bulk volume of change. This bulk volume of change is then multiplied by the average storativity of the subbasin to represent the amount of water that a given volume of aquifer will produce. The storativity values for each subbasin were derived from a numerical model of the basin developed by Yates and Zhang (2001).

The total change in groundwater storage for Zone 6 was an increase of 17,091 AF, while the total change for the basin, including the Bolsa subbasin, was an increase of 19,216 AF. This marks the first year since the beginning of the recent drought when groundwater storage increased in all subbasins. While all subbasins showed increased storage this year, average groundwater elevations in all subbasins continue to be below the elevations when the current drought began in 2011. Average subbasin groundwater elevations compared to 2011 are still more than 27 feet lower in Tres Pinos, more than 20 feet lower in San Juan, 18 feet lower in Bolsa SE, and more than 16 feet lower in Hollister West. **Figure 10** illustrates the change in storage by subbasin for the past eight years.

The change in storage analysis and subsequent calculations are highly dependent on how many and which wells are monitored from year to year. As noted above and in past years, the number of monitored wells has diminished and the set of monitored wells has been unstable. These two factors increase the uncertainty of subbasin-wide storage change estimates because actual groundwater elevation changes cannot be effectively distinguished from apparent fluctuations related to variations in which wells are monitored. In some subbasins and some years, the effects of variations in the monitoring well network have more influence on the average change in groundwater elevations than do measured differences. Stabilization of the year-to-year monitoring well network is necessary for valid assessment of change in storage.

**Figure 10. Change in Storage by Subbasin (2010-2017)**




## Hydrographs

Long term changes in groundwater elevations are illustrated in composite hydrographs. These composite hydrographs are generated by averaging elevations from key wells from each subbasin for each monitoring event. The key well locations are shown on **Figure 11.** It should be noted that these subbasin hydrographs represent average conditions in each subbasin and illustrate long-term trends, but do not show localized variations in groundwater elevations. Overall, groundwater elevations do not indicate overdraft conditions as of 2017.

Groundwater elevations in most subbasins have shown a decrease over the multi-year drought consistent with increased pumping and decreased storage. **Figure 12** shows the composite hydrographs. While precipitation in 2017 was higher than the long-term average, it will be some time before groundwater elevations recover to pre-drought levels. Some factors that will determine the length of recovery include not only precipitation but groundwater use, pattern and intensity of rainfall, local geology (that would affect how much time recharge travels from the surface to the aquifer), and any managed recharge activities (like wastewater percolation).

**Figure 11. Locations of Key Wells Used in Hydrographs**

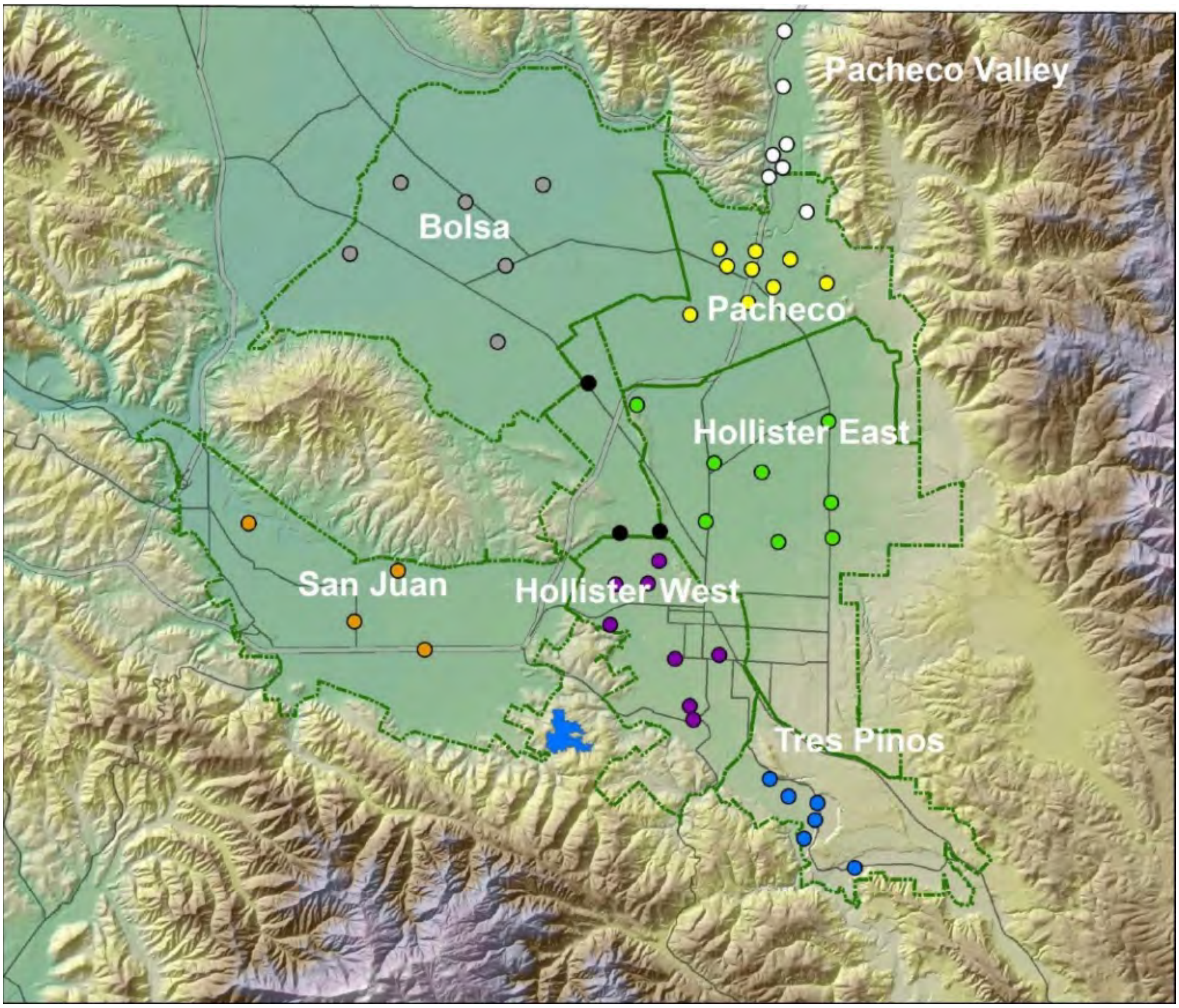
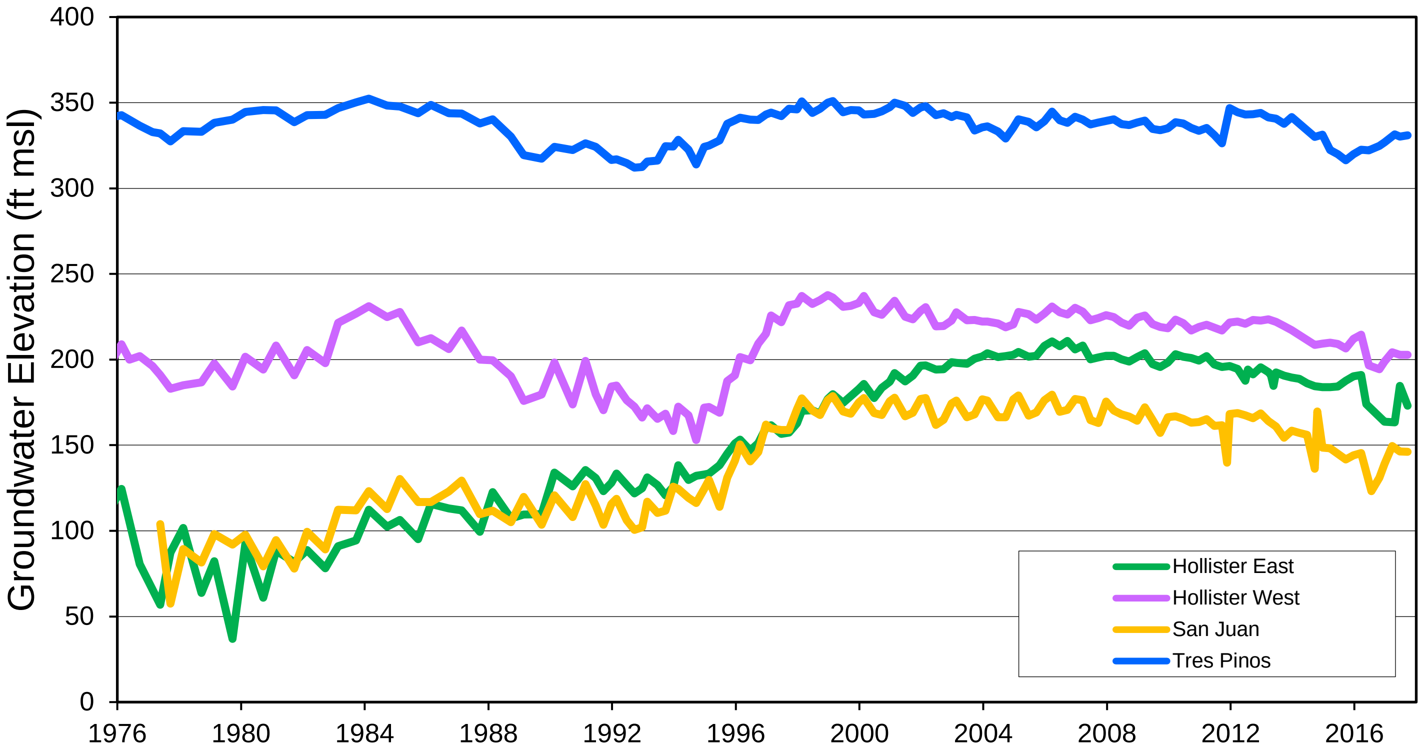
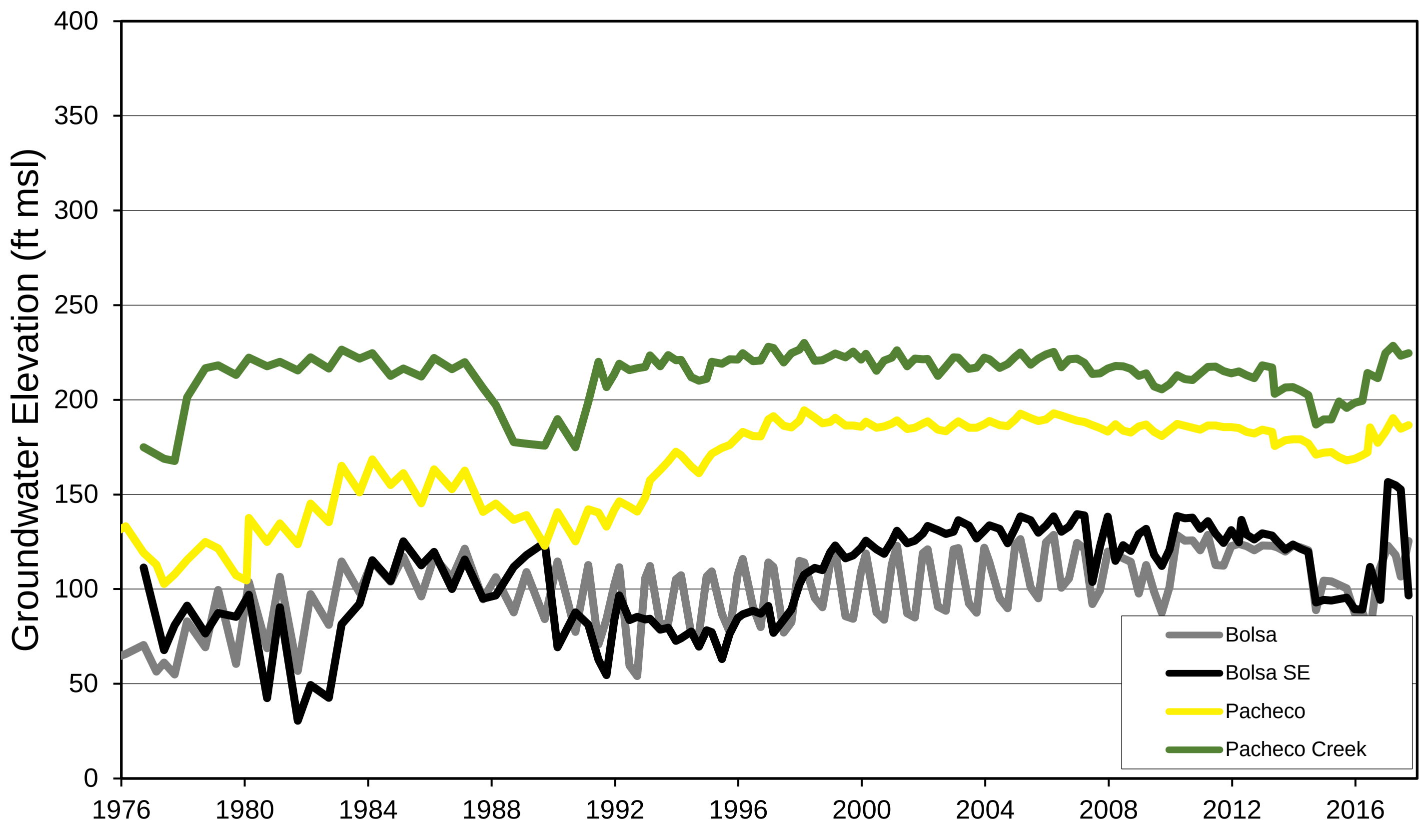


**Figure 12. Composite Hydrographs**



# 6 WATER BALANCE

The water balance provides a quantitative assessment of the state of the basin, including estimates of specific inflows and outflows for each individual subbasin, including the subbasins with Zone 6 supply (San Juan, Bolsa SE, Pacheco, Hollister East and West, and Tres Pinos) and the adjacent Bolsa, Paicines, and Tres Pinos Creek Valley subbasins. This detailed understanding of the groundwater system can serve as a basis to evaluate changes in the basin over time and develop tools for groundwater basin management. As in 2014, the soil moisture balance model (based on the 2010 updated land use) was employed to estimate various water balance inflows and confirm outflows. The estimated water balance from 2015 through 2017 is shown in **Tables 5 through 7.** Details on the water balance methodology can be found in Appendix G.

Future water balance analyses, including the water balances required by SGMA, will be conducted according to SGMA regulations and Best Management Practices. Water balances will be assessed according to DWR basin definitions. In addition, an updated hydrogeologic conceptual model and improved numerical model will provide comprehensive simulations of historical, current, and sustainable conditions. Comparison of newly simulated conditions to historical conditions and estimated water balances (in terms of differences between simulated and observed groundwater elevations and flows) will allow identification of data gaps and uncertainties and systematic review and adjustment of water balance analyses.

## Inflows

Many inflows to the basin are controlled by hydrologic conditions. Natural stream percolation and deep percolation from rainfall are directly related to the volume and distribution of rainfall. Flow into reservoirs is controlled by stream discharge rates, and releases from reservoirs are a function mostly of stream inflow and available storage. Because they are related to rainfall, these three inflows are generally higher in wet years and lower in dry years. There are five major sources of inflow to the subbasins in Zone 6 and the wider groundwater basin. These include:

- **Natural stream percolation** – Natural stream percolation occurs in every subbasin except Bolsa Southeast (which lacks significant streams) and is most substantial in subbasins with large streams, such as Pacheco, Hollister West and San Juan. Stream percolation varies considerably from year to year depending on rainfall and groundwater elevations. Stream percolation is controlled primarily by the permeable channel area of the waterway and the rate of infiltration. These two variables change over time in response to factors including depth to groundwater, such that shallow groundwater levels and reduced availability of groundwater storage space can limit the volume of inflow.

- **Percolation of reservoir and CVP releases** – Reservoir releases from Hernandez and Paicines Reservoir flow to Zone 3 and Zone 6 via Tres Pinos Creek and the San Benito River. CVP releases occurred in 2017 to off-stream ponds in Hollister West and Pacheco subbasins. The percolation amounts in the Tres Pinos, Hollister West, Pacheco, and San Juan subbasin are estimated separately. Relative to natural percolation, percolation from reservoir releases is less affected by seasonal conditions because it occurs during the dry season after natural streamflow has ceased. However, it ceases entirely in prolonged drought when surface water becomes unavailable.

- **Deep percolation (from rainfall and/or irrigation)** – Deep percolation from the root zone to the water table is estimated separately for rainfall and irrigation. Rainfall percolation varies significantly on an annual basis, while irrigation percolation remains relatively steady. Rainfall deep percolation is dependent on the volume of rainfall, temporal and areal distribution of rainfall, crop type/land cover, and soil type. Percolation from irrigation depends on crop type and irrigation efficiency; it generally does not change significantly from year to year. However, sustained trends in cropping patterns and irrigation techniques could have a noticeable effect over time.

- **Percolation of reclaimed water** – Percolation of reclaimed water in wastewater disposal ponds occurs in three subbasins (San Juan, Hollister West, and Tres Pinos) at facilities operated by the City of Hollister, SSCWD, and Tres Pinos County Water District. Reclaimed water percolation has been relatively low since 2012 (and certainly since the 2003 peak) because of changes in water treatment plant operations and water conservation measures.

- **Subsurface groundwater inflow** –Groundwater can also flow between adjacent subbasins. While significant uncertainty exists in calculating subsurface flow, groundwater elevation gradients were used to estimate the volumes of flow into and between each subbasin. As groundwater flow directions have not changed significantly over the past few years, estimated groundwater inflow and outflow also have not changed significantly.

## Outflows

Major outflows from the subbasins in Zone 6 and surrounding area are groundwater pumping (agricultural, M&I, and domestic) and subsurface outflow.

- **Agricultural groundwater pumping** – Agricultural pumping is dependent not only on cropping patterns and irrigation practices, but also on the volume of CVP imports and the amount and timing of rainfall; spring rains decrease total irrigation demand, and growers adjust pumping to compensate for changes in the availability of CVP imports.

- **Municipal pumping** is largely concentrated in the Hollister West, Hollister East, and Tres Pinos subbasins. Pumping by major municipal providers is measured, as is pumping by smaller community water systems in Zone 6. Domestic pumping is not measured.

- **Groundwater subsurface outflow** was calculated along with subsurface inflow. As with subsurface inflow, volumes did not change significantly over time.

- **River and creek outflow** – Discharges from the aquifer to surface water bodies generally occur along the San Benito River in San Juan Subbasin during wet years and along streams in the Hollister and Bolsa subbasins, including Pacheco Creek and Tequisquita Slough. Outflow to streams has not been evaluated systematically on a basin-wide basis. However, such outflow will need to be evaluated in the GSP along with identification of groundwater-dependent ecosystems (GDEs) and establishment of minimum thresholds to avoid undesirable results on GDEs.

Agricultural groundwater pumping is currently measured using hour meters on irrigation wells in Zone 6 and is estimated for surrounding areas based on the soil moisture balance and crop water demands. The duration of pumping at each well is multiplied by the pumping rate of the well to obtain the volume pumped. However, those pumping estimates have consistently been substantially less than estimates based on the soil moisture balance and crop water demands, which is the estimate that has always been used to estimate pumping outside of Zone 6. To be consistent with past annual reports, the agricultural pumping reported is used in the water balance. Future water balances will be prepared consistent with SGMA guidelines, and development of accurate estimates of pumping over the entire DWR defined subbasins may involve a well metering program for all but small wells (with *de minimis* pumping) followed by annual reporting.

## Change in Storage

The water balance tables (**Tables 5 through 7**) include two estimates of storage change: the calculated difference between inflows and outflows and the previously-described estimate based on changes in measured groundwater elevations. Both methods rely on assumptions; the inflows and outflows approach is the sum of all individually-estimated water balance components and the groundwater elevation difference approach relies on the quality of groundwater elevation data and on general estimates of storativity. The potential net inaccuracy in these methodologies is illustrated by the difference between the estimates of change in storage that result from each. In 2017, the difference between the water balance inflows and outflows indicated a change in storage that is significantly greater than the change in storage estimated through water level changes. This difference could be indicative of real-world processes, such as a lag between the recharge to the ground surface and the rise in groundwater levels due to migration through the unsaturated zone. Other possible reasons for this discrepancy are more indicative of data gaps. For example, storativity values used to estimate volume from change in water levels may not accurately reflect the average conditions of each subbasin. In addition, the geographic distribution of wells in the water level network may not adequately represent recharge areas.

As a matter of perspective over the past three years, water conditions in the basin have changed significantly in response to drought followed by wet years and data collection has diminished; these changes combine to reduce the reliability of both analytical methods and to increase uncertainty. To improve the water balance and conceptual understanding of the basin, additional data collection and quality control—along with a comprehensive numerical model to test assumptions—would provide tools for increasing the reliability of the change in storage estimates.

## Water Balance Conclusions

The water balance trends tend to track the hydrologic trends in the basin. In wet years, there is more recharge and less groundwater pumping and in dry years, the reverse is true. During the past three years, the basin has begun to show recovery from the most recent drought. Inflows increased significantly from 2015 to 2017. In 2015, inflows were reduced to the second lowest volume since 2006 and outflows were high because there was limited imported water for irrigation. By 2017, inflows were the highest since 2006 and outflows decreased as CVP imports resumed.

Tables 5 through 7 show the individual components of the water balance from Water Years 2015, 2016, and 2017. Figure 9 shows the water balance components over time.

The process of preparing the water balance provides important feedback on the availability and accuracy of the data collected and managed by the District. Two important data quality issues, presented in the 2014 report, are repeated here:

1. The soil moisture budget used to calculate return flows for agricultural and natural areas relies on reference evapotranspiration, crop types, crop coefficients, soil type and irrigation efficiency to determine the volume of water that percolates to the aquifer in each subbasin. As an intermediate step, the process also calculates the irrigation water demand of the irrigated lands. The calculated water demand is significantly greater than the reported groundwater use and CVP delivery data. Because the reported groundwater use is based on estimated power use and appears to be far lower than the water demand for the reported crops, the actual groundwater use may be significantly greater than the values reported.

2. The number of wells with available groundwater elevation data has decreased over time due to technical issues. Without a robust, spatially distributed network, the change in storage values may not represent the local or regional state of the subbasins. The storativity distribution is also largely unknown. Variations in storativity could greatly affect the calculated change in groundwater volume.

The SGMA process will provide an opportunity to revise the monitoring networks and improve these critical data sets. The District's GSP preparation will update the hydrogeologic conceptual model (including the water balance), update and improve the numerical model, and develop robust monitoring networks (e.g., for groundwater elevations, water use, and water quality) to aid in long term groundwater management.

**Figure 13. Water Balance for Zone 6 and the Bolsa (2006-2017)**

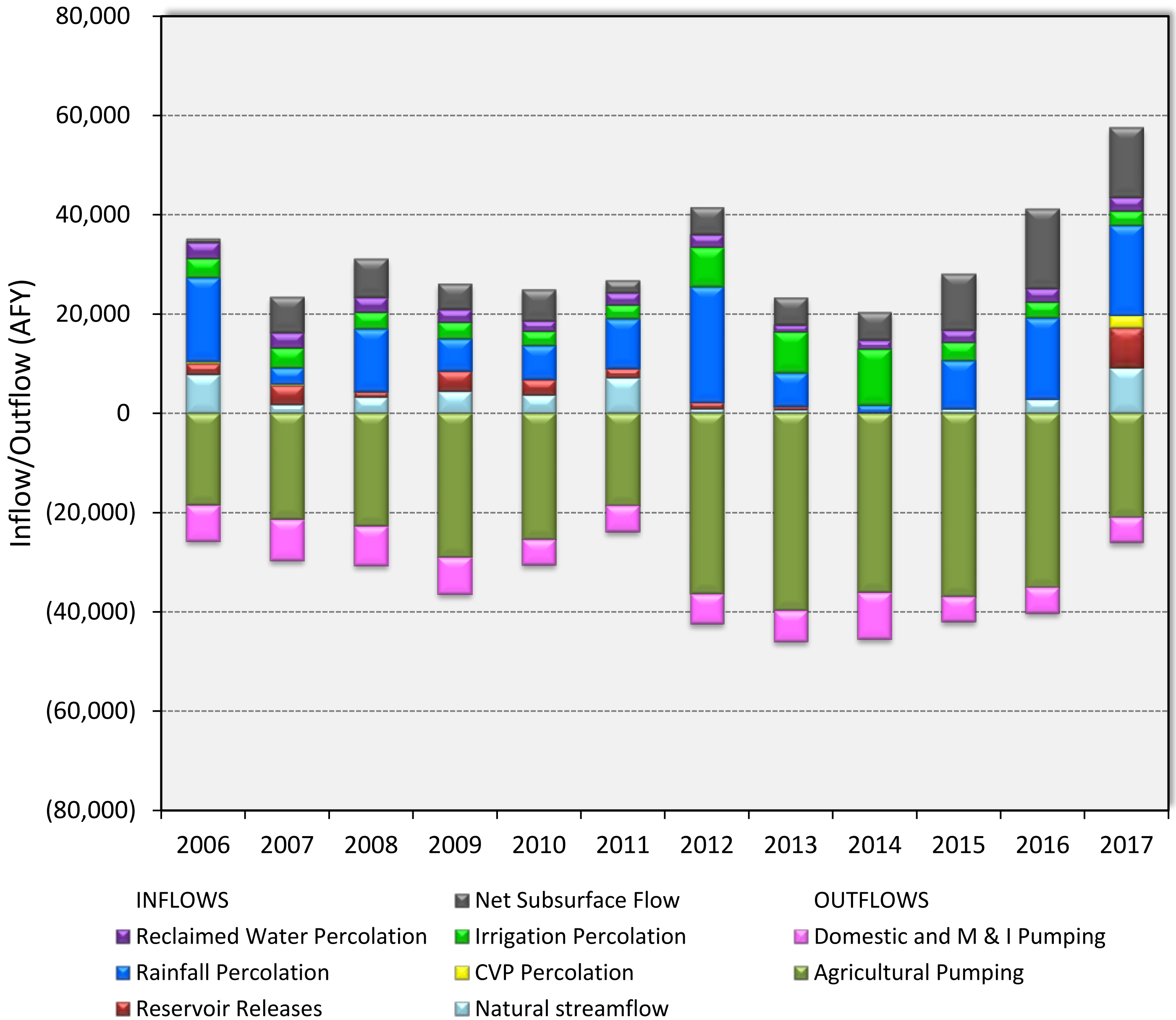


**Table 5. Water Balance for Water Year 2015 (AFY)**

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow | 494 | 0 | 52 | 63 | 266 | 21 | 896 | 0 | 0 | 66 | 962 |
| Reservoir releases | | | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| CVP Percolation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deep percolation through soils | | | | | | | | | | | 0 |
| Rainfall | 1,145 | 519 | 3,163 | 911 | 1,593 | 395 | 7,726 | 2,033 | 245 | 59 | 10,064 |
| Irrigation | 519 | 205 | 1,039 | 367 | 593 | 112 | 2,835 | 771 | 118 | 36 | 3,760 |
| Reclaimed water percolation | 0 | 0 | 2,255 | 44 | 0 | 200 | 2,499 | 0 | 0 | 0 | 2,499 |
| Groundwater inflow | 2,647 | 5,398 | 49 | 4,288 | 4,101 | 2,310 | 18,793 | 6,866 | 0 | -- | 17,791 |
| Total | 4,805 | 6,123 | 6,557 | 5,672 | 6,553 | 3,038 | 32,749 | 9,671 | 363 | 161 | 42,943 |
| **Outflows** | | | | | | | | | | | **0** |
| Wells | | | | | | | | | | | 0 |
| Agricultural | 4,124 | 2,396 | 12,280 | 2,636 | 6,334 | 1,459 | 29,229 | 7,712 | 1,176 | 356 | 38,472 |
| Domestic and M & I | 155 | 5 | 459 | 2,094 | 896 | 1,489 | 5,099 | 0 | 0 | 0 | 5,099 |
| Groundwater outflow | 1,913 | 3,485 | 11 | 5,398 | 2,080 | 1,379 | 14,266 | 0 | 500 | 2,310 | 17,349 |
| Total | 6,193 | 5,886 | 12,750 | 10,128 | 9,310 | 4,327 | 48,594 | 7,712 | 1,676 | 2,310 | 60,291 |
| **Storage change** | | | | | | | | | | | **0** |
| Inflows - outflows | (1,387) | 237 | (6,193) | (4,456) | (2,756) | (1,289) | (15,845) | 1,959 | (1,313) | (2,149) | (17,348) |
| Water level change | 388 | (719) | (5,530) | (1,090) | 492 | (1,579) | (8,040) | 915 | (1,455) | (2,574) | (11,155) |

Adjustments

Agriculutral pumping is based on reported groundwater use

Adjusted the K used in the Darcy equation to calibration (2015-2017)

**Table 6. Water Balance for Water Year 2016 (AFY)**

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow | 1,346 | 0 | 336 | 147 | 923 | 49 | 2,801 | 0 | 1,406 | 859 | 5,066 |
| Reservoir releases | | | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| CVP Percolation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deep percolation through soils | | | | | | | | | | | 0 |
| Rainfall | 1,627 | 726 | 5,496 | 1,301 | 2,789 | 780 | 12,718 | 3,750 | 517 | 114 | 17,098 |
| Irrigation | 457 | 166 | 840 | 317 | 525 | 94 | 2,400 | 712 | 117 | 35 | 3,264 |
| Reclaimed water percolation | 0 | 0 | 2,398 | 208 | 0 | 200 | 2,806 | 0 | 0 | 0 | 2,806 |
| Groundwater inflow | 2,841 | 4,142 | 109 | 6,908 | 3,985 | 2,859 | 20,843 | 8,055 | 0 | -- | 17,791 |
| Total | 6,271 | 5,034 | 9,178 | 8,881 | 8,222 | 3,981 | 41,567 | 12,517 | 2,039 | 1,008 | 57,131 |
| **Outflows** | | | | | | | | | | | **0** |
| Wells | | | | | | | | | | | 0 |
| Agricultural | 4,220 | 2,533 | 13,084 | 2,036 | 5,518 | 522 | 27,912 | 7,123 | 1,165 | 352 | 36,552 |
| Domestic and M & I | 167 | 25 | 497 | 1,996 | 865 | 1,701 | 5,251 | 0 | 0 | 0 | 5,251 |
| Groundwater outflow | 2,578 | 1,909 | 14 | 4,142 | 2,338 | 1,877 | 12,857 | 0 | 500 | 2,859 | 17,349 |
| Total | 6,964 | 4,467 | 13,595 | 8,173 | 8,720 | 4,100 | 46,019 | 7,123 | 1,665 | 3,211 | 58,018 |
| **Storage change** | | | | | | | | | | | **0** |
| Inflows - outflows | (693) | 566 | (4,417) | 708 | (498) | (119) | (4,452) | 5,394 | 374 | (2,203) | (887) |
| Water level change | 604 | (2,139) | (2,086) | 282 | 789 | (1,427) | (3,977) | (578) | 424 | 161 | (3,970) |

Adjustments

Agriculutral pumping is based on reported groundwater use

Rainfall percolation is reduced by 25%, to reflect additional runoff during intense storms

Adjusted the K used in the Darcy equation to calibration (2015-2017)

**Table 7. Water Balance for Water Year 2017 (AFY)**

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow | 3,537 | 0 | 1,464 | 1,410 | 1,844 | 952 | 9,207 | 0 | 657 | 2,398 | 12,261 |
| Reservoir releases | | | 1,955 | 2,158 | 0 | 3,863 | 7,976 | 0 | 847 | 0 | 8,823 |
| CVP Percolation | 340 | 0 | 0 | 2,209 | 0 | 0 | 2,549 | 0 | 0 | 0 | 2,549 |
| Deep percolation through soils | | | | | | | | | | | |
| Rainfall | 1,888 | 689 | 5,399 | 1,474 | 3,199 | 943 | 13,592 | 4,546 | 1,943 | 492 | 20,573 |
| Irrigation | 438 | 156 | 811 | 310 | 477 | 96 | 2,288 | 624 | 102 | 33 | 3,048 |
| Reclaimed water percolation | 0 | 0 | 2,310 | 228 | 0 | 208 | 2,746 | 0 | 0 | 0 | 2,746 |
| Groundwater inflow | 3,081 | 4,317 | 74 | 6,775 | 3,663 | 2,610 | 20,520 | 5,916 | 0 | 0 | 17,791 |
| Total | 9,284 | 5,162 | 12,013 | 14,562 | 9,183 | 8,672 | 58,877 | 11,087 | 3,549 | 2,923 | 76,435 |
| **Outflows** | | | | | | | | | | | |
| Wells | | | | | | | | | | | 0 |
| Agricultural | 2,904 | 1,399 | 6,914 | 971 | 2,192 | 347 | 14,727 | 6,245 | 1,025 | 328 | 22,324 |
| Domestic and M & I | 52 | 3 | 980 | 1,554 | 658 | 1,840 | 5,088 | 0 | 0 | 0 | 5,088 |
| Groundwater outflow | 1,667 | 1,465 | 16 | 4,317 | 2,595 | 2,332 | 12,392 | 0 | 500 | 2,610 | 17,349 |
| Total | 4,623 | 2,867 | 7,910 | 6,842 | 5,445 | 4,519 | 32,207 | 6,245 | 1,525 | 2,937 | 42,914 |
| **Storage change** | | | | | | | | | | | |
| Inflows - outflows | 4,661 | 2,295 | 4,103 | 7,720 | 3,738 | 4,153 | 26,670 | 4,842 | 2,024 | (14) | 33,522 |
| Water level change | 1,736 | 1,767 | 8,531 | 2,084 | 1,939 | 1,034 | 17,091 | 2,125 | 976 | 2,060 | 22,253 |

Adjustments

Agricultural pumping is based on reported groundwater use for Zone 6, land use for outside Zone 6

Rainfall percolation is reduced by 66%, to reflect additional runoff during intense storms

Adjusted the K used in the Darcy equation to calibration (2015-2017)

Sreams in Bolsa were assumed to percolate rain water; this is included under deep percolation

Streamflows exceeding 30 cfs in San Benito River was assumed to flow out of the basin and flows exceeding 10 cfs in smaller creeks were assumed to flow out of the basin

# 7 FINANCIAL INFORMATION

The District derives its operating revenue from charges levied on landowners and water users. Non-operating revenue is generated from property taxes, interest, standby and availability charges, and grants. Zone 6 charges, relating to the importation and distribution of CVP water, are the focus of this section.

The groundwater charge for Zone 6 water users reflects costs associated with groundwater monitoring and management, including the cost of purchasing CVP water and power charges associated with percolation. The per-acre-foot charge is determined by dividing these costs by the volume of groundwater usage. Groundwater charges are adjusted annually in March. For March 2017-February 2018, the District rates are $6.45 for agricultural use and a groundwater charge of $24.25 for M&I use.

The District has also calculated the groundwater charge for the next USBR water year (March 2018-February 2019). The detailed calculation is shown in Appendix F; the District recommends that rates increase to $7.95 for agricultural use in Zone 6. A groundwater charge of $24.25 is recommended for M&I use in Zone 6.

CVP rates (provided by the USBR) include the cost of service, restoration fund payment, charges for maintenance of San Luis Delta Mendota Water Authority facilities, and other fees (the breakdown is found in Appendix F). The District's San Felipe rates (paid by users) include a standby and availability charge, power charge, and a water charge. The standby and availability charge is a $6 per-acre charge assessed on all parcels with access to CVP water (an active or idle turnout from the distribution system). Power charges depend on the location of user. **Table 8a and b,** on the following page, shows the District San Felipe water and power charges, respectively, for the Water Years 2017-2018 and 2018-2019.

**Table 8a. District San Felipe Water Charges 2017-2018 and 2018-2019**

| Blue Valve Water Charge ($/af) | | | | |
|---|---|---|---|---|
| Year | Agricultural | | | Municipal & Industrial |
| | Non - Full Cost | Full Cost (1a) | Full Cost (1b) | |
| 2017-2018 | $191.00 | $364.00 | $382.00 | $363.00 |
| 2018-2019 | $272.00 | $445.00 | $463.00 | $363.00 |

**Table 8b. District San Felipe Power Charges 2017-2018 and 2018-2019**

| Blue Valve Power Charge ($/acre-foot) | 2017-2018 | 2018-2019 |
|---|---|---|
| Subsystem 2 | $126.80 | $130.60 |
| Subsystem 6H | $77.90 | $80.25 |
| Subsystem 9L | $113.25 | $116.65 |
| Subsystem 9H | $167.45 | $172.45 |
| All other subsystems | $68.05 | $70.10 |

Notes:

1 "Full-cost rates for agricultural users apply to landholders that have exceeded his/her or its non full-cost entitlement. There are two full-cost rates:

a. Section 202(3) - the lower full-cost rate, which applies to qualified recipients leasing in excess of their 960-acre entitlement, limited recipients that received Reclamation irrigation water on or before October 1, 1981, and extended recordable contracts.

There are currently no Zone 6 full-cost users under this section.

b. Section 205(a)(3) - the higher full-cost rate, which applies to prior law recipients leasing in excess of their applicable no full-cost entitlement, and limited recipients that did not receive Reclamation irrigation water on or before October 1, 1981.

See Section 202(3) or 205(a)(3) of RRA Rules and Regulations for further non-full-cost definitions.

Recycled Water rates (**Table 9)** were set through 2017 to recover current operating and maintenance costs related to the water service. Recycled water rates include those costs associated with water supply, water quality, and infrastructure (SBCWD February 2015).

**Table 9. Recycled Water Charges, 2016-2017**

| Recycled Water | | |
|---|---|---|
| **Effective** | **Agriculture Rate** | **Power Charge** |
| 3/1/2016 | $182.55 | $57.70 |
| 3/1/2017 | $183.45 | $59.45 |

Rates for water year 2018-2019 have not yet been adopted.

Development of a GSP by the District will be followed by expanded monitoring and management, with annual reporting and GSP updates every five years, consistent with SGMA. This will entail increased costs for operation and maintenance; during the GSP development process, the District will explore financial measures to support SGMA compliance equably across the managed subbasins.

# 8 OUTLOOK

## La Niña

The next water year, 2017-2018, is expected to be a weak La Niña year. The National Weather Service (NWS) is predicting that precipitation will be normal or slightly below normal for Northern California for most of the winter and spring (NWS 2017). We note that even average precipitation will aid in the replenishment of the groundwater basins and perhaps translate to higher CVP allocations.

## CVP Deliveries

The annual allocation of CVP water remains uncertain. In past years, San Luis & Delta Mendota Water Authority (SLDMWA) has forecasted CVP allocation for the next year. SLDWMA no longer publishes estimated allocation in the fall. Many factors affect the allocation, including environmental considerations in the Delta, seniority of CVP water rights on water ways, reduced snowpack due to climate change, debt to the State Water Project System and other factors. The District must continue to use its existing tools (and continue to develop new management tools) to secure a reliable water supply despite variable CVP allocations.

## Groundwater

In 2017, groundwater storage increased throughout most of the basin as a result of the very wet winter. However, groundwater elevations have not recovered yet to pre-drought levels. Multiple years of normal to above-normal rainfall and restored CVP supply will be needed to replenish groundwater storage.

Current groundwater storage is sufficient to accommodate water demand in the short term even with negative water budgets, and the capacity for groundwater recovery in subsequent wet years is sufficient to balance moderate increases in groundwater pumping without causing long-term overdraft. However, resumption of drought and reduced CVP supply entail a real risk of overdraft.

# 9 RECOMMENDATIONS

The water supply outlook is mixed. While precipitation is expected to be average—with promise of some replenishment--the state's and the basin's water resources have been depleted by years of drought that will require additional years to recover. The District should continue to move forward with plans and projects to ensure a more sustainable water supply system that includes a portfolio of sources.

**Groundwater Sustainability.** The District plans to begin GSP preparation early in 2018. As summarized in the SGMA section of this report, this preparation should progress systematically throughout the various tasks of: compilation and review of data, development of a hydrogeologic conceptual model and water budgets, update and extension of the groundwater model, evaluation of sustainability criteria, identification of management actions and development of monitoring networks and protocols. The entire process will occur with agency collaboration and stakeholder involvement to improve groundwater management. The District should proceed with its request to DWR for basin consolidation.

**Groundwater Charges.** Based on the methodology used since 2006, the groundwater charge for the USBR contract year (March 2017-February 2018) is recommended to be $6.45 for agricultural use in Zone 6 and a groundwater charge of $24.25 is recommended for M&I use in Zone 6.

G**roundwater Production and Replenishment.** District percolation operations helped to reverse historical overdraft and then accumulate a water supply reserve. The District currently manages groundwater storage and surface water to minimize excessively high or low groundwater elevations on a temporal and geographic basis. In 2017, storage in Hernandez Reservoir was effectively replenished and substantial releases were made to aid the recovery of groundwater levels in portions of the basin with persistent low groundwater elevations, like Tres Pinos, Hollister West, and San Juan. Such replenishment activities should be continued into 2018, with use of the District's new operations planning tool. In addition, in 2017 the District provided off-channel percolation of CVP water; this too should be continued given availability of CVP water and persistence of low groundwater levels. Given the decreased reliability of imported supplies and continuing threat of drought, such timely and intensive replenishment operations are critical to sustainable groundwater supply.

**Groundwater Monitoring.** The number of wells in both the groundwater elevation network and water quality network has declined over time. The District plans to improve the monitoring network and redouble efforts to monitor a stable network of wells on a regular basis. In addition, it will expand monitoring to cover the entire GSA area. If for some reason wells are no longer part of the network, they should be replaced as soon as possible with a nearby, comparably-constructed well that can serve as a permanent addition to the network.

# 10 REFERENCES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A

# REPORTING REQUIREMENTS AND SPECIAL TOPICS

List of Tables

The San Benito County Water District Act (1953) is codified in California Water Code Appendix 70. Section 70-7.6 authorizes the District Board of Directors to require the District to prepare an annual groundwater report; this report addresses groundwater conditions of the District and its zones of benefit for the water year, which begins October 1 of the preceding calendar year and ends September 30 of the current calendar year. The Board has consistently ordered preparation of Annual Reports, and the reports have included the contents specified Section 70-7.6:

- An estimate of the annual overdraft for the current water year and for the ensuing water year
- Information for the consideration of the Board in its determination of the annual overdraft and accumulated overdraft as of September 30 of the current year
- A report as to the total production of water from the groundwater supplies of the District and its zones as of September 30 of the current year
- Information for the consideration of the Board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the District and its zones
- The amount of water the District is obligated to purchase during the ensuing water year
- A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the District and its zones during the ensuing water year
- A recommendation as to whether or not a groundwater charge should be levied in any zone(s) of the District in the ensuing water year and if so, a rate per acre-foot for all water other than agricultural water for such zone(s)
- Any other information the Board requires.
- The full text of Appendix 70, Section 70-7.6 through 7.8 is enclosed at the end of this appendix.
- Each water year a special topic is identified for further consideration. These topics have included water quality, salt loading, shallow wells, and others. Additional analyses and documentation provided in previous annual reports are summarized in the following table.

**Table A-1. Special Topics in Previous Annual Reports**

| Water Year | Additional Analyses and Reporting |
|---|---|
| 2000 | Methodology to calculate water supply benefits of Zone 3 and 6 operations |
| 2001 | Preliminary salt balance |
| 2002 | Investigation of individual salt loading sources |
| 2003 | Documentation of nitrate in supply wells, drains, monitor wells, San Juan Creek |
| 2004 | Documentation of depth to groundwater in shallow wells |
| 2005 | Tabulation of waste discharger permit conditions and recent water quality monitoring results |
| 2006 | Rate study |
| 2007 | Water quality update |
| 2008 | Water budget update |
| 2009 | Water demand and supply |
| 2010 | Water quality update |
| 2011 | Water budget update |
| 2012 | Land use update |
| 2013 | Water quality update |
| 2014 | Water balance update and Groundwater Sustainability |
| 2015 | Groundwater Sustainability – Basin Boundaries and GSAs |
| 2016 | Water quality update |
| 2017 | Water budget update |

## Water Code Appendix 70 Excerpts

**Section 70-7.6. Groundwater; investigation and report: recommendations San Benito County**

Sec. 7.6. the board by resolution require the district to annually prepare an investigation and report on groundwater conditions of the district and the zones thereof, for the period from October 1 of the preceding calendar year through September 30 of the current year and on activities of the district for protection and augmentation of the water supplies of the district and the zones thereof. The investigation and report shall include all of the following information:

(a) Information for the consideration of the board in its determination of the annual overdraft.

(b) Information for the consideration of the board in its determination of the accumulated overdraft as of September 30 of the current calendar year.

(c) A report as to the total production of water from the groundwater supplies of the district and the zones thereof as of September 30 of the current calendar year.

(d) An estimate of the annual overdraft for the current water year and for the ensuing water year.

(e) Information for the consideration of the board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the district and the zones thereof for the ensuing water year.

(f) The amount of water the district is obligated to purchase during the ensuing water year.

(g) A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the district and the zones thereof the ensuing water year.

(h) A recommendation as to whether or not a groundwater charge should be levied in any zone or zones of the district during the ensuing year.

(i) If any groundwater charge is recommended, a proposal of a rate per acre-foot for agricultural water and a rate per acre-foot for all water other than agricultural water for such zone or zones.

(j) Any other information the board requires.

(Added by Stats. 1965, c. 1798,p.4167, 7. Amended by Stats.1967,c.934, 5, eff. July27,1967; Stats. 1983, c. 402, 1; Stats. 1998, c. 219 (A.B.2135), 1.)

**Section 70-7.7. Receipt of report; notice of hearing; contents; hearing**

Sec. 7.7. (a) On the third Monday in December of each year, the groundwater report shall be delivered to the clerk of the board in writing. The clerk shall publish, pursuant to Section 6061 of the Government Code, a notice of the receipt of the report and of a public hearing to be held on the second Monday of January of the following year in a newspaper of general circulation printed and published within the district, at least 10 days prior to the date at which the public hearing regarding the groundwater report shall be held. The notice shall include, but is not limited to, an invitation to all operators of water producing facilities within the district to call at the offices of the district to examine the groundwater report.

(b) The board shall hold, on the second Monday of January of each year, a public hearing, at which time any operator of a water-producing facility within the district, or any person interested in the condition of the groundwater supplies or the surface water supplies of the district, may in person, or by representative, appear and submit evidence concerning the groundwater conditions and the surface water supplies of the district. Appearances also may be made supporting or protesting the written groundwater report, including, but not limited to, the engineer's recommended groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4167, 8. Amended by Stats. 1983, c. 02,2; Stats. 1998, c. 219 (A.B.2135,2.)

**Section 70-7.8. Determination of groundwater charge; establishment of rates; zones; maximum charge; clerical errors**

Sec. 7.8. (a) Prior to the end of the water year in which a hearing is held pursuant to subdivision (b) of Section 7.7, the board shall hold a public hearing, noticed pursuant to Section 6061 of the government Code, to determine if a groundwater charge should be levied, it shall levy, assess, and affix such a charge or charges against all persons operating groundwater- producing facilities within the zone or zones during the ensuing water year. The charge shall be computed at fixed and uniform rate per acre-foot for agricultural water, and at a fixed and uniform rate per acre-foot for all water other than agricultural water. Different rates may be established in different zones. However, in each zone, the rate for agricultural water shall be fixed and uniform and the rate for water other than agricultural water shall be fixed and uniform. The rate for agricultural water shall not exceed one-third of the rate for all water other than agricultural water.

(b) The groundwater charge in any year shall not exceed the costs reasonably borne by the district in the period of the charge in providing the water supply service authorized by this act in the district or a zone or zones thereof.

(c) Any groundwater charge levied pursuant to this section shall be in addition to any general tax or assessment levied within the district or any zone or zones thereof.

(d) Clerical errors occurring or appearing in the name of any person or in the description of the water-producing facility where the production of water there from is otherwise properly charged, or in the making or extension of any charge upon the records which do not affect the substantial rights of the assesse or assesses, shall not invalidate the groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4168, 9. Amended by Stats. 1983, c. 402, 3; Stats.1983, c. 402, 3; Stats. 1998, c. 219 (A.B.2135), 3.)

# B CLIMATE DATA

## List of Tables and Figures

**Table B-1. Monthly Precipitation at the SBCWD CIMIS Station (inches)**

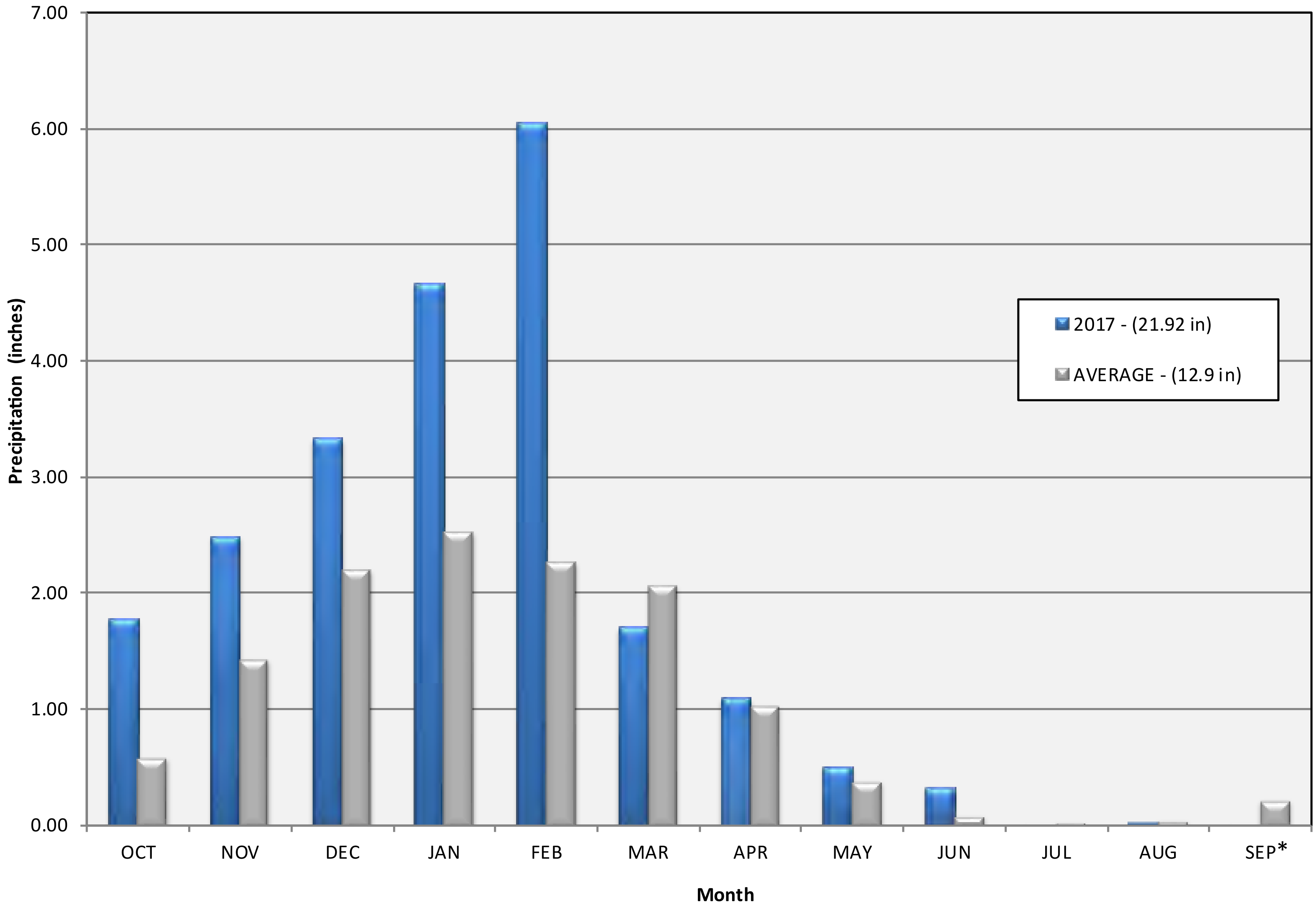
| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.1 | 0 | 2.2 | 4.4 | 4.5 | 1.6 | 1.3 | 1.3 | 0 | 0 | 0 | 0 | **15.5** | **120%** |
| 1997 | 1.0 | 3.2 | 4.3 | 6.8 | 0.2 | 0.1 | 0.2 | 0 | 0.1 | 0 | 0 | 0 | **15.9** | **123%** |
| 1998 | 0.2 | 3.8 | 2.6 | 4.9 | 9.1 | 2.7 | 2.3 | 2.4 | 0.1 | 0 | 0 | 0.1 | **28.1** | **218%** |
| 1999 | 0.5 | 1.9 | 0.8 | 2.5 | 2.5 | 1.5 | 0.7 | 0.1 | 0.1 | 0 | 0 | 0 | **10.6** | **82%** |
| 2000 | 0.1 | 1.0 | 0.1 | 4.1 | 4.5 | 0.7 | 0.4 | 0.5 | 0.1 | 0 | 0 | 0 | **11.5** | **89%** |
| 2001 | 3.5 | 0.8 | 0.2 | 2.9 | 2.8 | 0.6 | 2.2 | 0 | 0 | 0 | 0 | 0 | **13.1** | **101%** |
| 2002 | 0.7 | 11.5 | 11.9 | 0.7 | 1.2 | 1.6 | 0.4 | 0.3 | 0 | 0 | 0 | 0 | **28.1** | **218%** |
| 2003 | 0.0 | 1.7 | 5.0 | 0.8 | 1.4 | 1.1 | 3.1 | 0.1 | 0 | 0 | 0.1 | 0 | **13.1** | **102%** |
| 2004 | 0.2 | 0.6 | 5.3 | 1.3 | 4.2 | 0.6 | 0.3 | 0.1 | 0 | 0 | 0 | 0 | **12.5** | **97%** |
| 2005 | 2.0 | 0.5 | 3.5 | 2.5 | 2.9 | 3.4 | 0.8 | 0.6 | 0.4 | 0 | 0 | 0 | **16.7** | **129%** |
| 2006 | 0.1 | 0.3 | 3.1 | 1.5 | 1.0 | 5.0 | 1.7 | 0.4 | 0 | 0 | 0 | 0 | **13.0** | **101%** |
| 2007 | 0.2 | 0.7 | 1.7 | 0.6 | 2.2 | 0.3 | 0.6 | 0 | 0 | 0 | 0 | 0.4 | **6.7** | **52%** |
| 2008 | 0.7 | 0.7 | 0.9 | 4.6 | 2.1 | 0.1 | 0.1 | 0 | 0 | 0 | 0 | 0 | **9.1** | **70%** |
| 2009 | 0.3 | 1.1 | 1.9 | 0.4 | 3.7 | 1.8 | 0.2 | 0.5 | 0 | 0 | 0 | 0.2 | **10.0** | **77%** |
| 2010 | 0.5 | 0 | 1.3 | 2.3 | 2.2 | 1.7 | 3.4 | 0.6 | 0 | 0 | 0 | 0 | **12.1** | **94%** |
| 2011 | 0.7 | 1.9 | 2.6 | 1.6 | 2.6 | 2.3 | 0.2 | 0.8 | 0 | 0 | 0 | 0 | **13.0** | **100%** |
| 2012 | 0.7 | 1.0 | 0.1 | 0.8 | 0.5 | 2.3 | 1.4 | 0.3 | 0 | 0 | 0 | 0 | **7.1** | **55%** |
| 2013 | 0.0 | 2.2 | 1.2 | 1.4 | 0.6 | 0.5 | 0.3 | 0.0 | 0 | 0 | 0 | 0 | **6.3** | **49%** |
| 2014 | 0.1 | 0.4 | 0.2 | 0.2 | 1.9 | 1.6 | 0.9 | 0.0 | 0 | 0 | 0 | 0 | **5.4** | **41%** |
| 2015 | 1.6 | 0.5 | 5.8 | 0.0 | 1.2 | 0.2 | 0.2 | 0.9 | 0.0 | 0.0 | 0.1 | 0.1 | **10.6** | **82%** |
| 2016 | 0.2 | 3.7 | 1.6 | 4.0 | 0.6 | 3.7 | 0.8 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | **14.9** | **115%** |
| 2017 | 1.8 | 2.5 | 3.3 | 4.7 | 6.1 | 1.7 | 1.1 | 0.5 | 0.3 | 0.0 | 0.0 | 0.0 | **21.9** | **170%** |
| AVG | **0.6** | **1.5** | **2.2** | **2.6** | **2.3** | **2.1** | **1.0** | **0.4** | **0.1** | **0.0** | **0.0** | **0.2** | **12.9** | **104%** |

Note: The averages are for the available period of record, starting in 1875 for precipitation and 1995 for reference evapotranspiration.
The CIMIS value for September 2017 (2.4") includes measurement error due to irrigation overspray. The corrected District value is 0".

**Table B-2. Reference Evapotranspiration at the SBCWD CIMIS Station (inches)**

| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 3.9 | 2.2 | 1.2 | 1.5 | 1.9 | 3.7 | 5.1 | 6.1 | 6.7 | 7.4 | 6.7 | 4.7 | **51.0** | **104%** |
| 1997 | 3.8 | 1.8 | 1.4 | 1.4 | 2.5 | 4.3 | 5.8 | 7.5 | 7.1 | 7.2 | 6.7 | 5.7 | **55.2** | **113%** |
| 1998 | 3.9 | 1.8 | 1.5 | 1.3 | 1.4 | 2.8 | 4.3 | 4.5 | 5.3 | 6.9 | 6.8 | 4.7 | **45.2** | **92%** |
| 1999 | 3.5 | 1.7 | 1.5 | 1.5 | 1.8 | 3.0 | 4.7 | 5.8 | 6.7 | 6.9 | 5.9 | 4.7 | **47.8** | **98%** |
| 2000 | 4.0 | 2.0 | 1.9 | 1.2 | 1.6 | 3.7 | 5.1 | 6.0 | 6.7 | 6.7 | 6.2 | 4.7 | **50.0** | **102%** |
| 2001 | 2.9 | 1.7 | 1.5 | 1.5 | 1.8 | 3.1 | 3.9 | 6.2 | 6.5 | 6.0 | 6.2 | 4.8 | **46.0** | **94%** |
| 2002 | 3.5 | 1.9 | 1.2 | 1.5 | 2.3 | 3.7 | 4.2 | 6.4 | 7.1 | 7.2 | 6.1 | 5.4 | **50.5** | **103%** |
| 2003 | 3.6 | 1.9 | 1.3 | 1.6 | 1.8 | 3.9 | 3.8 | 6.0 | 6.5 | 7.3 | 6.2 | 5.1 | **48.8** | **100%** |
| 2004 | 4.1 | 1.7 | 1.2 | 1.3 | 1.7 | 4.0 | 5.2 | 6.4 | 6.7 | 6.6 | 6.0 | 5.3 | **50.3** | **103%** |
| 2005 | 3.1 | 1.7 | 1.4 | 1.3 | 1.7 | 3.0 | 4.4 | 5.7 | 6.4 | 6.9 | 6.1 | 4.6 | **46.2** | **94%** |
| 2006 | 3.6 | 2.0 | 1.2 | 1.4 | 2.2 | 2.4 | 3.0 | 5.5 | 6.4 | 7.0 | 5.6 | 4.4 | **44.7** | **91%** |
| 2007 | 3.3 | 1.7 | 1.4 | 1.8 | 1.8 | 4.1 | 4.8 | 6.3 | 6.9 | 6.8 | 6.5 | 4.7 | **49.8** | **102%** |
| 2008 | 3.5 | 2.2 | 1.4 | 1.3 | 2.0 | 3.8 | 5.2 | 6.0 | 6.9 | 6.7 | 6.3 | 5.0 | **50.2** | **103%** |
| 2009 | 3.8 | 1.9 | 1.4 | 1.7 | 1.7 | 3.5 | 4.8 | 5.5 | 6.3 | 7.1 | 6.3 | 5.3 | **49.3** | **101%** |
| 2010 | 3.5 | 2.2 | 1.7 | 1.3 | 1.8 | 3.5 | 3.9 | 5.4 | 6.7 | 6.3 | 5.9 | 5.0 | **47.0** | **96%** |
| 2011 | 3.0 | 1.9 | 1.1 | 1.6 | 2.1 | 2.7 | 4.4 | 5.3 | 6.0 | 6.6 | 5.7 | 4.6 | **45.0** | **92%** |
| 2012 | 3.3 | 1.9 | 1.8 | 1.8 | 2.5 | 3.3 | 4.4 | 6.4 | 6.8 | 6.6 | 6.0 | 4.6 | **49.5** | **101%** |
| 2013 | 3.3 | 1.8 | 1.2 | 1.5 | 2.1 | 3.7 | 5.4 | 6.3 | 6.4 | 6.5 | 6.0 | 4.8 | **48.8** | **100%** |
| 2014 | 3.5 | 2.0 | 1.8 | 2.1 | 1.9 | 3.6 | 4.9 | 6.8 | 6.6 | 6.4 | 6.0 | 4.7 | **50.4** | **103%** |
| 2015 | 3.9 | 1.9 | 1.5 | 1.8 | 2.2 | 4.1 | 5.1 | 5.0 | 6.4 | 6.5 | 6.5 | 5.3 | **50.2** | **102%** |
| 2016 | 4.1 | 2.1 | 1.4 | 1.3 | 2.7 | 3.4 | 4.7 | 5.7 | 7.5 | 7.2 | 5.7 | 5.2 | **51.0** | **104%** |
| 2017 | 3.4 | 2.1 | 1.5 | 1.6 | 1.8 | 3.7 | 4.5 | 6.3 | 6.8 | 7.6 | 6.0 | 5.2 | **50.4** | **103%** |
| AVG | 3.6 | 1.9 | 1.4 | 1.5 | 2.0 | 3.5 | 4.6 | 6.0 | 6.6 | 6.8 | 6.2 | 4.9 | **49.0** | **100%** |

Note: The averages are for the available period of record, starting in 1875 for precipitation and 1995 for reference evapotranspiration.




* CIMIS data adjusted for know irrigation near raingage
CIMIS data for September 2017 reflects irrigation occuring at site, not precipitation

December 2017

TODD GROUNDWATER

**Figure B-1**
**Monthly Precipitation**
**Hollister (2017)**

# C HYDROLOGICAL DATA

## List of Tables and Figures

Table C-1. Groundwater Elevations October 2016 through October 2017

| Well Number | Well Depth | Depth to Top | Ground | Subbasin | Key Well | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Oct-16 | Jan-17 | Apr-17 | Jul-17 | Oct-17 |
| **Bolsa SE** | | | | | | | | | | |
| 12-5-09M1 | 240.00 | 105.00 | | BSE | * | 115.3 | | 125.8 | 117.4 | 115.6 |
| 12-5-21Q1 | 500.00 | 0.00 | | BSE | * | | | 260.0 | 260.0 | |
| 12-5-22N1 | 372.00 | 250.00 | | BSE | * | 73.3 | | 78.8 | 80.7 | 77.7 |
| **Hollister East** | | | | | | | | | | |
| 12-5-14N1 | 0.00 | 0.00 | | HE | * | | | | 229.0 | |
| 12-5-22C1 | 237.00 | 102.00 | | HE | * | 155.0 | 163.7 | 121.9 | 133.7 | 146.3 |
| 12-5-22J2 | 355.00 | 120.00 | | HE | * | 185.5 | | 191.3 | 190.9 | 190.1 |
| 12-5-23A20 | 862.00 | 178.00 | | HE | * | 173.0 | | 177.0 | 184.7 | 182.6 |
| 12-6-07P1 | 147.00 | 0.00 | | HE | | 224.1 | | 246.6 | 244.5 | 243.9 |
| 12-6-18G1 | 198.00 | 70.00 | | HE | | 257.4 | 263.7 | 276.7 | 275.4 | 273.6 |
| 12-6-30E1 | 0.00 | 0.00 | | HE | | 347.4 | 348.8 | 349.2 | 347.7 | 348.9 |
| 13-6-07D2 | 0.00 | 0.00 | | HE | | 335.2 | 337.6 | 335.3 | 335.9 | 332.9 |
| 2317 | 0.00 | 0.00 | | HE | | 222.7 | 227.3 | 223.8 | 222.7 | 221.5 |
| ROSSI 1 | 0.00 | 0.00 | | HE | | 223.2 | 227.3 | 235.3 | 224.0 | 222.4 |
| **Hollister West** | | | | | | | | | | |
| 12-5-27E1 | 175.00 | 0.00 | | HW | * | 182.3 | | 188.2 | 183.1 | 181.7 |
| 12-5-28J1 | 220.00 | 0.00 | | HW | * | 194.0 | 195.9 | 199.6 | 197.4 | 198.6 |
| 12-5-33E2 | 121.00 | 81.00 | | HW | * | 195.3 | 196.0 | 202.6 | 202.9 | 205.4 |
| 12-5-34P1 | 195.00 | 153.00 | | HW | * | 193.4 | 198.3 | 202.8 | 201.6 | 199.3 |
| 13-5-03L1 | 126.00 | 0.00 | | HW | * | 206.5 | 208.4 | 213.2 | 212.8 | 211.7 |
| 13-5-04B | 0.00 | 0.00 | | HW | | 212.8 | 213.4 | 213.4 | 211.5 | 207.4 |
| 13-5-10B1 | 0.00 | 0.00 | | HW | * | 195.1 | 195.5 | 219.5 | 218.9 | 219.6 |
| 13-5-10L1 | 252.00 | 52.00 | | HW | | 312.0 | 312.0 | 312.0 | 312.0 | |
| 13-5-11E1 | 0.00 | 0.00 | | HW | | 239.0 | 237.0 | 246.6 | 274.3 | 277.9 |
| San Justo 4 (INDART) | 0.00 | 0.00 | | HW | | 271.6 | 271.7 | 275.1 | 273.5 | 272.7 |
| San Justo 6 (ROSE) | 0.00 | 0.00 | | HW | | 234.6 | 235.1 | 235.6 | 233.5 | 231.9 |
| **Pacheco** | | | | | | | | | | |
| 11-5-26N2 | 232.00 | 95.00 | | P | * | 165.4 | | 174.4 | 170.9 | 173.6 |
| 11-5-26R3 | 225.00 | 65.00 | | P | * | 169.6 | 179.6 | 185.3 | 181.1 | 180.4 |
| 11-5-35C1 | 180.00 | 0.00 | | P | * | 169.8 | 172.7 | 179.8 | 177.8 | 176.7 |
| 11-5-35G1 | 230.00 | 0.00 | | P | * | 172.0 | 178.3 | 186.0 | 184.1 | 185.1 |
| 11-5-35Q3 | 0.00 | 0.00 | | P | * | 160.6 | 164.2 | 176.0 | 161.5 | 159.7 |
| 11-5-36C1 | 98.00 | 0.00 | | P | * | 187.8 | 190.4 | 194.4 | 176.5 | 194.3 |
| 11-5-36M1 | 0.00 | 0.00 | | P | * | 172.7 | 175.2 | 189.2 | 186.4 | 185.7 |
| 11-6-31M2 | 188.00 | 155.00 | | P | * | 215.6 | 221.9 | 245.5 | 243.3 | 241.8 |
| 12-5-01G2 | 300.00 | 0.00 | | P | | 176.6 | 178.2 | 182.8 | 187.9 | 186.7 |
| 12-5-02H5 | 128.00 | 42.00 | | P | | 169.8 | | 185.0 | 181.6 | 178.8 |
| 12-5-02L2 | 170.00 | 0.00 | | P | | 185.6 | 189.1 | 198.5 | 195.6 | 194.6 |
| 12-5-03B1 | 128.00 | 100.00 | | P | * | 182.0 | 182.0 | 182.0 | 182.0 | 182.0 |
| 12-6-06K1 | 260.00 | 16.00 | | P | | 260.0 | 260.0 | 260.0 | 260.0 | 260.0 |
| 12-6-06L4 | 235.00 | 50.00 | | P | | 213.5 | 215.3 | 221.1 | 220.8 | 221.6 |
| **San Juan** | | | | | | | | | | |
| 12-4-17L20 | 0.00 | 0.00 | | SJ | | 117.8 | 122.6 | 124.6 | 122.8 | 121.9 |
| 12-4-18J1 | 0.00 | 0.00 | | SJ | | 120.3 | 122.2 | 126.6 | 121.6 | 121.6 |
| 12-4-21M1 | 250.00 | 0.00 | | SJ | * | 134.7 | 139.6 | 145.3 | 140.8 | 139.7 |
| 12-4-26G1 | 876.00 | 240.00 | | SJ | * | 128.6 | 138.5 | 150.8 | 146.7 | 145.9 |
| 12-4-34H1 | 387.00 | 120.00 | | SJ | * | 130.1 | 138.8 | 152.4 | 151.7 | 152.7 |
| 12-4-35A1 | 325.00 | 110.00 | | SJ | | 150.6 | 159.4 | 173.3 | 167.3 | 165.5 |
| 12-5-30H1 | 240.00 | 0.00 | | SJ | | 199.2 | 198.6 | 199.4 | 183.5 | 185.7 |
| 13-4-03H1 | 312.00 | 168.00 | | SJ | | 126.5 | 137.1 | 151.2 | 145.7 | 146.4 |
| 13-4-4A3 | 0.00 | 0.00 | | SJ | | 163.2 | 165.6 | 200.2 | 198.9 | 197.9 |
| RIDER BERRY | 0.00 | 0.00 | | SJ | | 130.1 | 142.3 | 160.4 | 157.8 | 155.9 |

**Table C-1. Groundwater Elevations October 2016 through October 2017**

| Well Number | Well Depth | Depth to Top | Ground | Subbasin | Key Well | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Oct-16 | Jan-17 | Apr-17 | Jul-17 | Oct-17 |
| **Tres Pinos** | | | | | | | | | | |
| 13-5-12D4 | 0.00 | 0.00 | | TP | | 197.0 | 236.0 | 122.0 | 171.0 | 169.0 |
| 13-5-12K1 | 0.00 | 0.00 | | TP | | 313.0 | 314.0 | 317.0 | 317.0 | |
| 13-5-12N20 | 352.00 | 301.00 | | TP | * | 303.0 | 304.5 | 309.3 | 308.4 | 310.1 |
| 13-5-13F1 | 134.00 | 30.00 | | TP | * | 324.2 | 324.9 | 326.8 | 324.5 | 325.7 |
| 13-5-13J2 | 180.00 | 0.00 | | TP | * | 327.2 | 328.1 | 336.7 | 333.6 | 330.6 |
| 13-6-19J1 | 340.00 | 128.00 | | TP | | 413.3 | 414.5 | 430.8 | 427.3 | 428.6 |
| 13-6-19K1 | 211.00 | 0.00 | | TP | * | 344.8 | 349.6 | 353.5 | 354.5 | 357.6 |
| 13-6-20K1 | 0.00 | 0.00 | | TP | | | 408.1 | 428.3 | 427.6 | 427.5 |
| **Bolsa** | | | | | | | | | | |
| 11-4-25H1 | 0.00 | 0.00 | | B | | 86.3 | | 119.3 | 115.7 | 114.4 |
| 11-4-26B1 | 642.00 | 149.00 | | B | * | 126.8 | | 135.4 | 132.9 | 131.9 |
| 11-4-34A1 | 100.00 | 0.00 | | B | * | 128.1 | | 137.0 | 128.9 | 127.9 |
| 11-5-20N1 | 300.00 | 0.00 | | B | * | 72.3 | | 97.7 | 63.3 | |
| 11-5-21E2 | 220.00 | 100.00 | | B | | 155.0 | 155.0 | 155.0 | 155.0 | 155.0 |
| 11-5-27P2 | 331.00 | 67.00 | | B | | 165.1 | 170.8 | 173.7 | 169.4 | 167.3 |
| 11-5-28B1 | 198.00 | 125.00 | | B | | 168.0 | 168.0 | 168.0 | 168.0 | 168.0 |
| 11-5-28P4 | 140.00 | 80.00 | | B | | 165.0 | 165.0 | 165.0 | 165.0 | 165.0 |
| 11-5-31F1 | 515.00 | 312.00 | | B | * | 68.6 | | 69.1 | 67.6 | 68.0 |
| 11-5-33B1 | 125.00 | 0.00 | | B | | 169.0 | 169.0 | 169.0 | 169.0 | 169.0 |
| 12-5-05M1 | 0.00 | 0.00 | | B | | 62.5 | | 59.5 | 36.3 | 47.7 |
| 12-5-06L1 | 0.00 | 0.00 | | B | * | 143.5 | | 150.7 | 140.9 | 141.6 |
| 12-5-07P1 | 750.00 | 360.00 | | B | | 20.3 | 36.0 | 42.0 | 35.7 | 36.7 |
| 12-5-17D1 | 950.00 | 314.00 | | B | | 32.0 | 44.0 | | | |
| **Paicines** | | | | | | | | | | |
| DONATI 6 | 0.00 | 0.00 | | Paicines | | | | 616.6 | 630.5 | 631.6 |
| RFP Vineyard 3 (FRANCHIONI) | 0.00 | 0.00 | | Paicines | | 657.6 | | 652.7 | 647.7 | 646.9 |
| RIDGEMARK 5 | 0.00 | 0.00 | | Paicines | | 622.9 | | | 640.6 | 639.6 |
| RIDGEMARK 7 | 0.00 | 0.00 | | Paicines | | 627.4 | | 629.1 | 627.9 | 628.7 |
| SCHIELDS 2 | 0.00 | 0.00 | | Paicines | | | | 737.0 | 737.0 | |
| SCHIELDS 4 (vineyard) | 0.00 | 0.00 | | Paicines | | 623.2 | | 626.7 | 624.7 | 625.7 |
| **Pacheco Creek** | | | | | | | | | | |
| 11-5-12E1 | 103.00 | 52.00 | | PC | * | | | 241.8 | 240.6 | 243.3 |
| 11-5-13D1 | 125.00 | 0.00 | | PC | * | 221.6 | 235.7 | 233.2 | 229.0 | 229.3 |
| 11-5-24C1 | 134.00 | 0.00 | | PC | * | 213.3 | | | 214.8 | 213.9 |
| 11-5-24C2 | 165.00 | 70.00 | | PC | * | 221.2 | | 229.2 | 225.6 | 225.9 |
| 11-5-24L1 | 70.00 | 0.00 | | PC | * | 206.7 | 213.6 | 214.5 | 209.3 | 212.7 |
| 11-5-25G1 | 225.00 | 0.00 | | PC | * | 200.3 | | 224.1 | 220.9 | 223.0 |
| **Tres Pinos Creek Valley** | | | | | | | | | | |
| 1536 | 0.00 | 0.00 | | TPCV | | 278.0 | 288.0 | 283.0 | 279.0 | 276.0 |
| DONATI 2 | 0.00 | 0.00 | | TPCV | | 646.4 | | 654.5 | 653.6 | 654.6 |
| GRANITE ROCK WELL 1 | 0.00 | 0.00 | | TPCV | | 282.7 | | 297.1 | 300.1 | 299.6 |
| GRANITE ROCK WELL 2 | 0.00 | 0.00 | | TPCV | | 290.6 | | 327.8 | 316.6 | 314.5 |
| San Justo 5 (WINDMILL) | 0.00 | 0.00 | | TPCV | | 275.0 | 274.8 | 276.3 | 274.7 | 273.9 |
| WILDLIFE CENTER 5 | 0.00 | 0.00 | | TPCV | | 702.0 | | 708.3 | 704.8 | 705.6 |
| **Llagas** | | | | | | | | | | |
| 11S04E02D008 | 0.00 | 0.00 | | SCVWD | | 142.2 | 168.2 | 157.9 | 133.7 | 151.4 |
| 11S04E02N001 | 0.00 | 0.00 | | SCVWD | | 139.0 | 160.9 | 146.1 | 115.7 | 147.0 |
| 11S04E03J002 | 0.00 | 0.00 | | SCVWD | | 142.3 | 166.6 | 151.7 | 126.7 | 152.5 |
| 11S04E08K002 | 0.00 | 0.00 | | SCVWD | | 144.1 | | 163.2 | 156.2 | 152.5 |
| 11S04E10D004 | 0.00 | 0.00 | | SCVWD | | 141.2 | 163.0 | 155.4 | 137.9 | 143.8 |
| 11S04E15J002 | 0.00 | 0.00 | | SCVWD | | 130.8 | 144.0 | 138.1 | 121.2 | 133.0 |
| 11S04E17N004 | 0.00 | 0.00 | | SCVWD | | 145.1 | 167.6 | 164.7 | 150.6 | 153.7 |
| 11S04E21P003 | 0.00 | 0.00 | | SCVWD | | 133.0 | 149.3 | 136.1 | 128.2 | 139.2 |
| 11S04E22N001 | 0.00 | 0.00 | | SCVWD | | 128.0 | 144.5 | 137.8 | 123.1 | 134.6 |
| 11S04E32R002 | 0.00 | 0.00 | | SCVWD | | 121.5 | 135.3 | 128.9 | 116.7 | 128.0 |

**Table C-2. Groundwater Change Attributes**

| Subbasin | Subbasin Area (Acres) | Average Storativity |
|---|---|---|
| San Juan | 11,708 | 0.05 |
| Hollister West | 6,050 | 0.05 |
| Tres Pinos | 4,725 | 0.05 |
| Pacheco | 6,743 | 0.03 |
| Northern Hollister East | 10,686 | 0.03 |
| Southern Hollister East | 5,175 | 0.03 |
| Bolsa SE | 2,691 | 0.08 |
| Bolsa | 20,003 | 0.01 |

**Table C-3. Groundwater Change in Elevation 2016-2017 (feet)**

| | Average Change in Groundwater Elevation | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subbasin | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| San Juan | 0.87 | (4.49) | 0.29 | (0.75) | (1.39) | (0.89) | - | (10.66) | (7.95) | (9.45) | (3.56) | 14.57 |
| Hollister West | 3.13 | (1.69) | 3.31 | (1.43) | (1.58) | (0.66) | 2.12 | (5.72) | (17.41) | (3.60) | 0.93 | 6.89 |
| Tres Pinos | 2.47 | (2.34) | 0.72 | 8.10 | (10.52) | 0.97 | 2.54 | (2.48) | (6.66) | (6.68) | (6.04) | 4.38 |
| Pacheco | 1.93 | (4.41) | (1.36) | 8.10 | (6.60) | 1.92 | (4.36) | (2.95) | (7.37) | 1.92 | 2.98 | 8.58 |
| Northern Hollister East | 3.64 | (6.51) | (4.21) | 10.15 | (8.73) | 2.72 | (2.36) | 1.65 | (9.10) | 0.76 | (1.48) | 5.82 |
| Southern Hollister East | 3.26 | (1.46) | 5.45 | 9.39 | 4.93 | (1.94) | (2.18) | (1.14) | (6.87) | 1.61 | 8.13 | 0.46 |
| Bolsa SE | 1.55 | (6.78) | 11.51 | (24.80) | 25.29 | (11.65) | 0.25 | (4.27) | (10.68) | (3.34) | (9.94) | 8.21 |
| Bolsa | 6.79 | (3.30) | 8.97 | (16.86) | 23.15 | (11.19) | 10.72 | (3.37) | (25.56) | 4.57 | (2.89) | 10.62 |

**Table C-4. Groundwater Change in Storage 2006-2017 (acre-feet)**

| | Average Change in Groundwater Storage (AF) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subbasin | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
| San Juan | 510 | (2,626) | 168 | (437) | (811) | (523) | - | (6,239) | (4,653) | (5,530) | (2,086) | 8,531 |
| Hollister West | 947 | (510) | 1,001 | (431) | (477) | (198) | 640 | (1,730) | (5,267) | (1,090) | 282 | 2,084 |
| Tres Pinos | 584 | (553) | 169 | 1,913 | (2,485) | 228 | 601 | (586) | (1,574) | (1,579) | (1,427) | 1,034 |
| Pacheco | 391 | (892) | (275) | 1,639 | (1,335) | 389 | (882) | (597) | (1,490) | 388 | 604 | 1,736 |
| Northern Hollister East | 1,167 | (2,087) | (1,350) | 3,253 | (2,798) | 870 | (757) | 528 | (2,918) | 242 | (474) | 1,867 |
| Southern Hollister East | 506 | (227) | 846 | 1,457 | 766 | (301) | (339) | (177) | (1,067) | 250 | 1,263 | 72 |
| Bolsa SE | 333 | (1,458) | 2,478 | (5,338) | 5,443 | (2,508) | 53 | (918) | (2,300) | (719) | (2,139) | 1,767 |
| Bolsa | 1,358 | (659) | 1,794 | (3,372) | 4,631 | (2,239) | 2,144 | (674) | (5,112) | 915 | (578) | 2,125 |

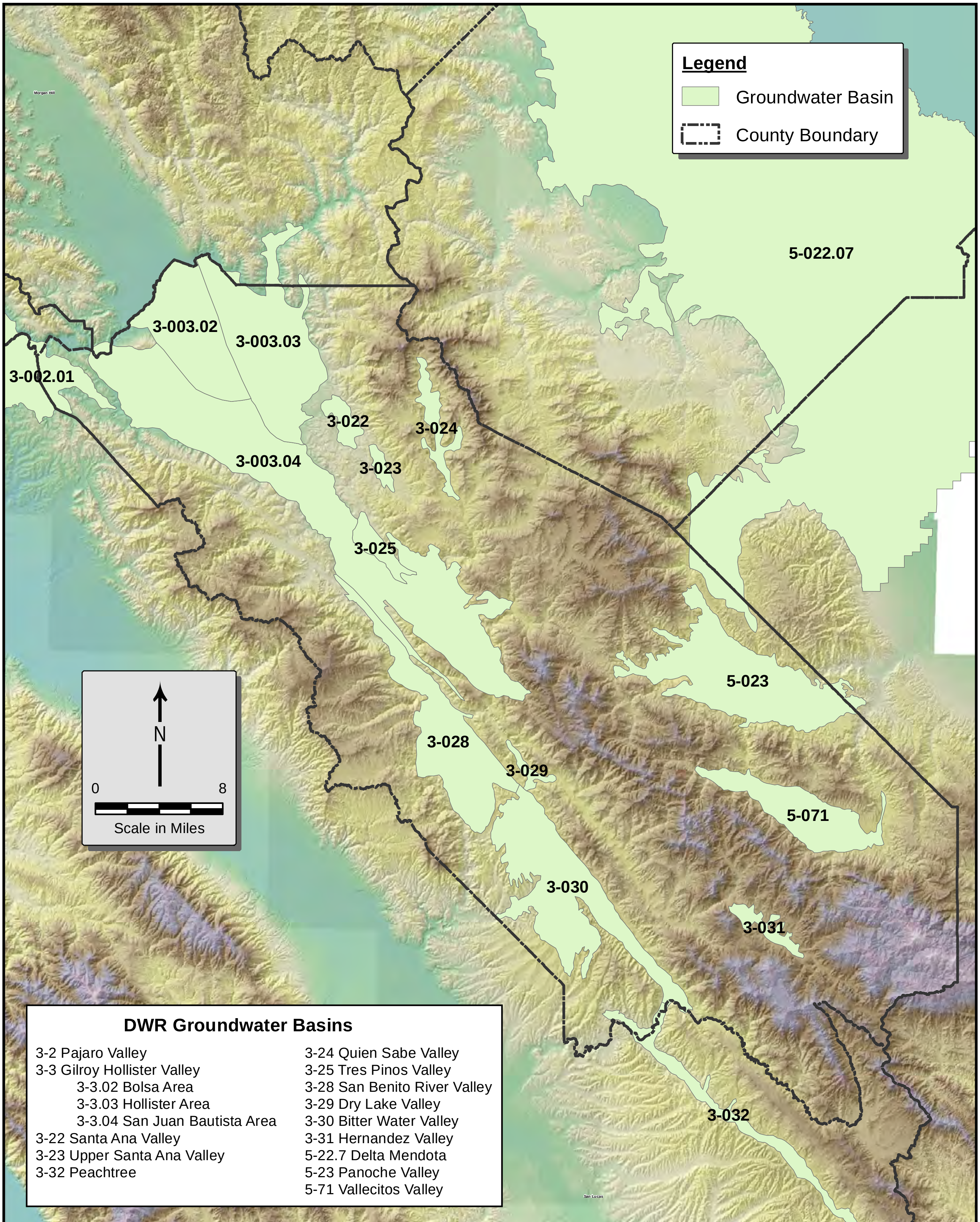



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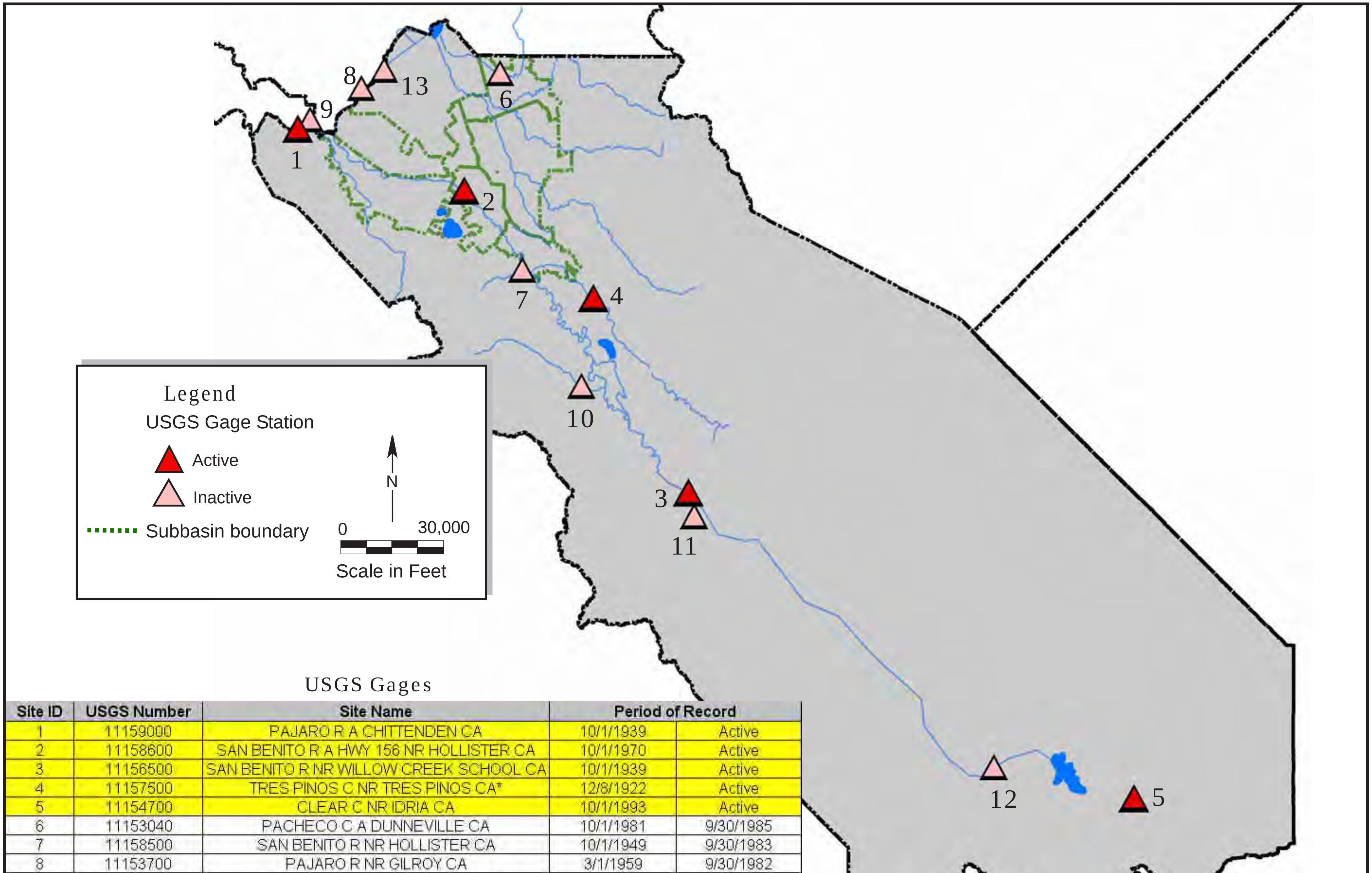
**Figure C-1**
**Groundwater Basins in San Benito County**




## USGS Gages

| Site ID | USGS Number | Site Name | Period of Record | |
|---|---|---|---|---|
| 1 | 11159000 | PAJARO R A CHITTENDEN CA | 10/1/1939 | Active |
| 2 | 11158600 | SAN BENITO R A HWY 156 NR HOLLISTER CA | 10/1/1970 | Active |
| 3 | 11156500 | SAN BENITO R NR WILLOW CREEK SCHOOL CA | 10/1/1939 | Active |
| 4 | 11157500 | TRES PINOS C NR TRES PINOS CA* | 12/8/1922 | Active |
| 5 | 11154700 | CLEAR C NR IDRIA CA | 10/1/1993 | Active |
| 6 | 11153040 | PACHECO C A DUNNEVILLE CA | 10/1/1981 | 9/30/1985 |
| 7 | 11158500 | SAN BENITO R NR HOLLISTER CA | 10/1/1949 | 9/30/1983 |
| 8 | 11153700 | PAJARO R NR GILROY CA | 3/1/1959 | 9/30/1982 |
| 9 | 11158900 | PESCADERO C NR CHITTENDEN CA | 9/11/1970 | 9/30/1981 |
| 10 | 11156700 | PESCADERO C NR PAICINES CA | 7/1/1959 | 10/7/1970 |
| 11 | 11156450 | WILLOW C TRIB NR SAN BENITO CA | 7/1/1964 | 9/30/1969 |
| 12 | 11156000 | SAN BENITO R BL M C NR HERNANDEZ CA | 10/1/1949 | 9/30/1963 |
| 13 | 11154500 | PAJARO R A SARGENT CA | 10/1/1940 | 9/30/1941 |

* WY 2006 data for gage height only

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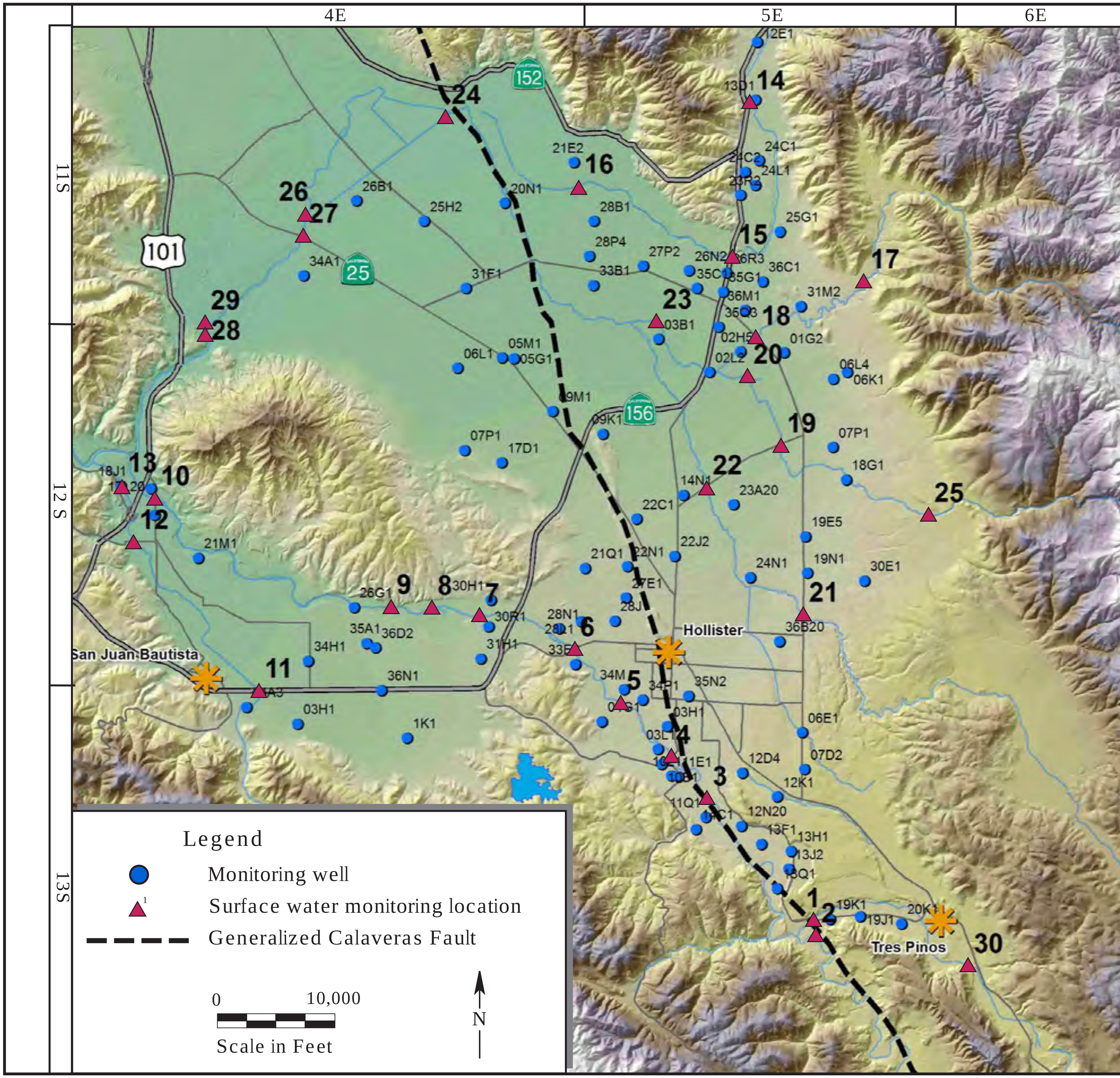
Figure C-2
Location of Streamflow Stations




Surface Water Monitoring Locations

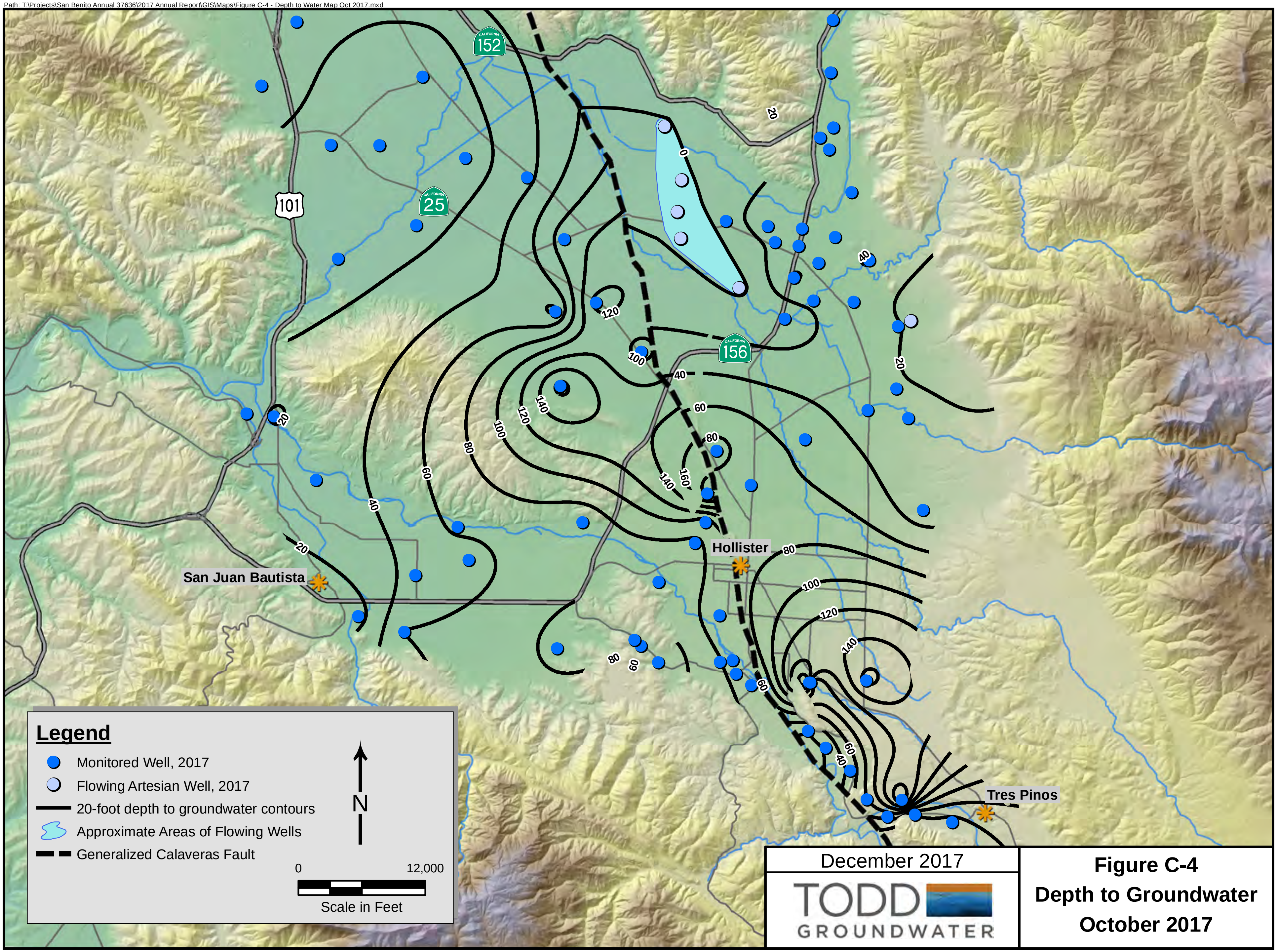
1. Tres Pinos Cr - Southside Road Bridge (West)
2. San Benito River - KT Road bridge
3. San Benito River - Hospital Road
4. San Benito River - Cienega Road
5. San Benito River - Nash Road
6. San Benito River - Old Highway 156
7. San Benito River - near Mitchell Road
8. San Benito River - near Flint Road
9. San Benito River - upstream of Bixby Road
10. San Benito River - Y Road
11. San Juan Creek - - Highway 156
12. San Juan Creek - Anzar Road
13. San Juan Creek - 2000 ft downstream of Highway101
14. Pacheco Creek - Walnut Avenue
15. Pacheco Creek - Highway 156
16. Pacheco Creek - Lovers Lane
17. Arroyo de las Viboras - Hawkins Ranch driveway
18. Arroyo de las Viboras - Fairview Road
19. Arroyo Dos Picachos - Fallon Road
20. Arroyo Dos Picachos - Aquistapace Road
21. Santa Ana Creek - Fairview Road
22. Santa Ana Creek - Fallon Road
23. Tequisquita Sough - San Felipe Road
24. Millers Canal - 2000 ft downstream of San Felipe Lake
25. Arroyo Dos Picachos - Lone Tree Road
26. Pajaro River - above Millers Canal
27. Pajaro River - Highway 25
28. Pajaro River - below Carnadero Creek
29. Carnadero Creek - above Pajaro River
30. Tres Pinos Creek - Bolado Park

Figure C-3
Monitoring Locations

December 2017

TODD GROUNDWATER

Path: T:\Projects\San Benito Annual 37636\2017 Annual Report\GIS\Maps\Figure C-4 - Depth to Water Map Oct 2017.mxd



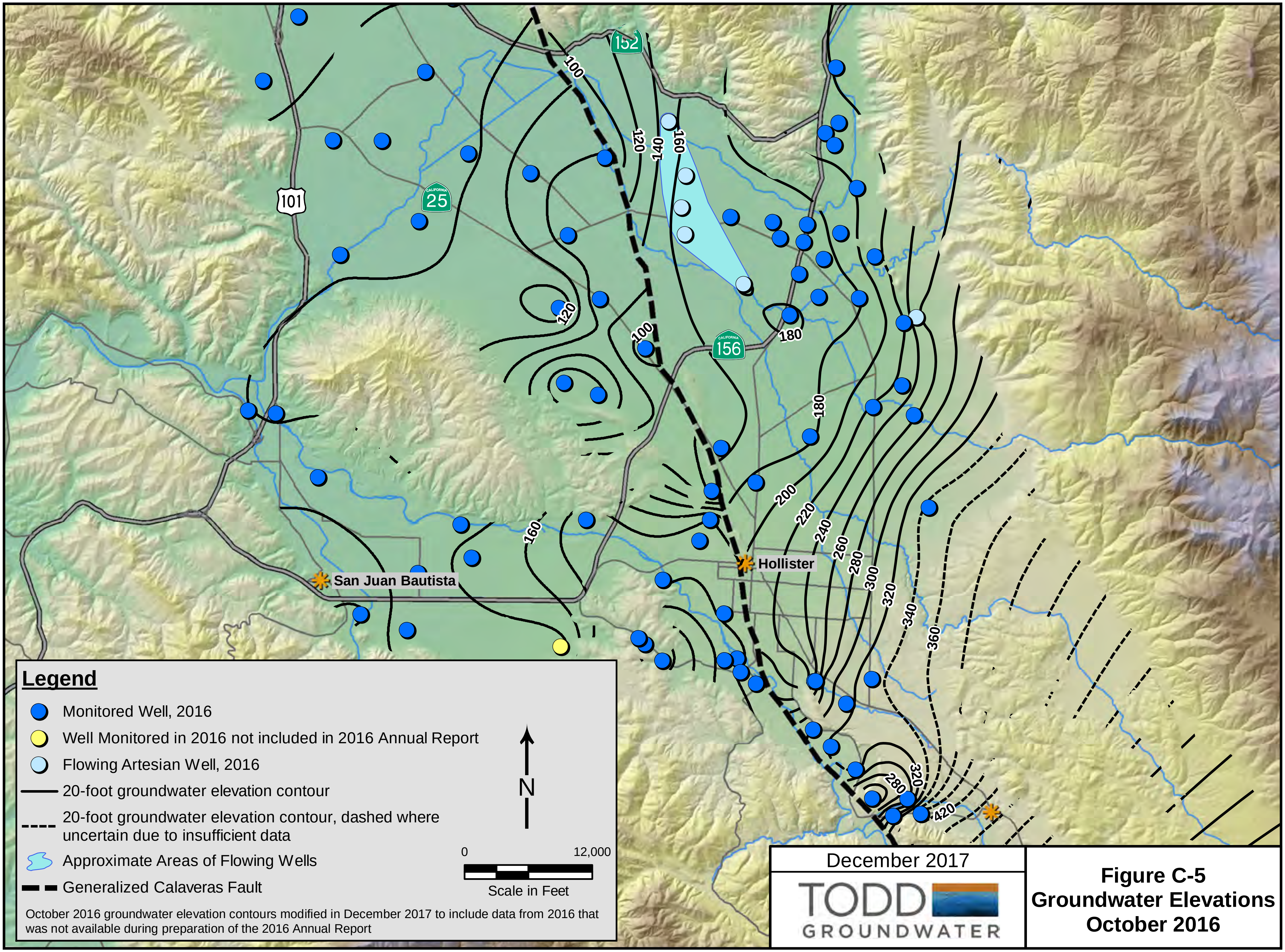
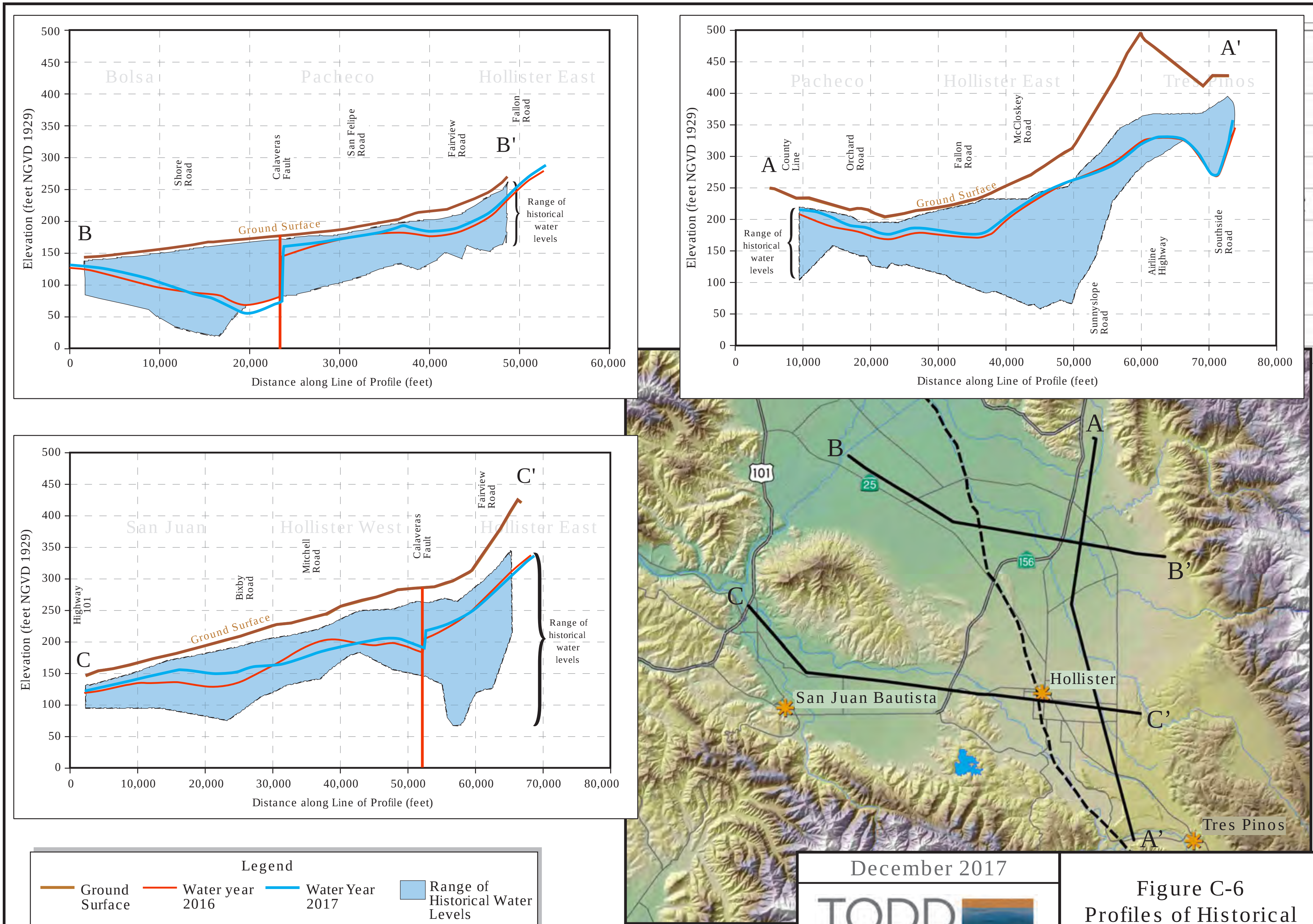



**Figure C-5**
**Groundwater Elevations**
**October 2016**




December 2017

TODD GROUNDWATER

Figure C-6
Profiles of Historical Groundwater Elevations

# D PERCOLATION DATA

List of Tables and Figures

**Table D-1. Reservoir Water Budgets for Water Year 2017 (acre-feet)**

| | Hernandez | Paicines | San Justo |
|---|---|---|---|
| **Inflows** | | | |
| Rainfall | 569 | 100 | 300 |
| San Benito River | 37,024 | 2,834 | n.a. |
| Hernandez-Paicines transfer | n.a. | 503 | n.a. |
| San Felipe Project | n.a. | n.a. | 21,721 |
| **Total Inflows** | **37,593** | **3,438** | **22,021** |
| **Outflows** | | | |
| Hernandez spills | -15,006 | n.a. | n.a. |
| Hernandez-Paicines transfer | 503 | n.a. | n.a. |
| Tres Pinos Creek percolation releases | n.a. | -2,407 | n.a. |
| San Benito River percolation releases | -23,191 | n.a. | -2,209 |
| CVP Deliveries | n.a. | n.a. | -16,131 |
| Evaporation and seepage | 846 | -736 | -1,237 |
| **Total Outflows** | **-36,847** | **-3,143** | **-19,577** |
| **Storage Change** | | | |
| Reservoir capacity | 17,200 | 2,870 | 11,000 |
| Maximum storage | 16,952 | 1,425 | 10,102 |
| Minimum storage | 323 | 0 | 4,307 |
| **Net water year storage change** | **478** | **300** | **1,831** |
| **Unaccounted for Water** | **269** | **-5** | **613** |

**Table D-2. Historical Reservoir Releases (AFY)**

| WY | Hernandez | Paicines | TOTAL |
|---|---|---|---|
| 1996 | 13,535 | 6,139 | 19,674 |
| 1997 | 3,573 | 2,269 | 5,842 |
| 1998 | 26,302 | 450 | 26,752 |
| 1999 | 12,084 | 1,293 | 13,377 |
| 2000 | 13,246 | 2,326 | 15,572 |
| 2001 | 12,919 | 3,583 | 16,502 |
| 2002 | 9,698 | 310 | 10,008 |
| 2003 | 5,434 | 0 | 5,434 |
| 2004 | 3,336 | 0 | 3,336 |
| 2005 | 19,914 | 677 | 20,591 |
| 2006 | 14,112 | 196 | 14,308 |
| 2007 | 12,022 | 1,254 | 13,276 |
| 2008 | 7,646 | 495 | 8,141 |
| 2009 | 4,883 | 0 | 4,883 |
| 2010 | 8,484 | 4,147 | 12,631 |
| 2011 | 9,757 | 2,397 | 12,154 |
| 2012 | 6,341 | 1,321 | 7,662 |
| 2013 | 3,963 | 677 | 4,640 |
| 2014 | 0 | 0 | 0 |
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 23,191 | 2,407 | 25,597 |
| AVG | **9,565** | **1,361** | **10,926** |

**Table D-3. Historical Percolation of CVP Water (AFY)**

| Water Year | Pacheco Creek | Arroyo de las Viboras | | | Arroyo Dos Picachos | | | Santa Ana Creek | | | | Tres Pinos Creek | San Benito River | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Road | Creek 1 | Creek 2 | Fallon Road | Jarvis Lane | Creek | John Smith Road | Maranatha Road | Airline Highway | Ridgemark | | | |
| 1994 | 232 | 136 | 515 | 0 | 0 | 550 | 209 | 0 | 0 | 0 | 0 | 85 | 158 | **1,885** |
| 1995 | 444 | 238 | 770 | 2 | 0 | 654 | 622 | 73 | 0 | 0 | 0 | 809 | 2,734 | **6,345** |
| 1996 | 0 | 494 | 989 | 832 | 67 | 235 | 708 | 531 | 197 | 134 | 25 | 21 | 6,097 | **10,330** |
| 1997 | 0 | 447 | 601 | 1,981 | 77 | 0 | 200 | 17 | 353 | 286 | 29 | 1,477 | 5,619 | **11,087** |
| 1998 | 0 | 132 | 109 | 403 | 0 | 0 | 0 | 65 | 0 | 158 | 74 | 518 | 1,084 | **2,543** |
| 1999 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 256 | 48 | 141 | 10 | 452 | 413 | **1,322** |
| 2000 | 1 | 0 | 0 | 6 | 0 | 0 | 3 | 236 | 21 | 240 | 12 | 285 | 938 | **1,740** |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 161 | 17 | 186 | 1 | 703 | 1,041 | **2,110** |
| 2002 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 78 | 2 | 143 | 0 | 426 | 470 | **1,122** |
| 2003 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 119 | 9 | 172 | 0 | 163 | 605 | **1,074** |
| 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 83 | 0 | 0 | 0 | 1 | 882 | **1,018** |
| 2005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 527 | **527** |
| 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 156 | 0 | 0 | 0 | 1 | 451 | **614** |
| 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 216 | **304** |
| 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | **6** |
| 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2014 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2015 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2016 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2017* | 0 | 0 | 340 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,209 | **2,549** |

*2017 percolation occurred only to recharge basins adjacent to the listed streams.

**Table D-4. Percolation of Municipal Wastewater during Water Year 2017**

| | Pond Area[1] (acres) | Effluent Discharge (acre-feet) | Evaporation[2] (acre-feet) | Percolation (acre-feet) |
|---|---|---|---|---|
| Hollister - domestic* | 92.9 | 2,211 | 266 | 1,945 |
| Hollister - industrial* | 39.0 | 85 | 28 | 57 |
| Ridgemark Estates I & II | 7.2 | 175 | 21 | 154 |
| Tres Pinos | 1.8 | 25 | 5 | 20 |
| Total | 141 | 2,497 | 320 | 2,177 |

Notes:

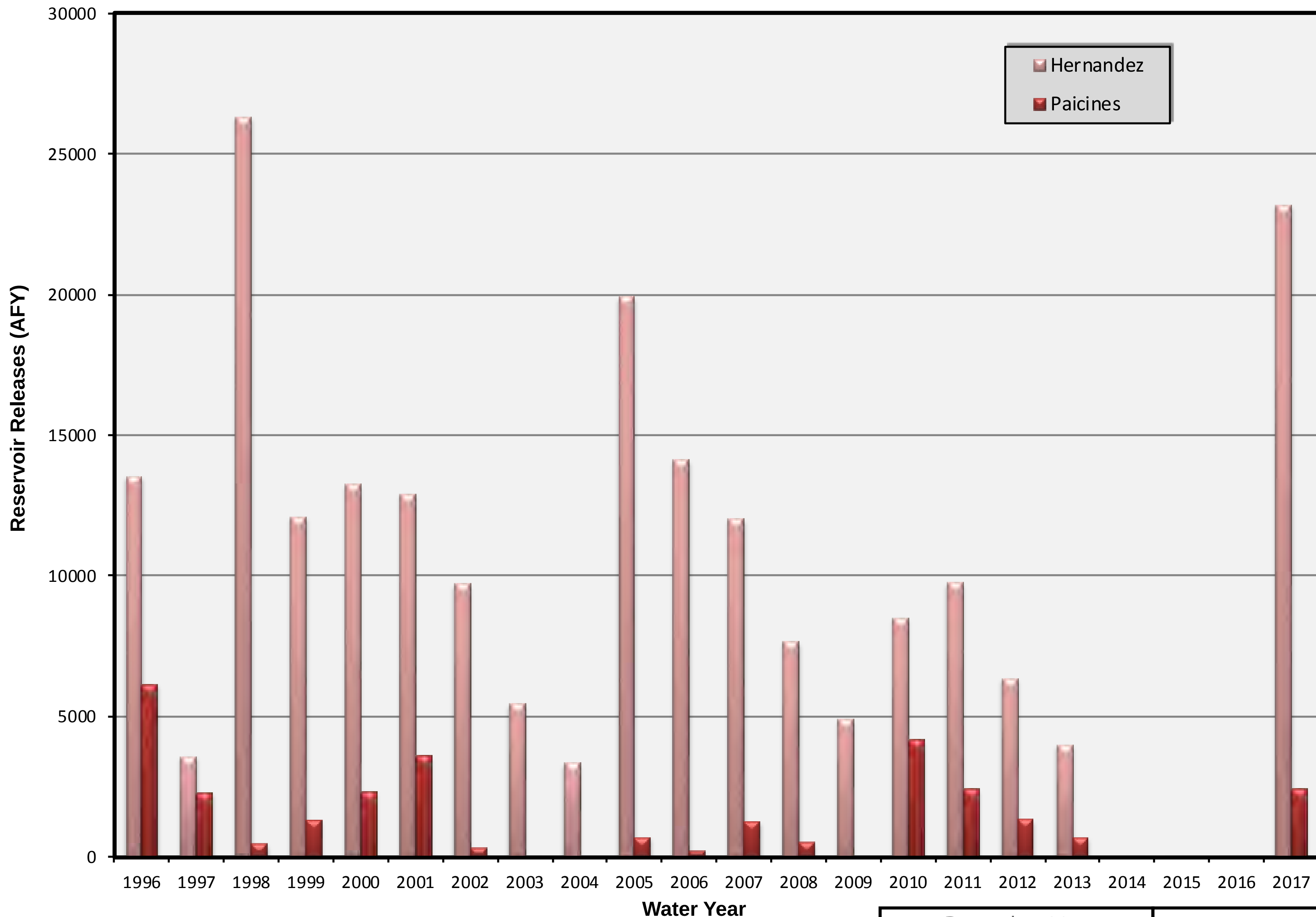
1. Hollister pond areas are from Dickson and Kenneth D. Schmidt and Associates (1999) and include treatment ponds in addition to percolation ponds at the domestic wastewater treatment plant. Assumes 80% of total pond area in use at any time (Rose, pers. comm.). These areas should be updated as operations change.

2. Average evaporation less precip = 43 inches (56 in/yr evaporation (DWR Bulletin 73-79) less 13 in/yr precip (CIMIS) The IWTP evaportation was adjsuted to account only for when the ponds are in use.
The San Juan Bautista plant is not included because the unnamed tributary of San Juan Creek that receives its effluent usually gains flow along the affected reach and is on the southwest side of the San Andreas Fault. These conditions prevent the effluent from recharging the San Juan Subbasin.

**Table D-5. Historical Percolation of Municipal Wastewater (AFY)**

| | Hollister Reclamation Plant - Domestic | Hollister - industrial | Ridgemark Estates I & II | Tres Pinos | TOTAL |
|---|---|---|---|---|---|
| 1994 | 1,775 | 665 | 155 | 5 | 2,600 |
| 1995 | 1,935 | 610 | 180 | 10 | 2,735 |
| 1996 | 2,020 | 689 | 207 | 14 | 2,930 |
| 1997 | 1,965 | 909 | 201 | 17 | 3,092 |
| 1998 | 2,490 | 518 | 231 | 17 | 3,256 |
| 1999 | 1,693 | 1,476 | 156 | 12 | 3,337 |
| 2000 | 2,110 | 1,136 | 293 | 24 | 3,563 |
| 2001 | 1,742 | 1,078 | 303 | 24 | 3,147 |
| 2002 | 1,884 | 1,545 | 283 | 24 | 3,736 |
| 2003 | 2,009 | 1,432 | 279 | 24 | 3,744 |
| 2004 | 1,787 | 1,536 | 268 | 21 | 3,612 |
| 2005 | 1,891 | 1,323 | 227 | 26 | 3,468 |
| 2006 | 1,797 | 1,211 | 216 | 33 | 3,257 |
| 2007 | 1,740 | 1,228 | 139 | 19 | 3,126 |
| 2008 | 1,580 | 1,257 | 139 | 19 | 2,996 |
| 2009 | 1,976 | 428 | 172 | 19 | 2,594 |
| 2010 | 1,922 | 37 | 172 | 19 | 2,150 |
| 2011 | 1,807 | 466 | 183 | 19 | 2,476 |
| 2012 | 1,740 | 605 | 177 | 19 | 2,541 |
| 2013* | 889 | 332 | 188 | 21 | 1,430 |
| 2014 | 1,552 | 86 | 179 | 21 | 1,838 |
| 2015 | 1,816 | 344 | 161 | 21 | 2,342 |
| 2016 | 1,923 | 305 | 154 | 21 | 2,402 |
| 2017 | 1,945 | 57 | 154 | 20 | 2,177 |

*Potential missing data




December 2017

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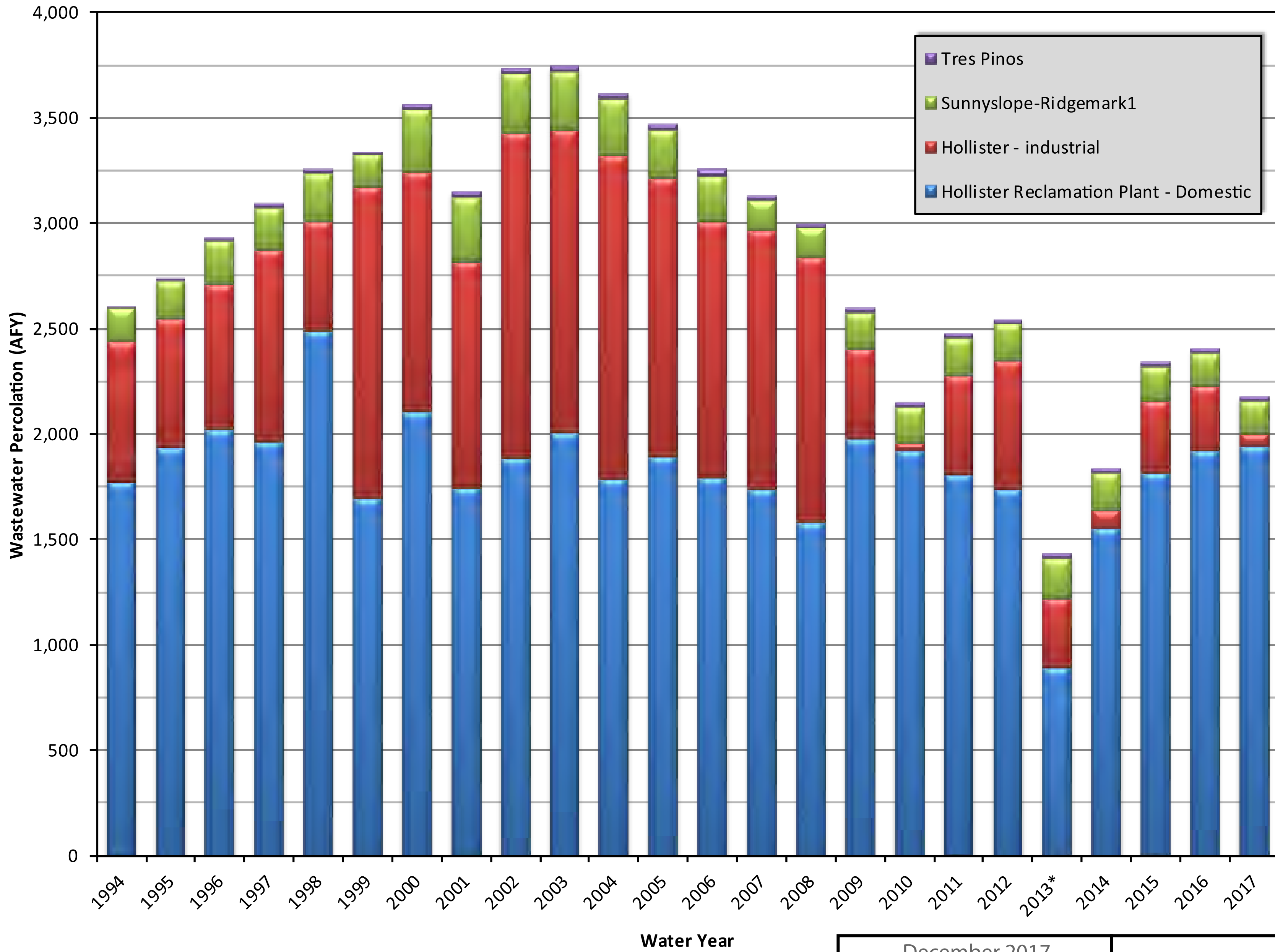
**Figure D-1**
**Reservoir Releases for Percolation**




* Potential Missing Data

December 2017

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**Figure D-2**
**Wastewater Percolation by Facility**

# E WATER USE DATA

## List of Tables and Figures

**Table E-1. Recent CVP Allocation and Use**

| | Municipal and Industrial (M&I) CVP | | | | Agricultural CVP | | | |
|---|---|---|---|---|---|---|---|---|
| Water Year | Percent of Contract Allocation | Percent of Historic Average | Contract Amount Used (AF) | Contract Amount Used (%) | Percent of Contract Allocation | Percent of Contract and M&I Adjustment[1] | Contract Amount Used (AF) | Contract Amount Used (%) |
| | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | |
| **2006** | 100% | | 3,152 | 38% | 100% | | 19,840 | 56% |
| **2007** | 100% | | 4,969 | 60% | 40% | | 18,865 | 53% |
| **2008** | 37% | 75% | 2,232 | 27% | 40% | 45% | 10,514 | 30% |
| **2009** | 29% | 60% | 1,978 | 24% | 10% | 11% | 6,439 | 18% |
| **2010** | 37% | 75% | 2,197 | 27% | 45% | 50% | 10,061 | 28% |
| **2011** | 100% | | 2,433 | 29% | 80% | | 16,234 | 46% |
| **2012** | 51% | 75% | 2,683 | 33% | 40% | 40% | 17,267 | 49% |
| **2013** | 47% | 70% | 2,652 | 32% | 20% | 22% | 12,914 | 36% |
| **2014** | 34% | 50% | 1,599 | 29% | 0% | 0% | 7,545 | 21% |
| **2015** | 25% | 25% | 1,810 | 22% | 0% | 0% | 3,697 | 10% |
| **2016** | 55% | 55% | 1,914 | 23% | 5% | 0% | 4,434 | 12% |
| **2017** | 100% | 100% | 2,909 | 35% | 100% | 100% | 13,288 | 37% |

Notes:

[1] If the M&I allocation is 75 percent or less, the difference between the M&I contract amount and M&I allocation is added to the agricultural contract amount. The agricultural percentage is multiplied by that sum to obtain the agricultural allocation.

**Table E-2. Historical Water Use by Subbasin and Water Source (AFY)**

| Subbasin | Pacheco | | Bolsa Southeast | | | San Juan | | Hollister West | | | Hollister East | | | Tres Pinos | | Total Zone 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source | GW | CVP | GW | CVP | RW | GW | CVP | GW | CVP | RW | GW | CVP | RW | GW | CVP | GW | CVP | RW |
| 1993 | 2,251 | 3,210 | 3,474 | 533 | | 9,278 | 4,300 | 7,213 | 90 | | 3,744 | 7,275 | | 5,658 | 224 | 31,618 | 15,633 | - |
| 1994 | 3,748 | 3,394 | 3,467 | 602 | | 10,859 | 3,836 | 7,327 | 87 | | 5,475 | 6,808 | | 5,294 | 263 | 36,169 | 14,990 | - |
| 1995 | 2,756 | 3,474 | 2,855 | 720 | | 9,328 | 4,554 | 7,092 | 460 | | 3,428 | 6,647 | | 4,475 | 275 | 29,935 | 16,130 | - |
| 1996 | 2,533 | 3,500 | 2,682 | 782 | | 8,726 | 5,187 | 5,717 | 679 | | 3,396 | 8,267 | | 3,695 | 408 | 26,748 | 18,823 | - |
| 1997 | 2,209 | 4,205 | 2,755 | 997 | | 9,587 | 6,191 | 7,602 | 907 | | 3,534 | 8,284 | | 4,620 | 466 | 30,307 | 21,048 | - |
| 1998 | 2,035 | 2,165 | 1,561 | 361 | | 6,963 | 4,099 | 4,991 | 591 | | 4,037 | 5,291 | | 3,751 | 289 | 23,338 | 12,796 | - |
| 1999 | 2,553 | 3,219 | 2,453 | 433 | | 9,312 | 5,990 | 7,013 | 726 | | 3,701 | 7,279 | | 4,199 | 391 | 29,231 | 18,038 | - |
| 2000 | 2,270 | 3,256 | 2,418 | 355 | | 8,681 | 6,372 | 7,590 | 869 | | 3,108 | 7,279 | | 4,006 | 542 | 28,073 | 18,673 | - |
| 2001 | 1,848 | 3,443 | 2,126 | 411 | | 7,977 | 7,232 | 7,377 | 685 | | 2,213 | 7,010 | | 3,599 | 621 | 25,140 | 19,402 | - |
| 2002 | 2,322 | 3,840 | 2,193 | 497 | | 7,571 | 7,242 | 6,577 | 706 | | 2,588 | 7,390 | | 3,994 | 737 | 25,244 | 20,411 | - |
| 2003 | 2,425 | 3,277 | 2,175 | 493 | | 7,434 | 7,127 | 6,222 | 720 | | 1,897 | 9,329 | | 2,805 | 788 | 22,958 | 21,734 | - |
| 2004 | 2,461 | 3,607 | 2,405 | 740 | | 8,121 | 7,357 | 4,971 | 614 | | 2,321 | 10,726 | | 3,204 | 966 | 23,484 | 24,010 | - |
| 2005 | 1,320 | 3,106 | 1,849 | 514 | | 6,608 | 6,245 | 5,084 | 680 | | 2,586 | 9,198 | | 2,378 | 642 | 19,825 | 20,384 | - |
| 2006 | 1,208 | 3,495 | 1,864 | 661 | | 6,741 | 7,200 | 4,633 | 579 | | 2,555 | 10,253 | | 2,537 | 803 | 19,538 | 22,992 | - |
| 2007 | 1,034 | 3,832 | 2,005 | 572 | | 7,658 | 6,160 | 5,118 | 553 | | 3,867 | 10,194 | | 2,908 | 804 | 22,590 | 22,115 | - |
| 2008 | 1,900 | 1,568 | 2,014 | 333 | | 7,796 | 3,160 | 4,375 | 399 | | 3,962 | 6,792 | | 2,743 | 493 | 22,789 | 12,745 | - |
| 2009 | 3,370 | 1,257 | 2,082 | 179 | | 11,956 | 1,605 | 4,186 | 19 | | 4,733 | 4,697 | | 2,871 | 447 | 29,199 | 8,204 | - |
| 2010 | 2,553 | 1,771 | 1,897 | 207 | | 9,561 | 3,452 | 4,081 | 10 | 151 | 4,460 | 6,056 | | 1,686 | 488 | 24,238 | 11,984 | 151 |
| 2011 | 1,992 | 2,420 | 2,781 | 229 | | 4,987 | 5,623 | 3,940 | 394 | 183 | 1,947 | 9,575 | | 2,454 | 427 | 18,102 | 18,667 | 183 |
| 2012 | 3,723 | 2,652 | 1,556 | 288 | | 5,782 | 5,976 | 4,298 | 549 | 230 | 2,004 | 9,917 | | 2,492 | 568 | 19,855 | 19,949 | 230 |
| 2013* | 4,157 | 1,976 | 2,348 | 292 | | 11,044 | 4,134 | 5,656 | 374 | 357 | 5,430 | 8,224 | | 2,452 | 565 | 31,087 | 15,566 | 357 |
| 2014 | 3,303 | 1,020 | 2,157 | 32 | | 10,018 | 1,984 | 7,227 | 233 | 262 | 4,872 | 5,490 | | 3,014 | 384 | 30,592 | 9,144 | 262 |
| 2015 | 4,279 | 555 | 2,401 | 20 | | 12,739 | 975 | 4,730 | 148 | 101 | 7,230 | 3,568 | | 2,948 | 241 | 34,327 | 5,507 | 101 |
| 2016 | 4,386 | 420 | 2,558 | 30 | 38 | 13,581 | 819 | 4,031 | 162 | 253 | 6,383 | 4,810 | 207 | 2,223 | 106 | 33,162 | 6,347 | 499 |
| 2017 | 2,949 | 2,097 | 1,414 | 365 | 66 | 7,542 | 5,853 | 3,255 | 217 | 108 | 2,209 | 7,488 | 192 | 2,447 | 177 | 19,815 | 16,197 | 366 |
| AVG 03-17 | 2,737 | 2,203 | 2,100 | 330 | 52 | 8,771 | 4,511 | 4,787 | 377 | 206 | 3,764 | 7,755 | 200 | 2,611 | 527 | 24,771 | 15,703 | 143 |

GW = groundwater, CVP = Central Valley Project, RW = recycled water

**Table E-3. Recent Water Use by Subbasin and User Type, not including recycled water (AFY)**

| SUBBASIN | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Agriculture** | | | | | | | | | | | | | |
| Bolsa SE | 2,352 | 2,517 | 2,570 | 2,334 | 2,252 | 2,103 | 3,004 | 1,837 | 2,635 | 2,180 | 2,417 | 2,601 | 1,765 |
| Hollister East | 8,543 | 9,526 | 10,685 | 8,012 | 6,860 | 8,315 | 9,067 | 9,453 | 10,832 | 8,151 | 8,464 | 8,784 | 7,564 |
| Hollister West | 2,128 | 1,936 | 2,145 | 1,509 | 1,708 | 1,888 | 2,190 | 2,228 | 3,324 | 2,584 | 2,750 | 2,192 | 1,338 |
| Pacheco | 4,190 | 4,469 | 4,573 | 3,220 | 4,304 | 4,242 | 4,279 | 6,148 | 5,990 | 4,121 | 4,658 | 4,616 | 4,964 |
| San Juan | 11,496 | 12,622 | 12,185 | 9,581 | 12,397 | 11,960 | 10,009 | 10,964 | 14,376 | 11,183 | 13,123 | 13,826 | 11,916 |
| Tres Pinos | 800 | 1,004 | 954 | 655 | 670 | 640 | 471 | 641 | 652 | 514 | 1,513 | 572 | 468 |
| TOTAL | 29,509 | 32,074 | 33,112 | 25,310 | 28,192 | 29,148 | 29,020 | 30,980 | 37,810 | 28,734 | 32,926 | 32,591 | 28,015 |
| **M&I** | | | | | | | | | | | | | |
| Bolsa SE | 12 | 8 | 7 | 13 | 9 | 0 | 6 | 6 | 4 | 9 | 5 | 25 | 14 |
| Hollister East | 3,241 | 3,280 | 3,203 | 2,742 | 2,570 | 2,201 | 2,455 | 2,469 | 2,822 | 2,211 | 2,334 | 2,617 | 2,132 |
| Hollister West | 3,636 | 3,168 | 3,361 | 3,265 | 2,710 | 2,477 | 2,144 | 2,619 | 2,705 | 4,876 | 2,128 | 2,254 | 2,134 |
| Pacheco | 235 | 234 | 293 | 248 | 323 | 83 | 133 | 227 | 144 | 203 | 176 | 191 | 81 |
| San Juan | 1,356 | 1,320 | 1,640 | 1,375 | 1,164 | 1,053 | 601 | 793 | 803 | 820 | 590 | 574 | 1,479 |
| Tres Pinos | 2,220 | 2,336 | 2,748 | 2,581 | 2,648 | 3,048 | 2,410 | 2,710 | 2,365 | 2,884 | 1,676 | 1,757 | 2,156 |
| TOTAL | 10,700 | 10,345 | 11,252 | 10,225 | 9,424 | 8,862 | 7,749 | 8,825 | 8,843 | 11,002 | 6,909 | 7,417 | 7,997 |

**Table E-4. Historical Water Use by User Type (AFY)**

| WY | Agricultural | Municipal, and Industrial | Total | % Ag |
|---|---|---|---|---|
| 1988 | 45,366 | 5,152 | 50,518 | 90% |
| 1989 | 32,387 | 6,047 | 38,434 | 84% |
| 1990 | 49,663 | 5,725 | 55,388 | 90% |
| 1991 | 46,640 | 7,631 | 54,271 | 86% |
| 1992 | 32,210 | 6,912 | 39,122 | 82% |
| 1993 | 38,878 | 5,066 | 43,944 | 88% |
| 1994 | 41,854 | 7,186 | 49,040 | 85% |
| 1995 | 36,399 | 8,272 | 44,671 | 81% |
| 1996 | 39,575 | 8,338 | 47,913 | 83% |
| 1997 | 41,482 | 11,117 | 52,599 | 79% |
| 1998 | 27,526 | 8,650 | 36,176 | 76% |
| 1999 | 37,203 | 10,110 | 47,313 | 79% |
| 2000 | 36,062 | 10,811 | 46,873 | 77% |
| 2001 | 34,035 | 10,687 | 44,722 | 76% |
| 2002 | 34,354 | 11,347 | 45,701 | 75% |
| 2003 | 33,533 | 11,206 | 44,739 | 75% |
| 2004 | 35,597 | 11,944 | 47,541 | 75% |
| 2005 | 29,509 | 10,700 | 40,209 | 73% |
| 2006 | 32,074 | 10,345 | 42,419 | 76% |
| 2007 | 33,112 | 11,252 | 44,364 | 75% |
| 2008 | 25,310 | 10,225 | 35,535 | 71% |
| 2009 | 28,192 | 9,424 | 37,616 | 75% |
| 2010 | 29,148 | 8,862 | 38,010 | 77% |
| 2011 | 29,020 | 7,749 | 36,769 | 79% |
| 2012 | 31,270 | 8,825 | 40,095 | 78% |
| 2013 | 37,810 | 8,843 | 46,653 | 81% |
| 2014 | 28,734 | 11,226 | 39,960 | 72% |
| 2015 | 32,926 | 7,010 | 39,935 | 82% |
| 2016 | 32,591 | 7,417 | 40,008 | 81% |
| 2017 | 28,015 | 7,997 | 36,012 | 78% |
| AVERAGE | **34,682** | **8,869** | **43,552** | **79%** |

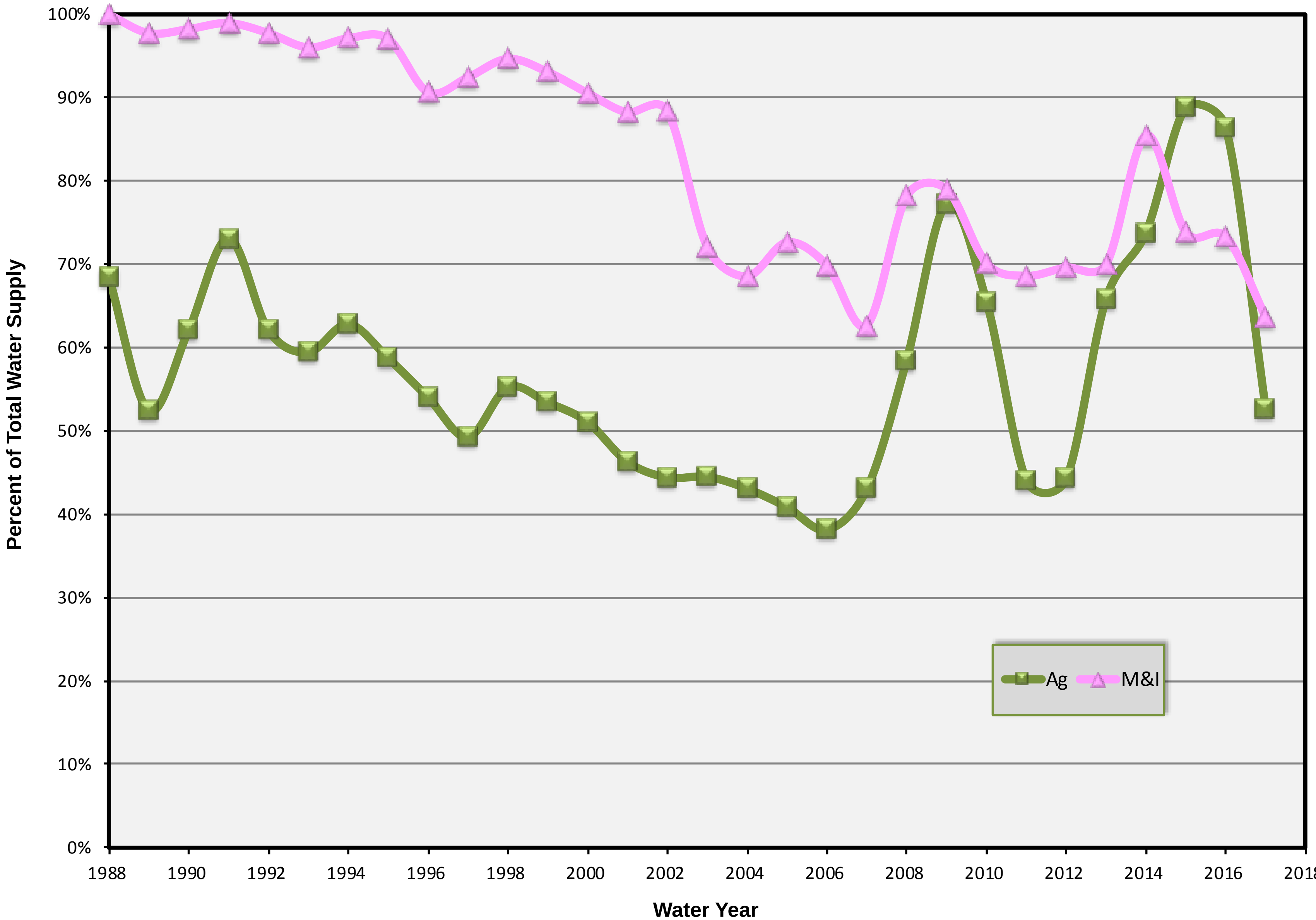
**Table E-5. Municipal Water Use by Purveyor for Water Year 2017 (AF)**

| | WY 2017 | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Groundwater** | | | | | | | | | | | | | |
| Sunnyslope CWD | **1,449** | 190 | 78 | 58 | 72 | 56 | 39 | 71 | 111 | 168 | 226 | 199 | 180 |
| City of Hollister | **1,543** | 145 | 110 | 97 | 92 | 66 | 66 | 84 | 166 | 208 | 123 | 221 | 166 |
| City of Hollister - Cienega Wells | **79** | 9 | 9 | 10 | 9 | 7 | 10 | 9 | 9 | 6 | 1 | 0 | 1 |
| San Juan Bautista | **249** | 19 | 18 | 15 | 13 | - | 15 | 16 | 25 | 31 | 33 | 32 | 31 |
| Tres Pinos CWD | **32** | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 3 | 3 |
| **Groundwater Subtotal** | **3,352** | **367** | **218** | **181** | **188** | **130** | **131** | **182** | **314** | **417** | **387** | **456** | **382** |
| **CVP Imported Water** | | | | | | | | | | | | | |
| Lessalt Treatment Plant | **1,940** | 168 | 146 | 123 | 145 | 127 | 163 | 189 | 172 | 178 | 200 | 168 | 162 |
| West Hills Treatment Plant | **51** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 51 |
| **Imported Water Subtotal** | **1,991** | **168** | **146** | **123** | **145** | **127** | **163** | **189** | **172** | **178** | **200** | **168** | **213** |
| **Municipal Total** | | | | | | | | | | | | | |
| **Municipal Water Supply Total** | **5,344** | **534** | **364** | **304** | **332** | **258** | **294** | **370** | **487** | **594** | **586** | **624** | **595** |

**Table E-6. Historical Municipal Water Use by Purveyor (AFY)**

| WY | Sunnyslope CWD - GW | City of Hollister - GW | City of Hollister - Cienega Wells[1] | San Juan Bautista | Tres Pinos CWD | Lessalt Treatment Plant | West Hills Lessalt Treatment Plant | Undivided Total | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 1988 | | | | | | 0 | | 5,152 | **5,152** |
| 1989 | | | | | | 0 | | 6,047 | **6,047** |
| 1990 | | | | | | 0 | | 5,725 | **5,725** |
| 1991 | | | | | | 0 | | 7,631 | **7,631** |
| 1992 | | | | | | 0 | | 6,912 | **6,912** |
| 1993 | | | | | | 0 | | 5,066 | **5,066** |
| 1994 | | | | | | 0 | | 7,186 | **7,186** |
| 1995 | 2,167 | 2,446 | | | | 0 | | | **4,613** |
| 1996 | 2,139 | 3,386 | | | | 0 | | | **5,525** |
| 1997 | 2,638 | 3,848 | | | | 0 | | | **6,486** |
| 1998 | 2,357 | 3,441 | | | | 0 | | | **5,798** |
| 1999 | 2,820 | 3,558 | | | | 0 | | | **6,378** |
| 2000 | 3,214 | 4,021 | | | | 0 | | | **7,235** |
| 2001 | 3,290 | 3,851 | | | | 0 | | | **7,141** |
| 2002 | 3,256 | 4,120 | | | | 21 | | | **7,398** |
| 2003 | 2,053 | 2,754 | | | | 2,494 | | | **7,302** |
| 2004 | 2,426 | 2,828 | | | | 2,101 | | | **7,356** |
| 2005 | 1,959 | 3,147 | 123 | 247 | 49 | 1,843 | | | **7,368** |
| 2006 | 1,907 | 2,801 | 123 | 150 | 49 | 1,900 | | | **6,930** |
| 2007 | 2,413 | 2,758 | 123 | 47 | 49 | 1,719 | | | **7,108** |
| 2008 | 2,294 | 2,746 | 123 | 417 | 47 | 1,323 | | | **6,949** |
| 2009 | 2,251 | 2,503 | 123 | 373 | 47 | 1,212 | | | **6,509** |
| 2010 | 1,861 | 2,194 | 108 | 308 | 47 | 1,344 | | | **5,861** |
| 2011 | 2,225 | 1,651 | 80 | 292 | 47 | 1,593 | | | **5,887** |
| 2012 | 2,360 | 1,761 | 130 | 267 | 45 | 1,657 | | | **6,219** |
| 2013 | 1,655 | 2,655 | 120 | 281 | 46 | 1,648 | | | **6,405** |
| 2014 | 2,134 | 2,646 | 114 | 285 | 49 | 979 | | | **6,207** |
| 2015 | 1,348 | 1,960 | 114 | 225 | 49 | 1,364 | | | **5,060** |
| 2016 | 1,331 | 1,615 | 105 | 232 | 49 | 1,682 | | | **5,014** |
| 2017 | 1,449 | 1,543 | 79 | 249 | 32 | 1,940 | 51 | | **5,344** |

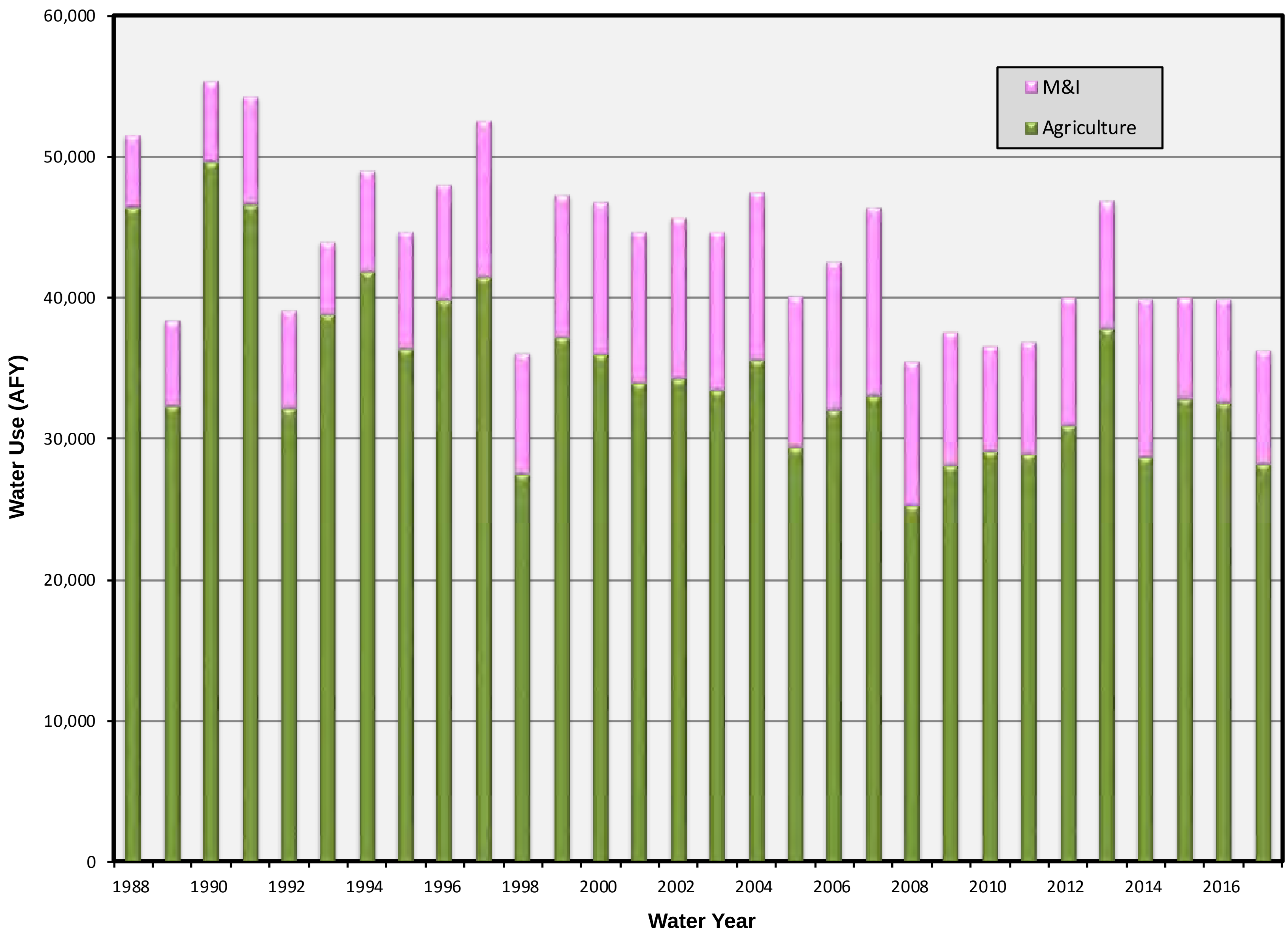
1. Data from Hollister Cienega Wells for 2005-2008 was estimated to be the same as WY 2009
Cells with no data indicate that the information is unavailable, while years with no use are shown explicitly as 0's.




December 2017

TODD GROUNDWATER

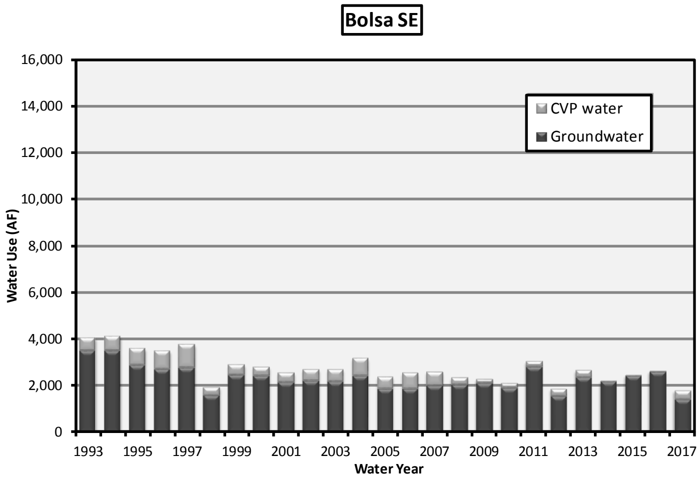
**Figure E-1**
**Groundwater Percentage of Total Water Use**

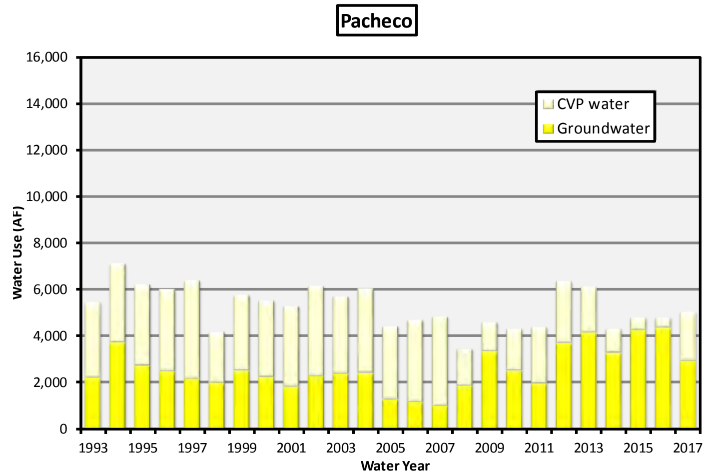


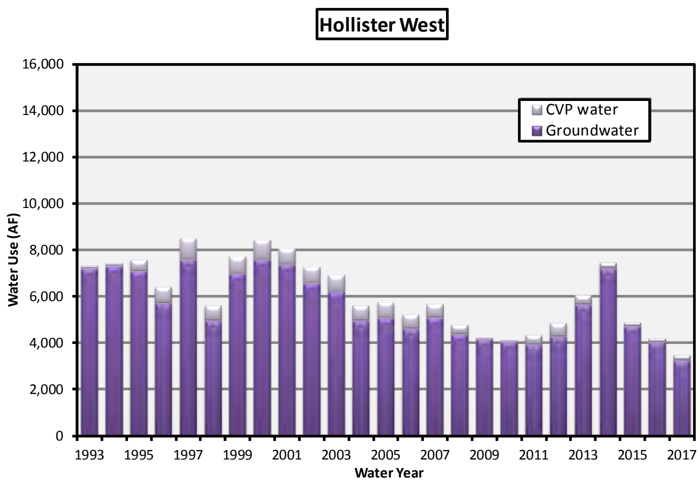

December 2017

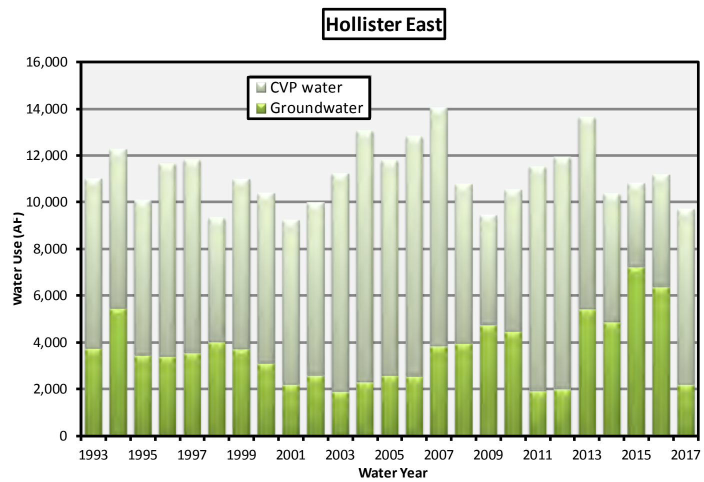
TODD GROUNDWATER

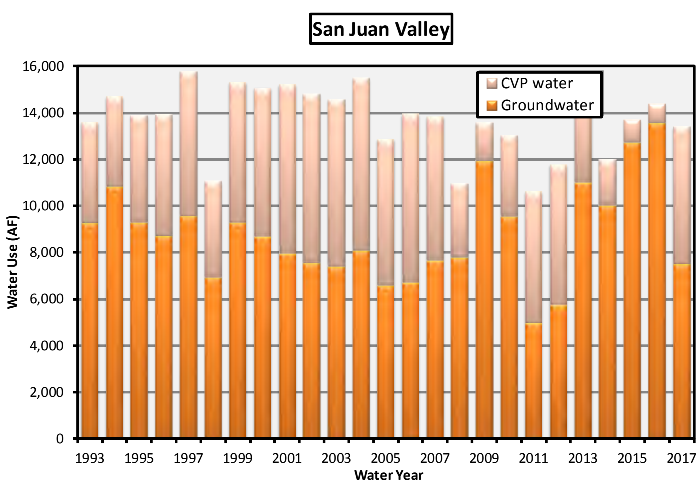
**Figure E-2**
**Water Use in Zone 6 by User Category**

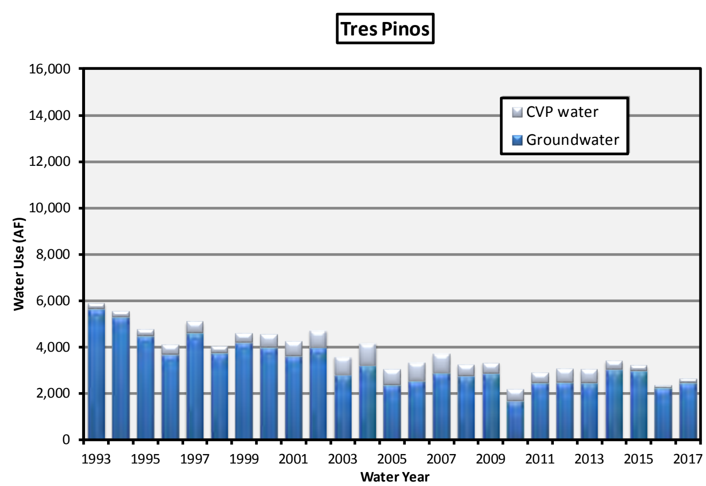


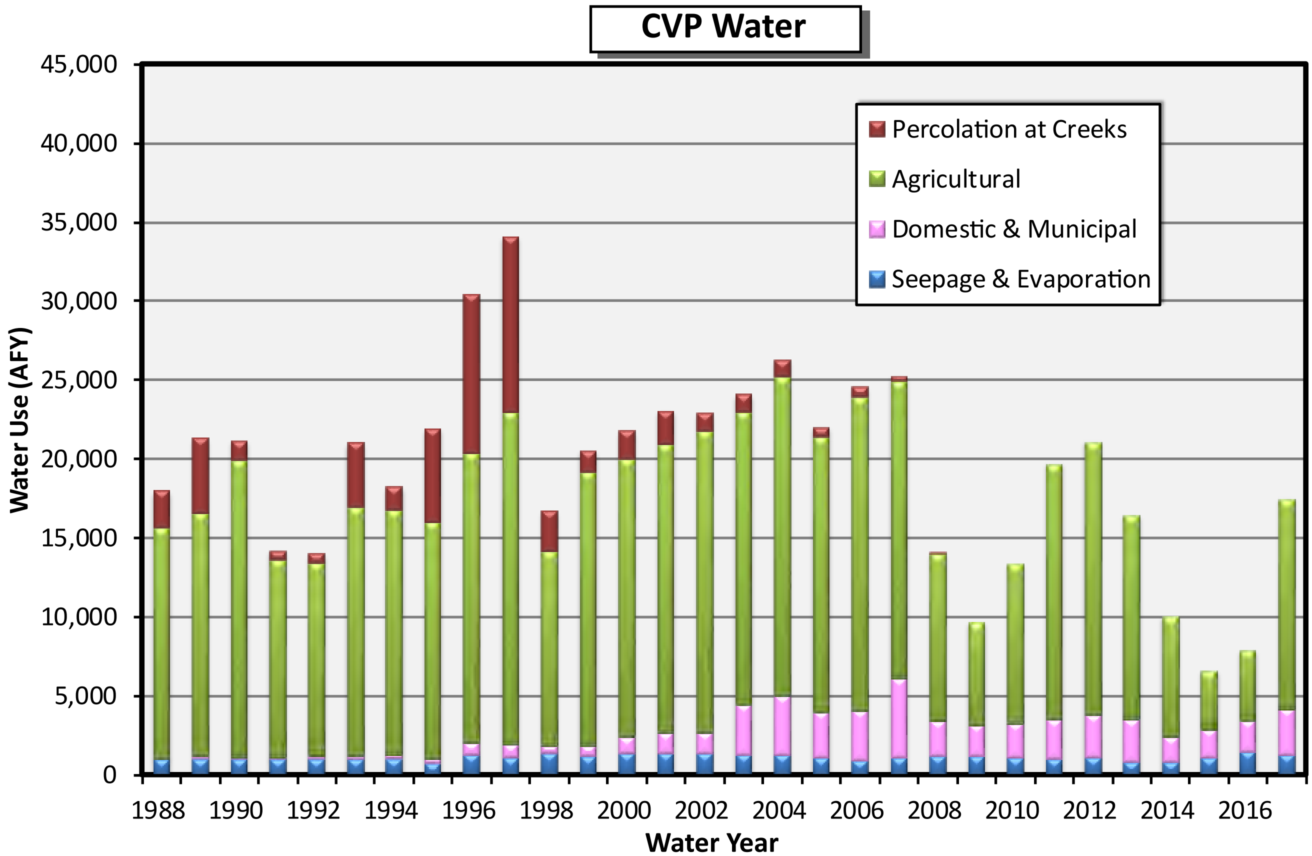



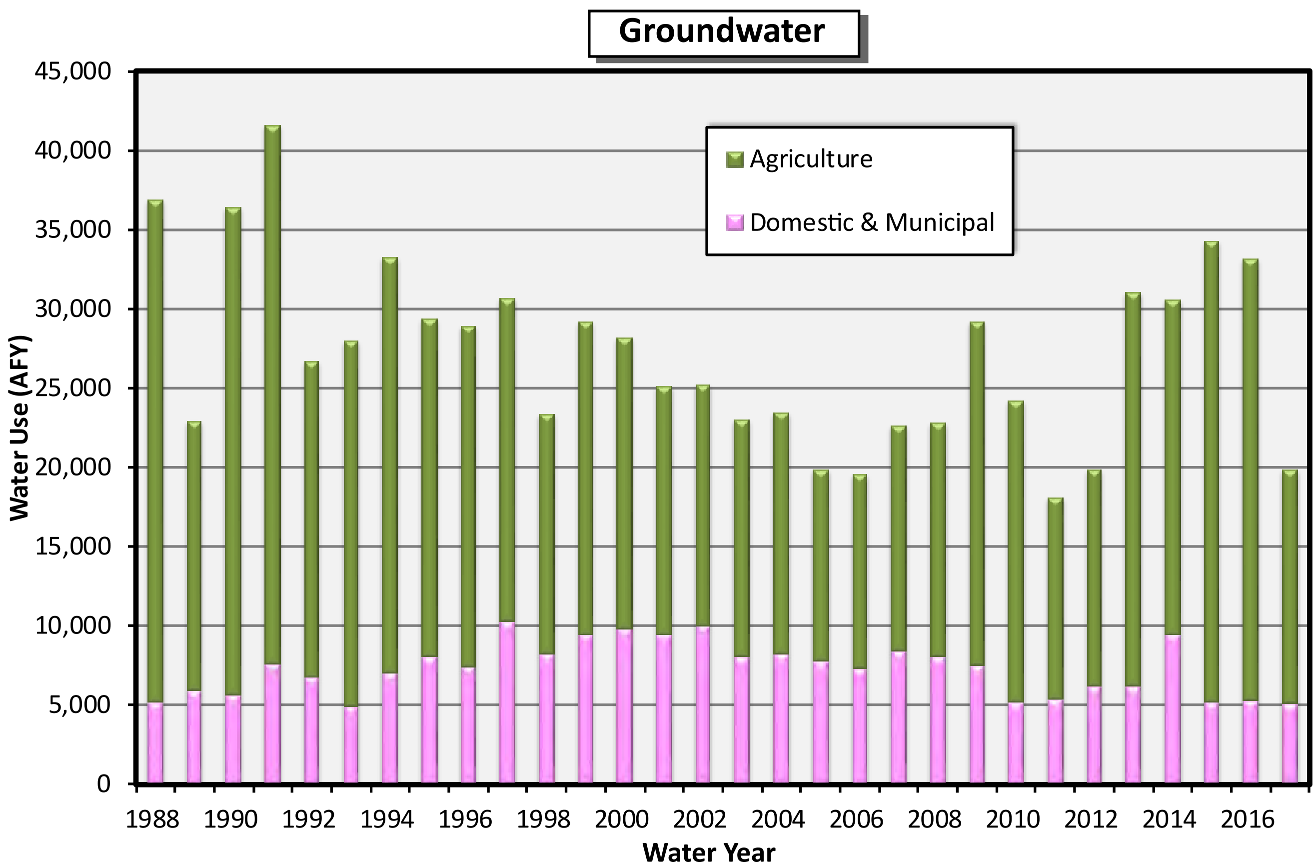




December 2017

TODD GROUNDWATER

**Figure E-3**
**Total Subbasin Water Use by Water Type**

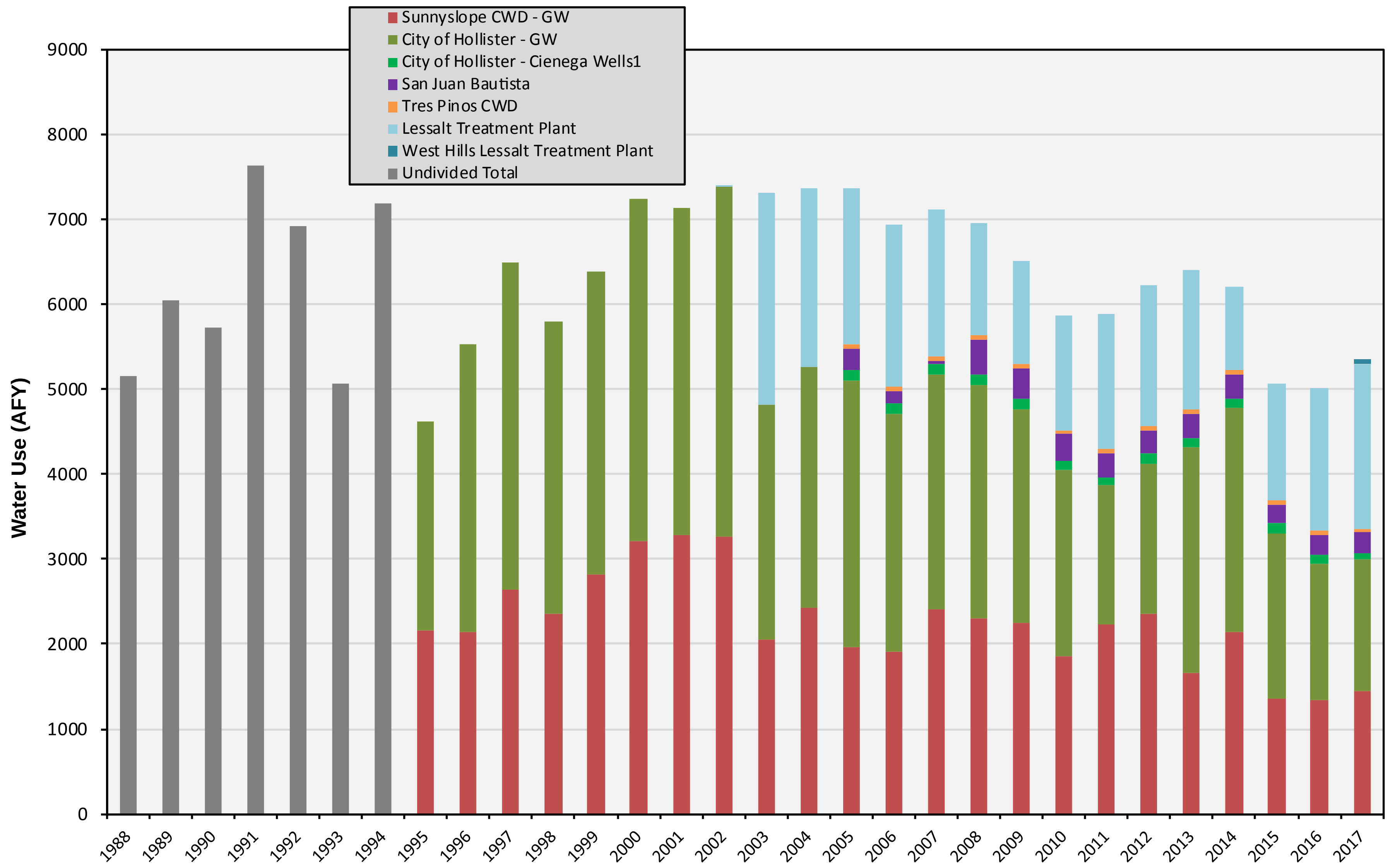



December 2017

TODD GROUNDWATER

**Figure E-4**
**Annual Total of CVP and Groundwater by Use**




December 2017

TODD GROUNDWATER

**Figure E-5**
**Municipal Water Use by Purveyor**

# F RATES AND CHARGES

List of Tables and Figures

**Table F-1. Historical and Current San Benito County Water District CVP (Blue Valve) Water Rates (dollars/af)**

| USBR Water Year | Standby & Availability Charge (dollars/acre) | Water Charge | | Power Charge | | | | | Groundwater Charge (dollars/af) | | | Recycled Water (per AF) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agricultural | Municipal & Industrial | Distribution Subsystem | | | | | Agricultural | Municipal & Industrial | | Agricultural | Power Charge |
| | | | | 2 | 6H | 9L | 9H | Others | | | | | |
| 1987 | $8.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | | | |
| 1988 | $2.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | | | |
| 1991 | $4.00 | $38.00 | $110.00 | | | | | | $6.25 | $22.00 | | | |
| 1992 | $4.00 | $45.00 | $120.00 | | | | | | $2.00 | $10.00 | | | |
| 1994 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $5.00 | | | |
| 1995 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $15.75 | First 100 af | | |
| | | | | | | | | | | $36.70 | Next 500 af | | |
| | | | | | | | | | | $54.60 | Over 600 af | | |
| 1996 | $6.00 | $75.00 | $150.00 | | | | | | $1.50 | $33.00 | | | |
| 1997 | $6.00 | $75.00 | $157.00 | | | | | | $1.50 | $33.00 | | | |
| 1998 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $33.00 | | | |
| 2000 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $11.50 | | | |
| 2001 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $25.00 | | | |
| 2004 | $6.00 | $75.00 | $150.00 | $24.30 | $46.75 | $25.05 | $53.70 | $15.25 | $1.50 | $10.00 | | | |
| 2005 | $6.00 | $80.00 | $150.00 | $26.15 | $49.40 | $35.00 | $66.90 | $17.10 | $1.50 | $21.50 | | | |
| 2006 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | | | |
| 2007 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | | | |
| 2008 | $6.00 | $100.00 | $170.00 | $17.25 | $19.40 | $32.60 | $62.75 | $14.85 | $1.50 | $21.50 | | | |
| 2009 | $6.00 | $115.00 | $180.00 | $17.50 | $20.25 | $42.55 | $74.85 | $16.30 | $2.50 | $22.50 | | | |
| 2010 | $6.00 | $135.00 | $200.00 | $22.00 | $27.30 | $49.75 | $84.35 | $21.75 | $2.50 | $22.50 | | | |
| 2011 | $6.00 | $155.00 | $220.00 | $22.70 | $28.15 | $51.25 | $86.90 | $22.40 | $2.50 | $22.50 | | | |
| 2012 | $6.00 | $170.00 | $235.00 | $23.35 | $29.00 | $52.80 | $89.50 | $23.10 | $2.50 | $22.50 | | | |
| 2013 | $6.00 | $170.00 | $235.00 | $40.30 | $29.25 | $43.05 | $91.55 | $22.40 | $3.25 | $23.25 | | | |
| 2014 | $6.00 | $170.00 | $238.00 | $41.55 | $30.15 | $44.35 | $94.30 | $23.10 | $3.60 | $23.25 | | | |
| 2015 | $6.00 | $179.00 | $247.00 | $42.75 | $31.05 | $45.70 | $97.15 | $23.80 | $3.95 | $23.25 | | | |
| 2016 | $6.00 | $272.00 | $363.00 | $123.10 | $75.65 | $109.95 | $162.55 | $66.05 | $4.95 | $24.25 | | $182.55 | $57.70 |
| 2017 | $6.00 | $191.00 | $363.00 | $126.80 | $77.90 | $113.25 | $167.45 | $68.05 | $6.45 | $24.25 | | $183.45 | $59.45 |

Notes:

af = acre-feet.
n.c. = no classification.
n.i. = not implemented
All rates effective March 1 through following February.

**Table F-2. 2016 Recommended Groundwater Revenue Requirement/Charges**

| REVENUE REQUIREMENTS | | | | | | Rates[2] | |
|---|---|---|---|---|---|---|---|
| | Component | Rate ($/AF) | Quantity[1] (af) | Amount | | Ag | M & I |
| **Source of Supply** | | | | | | | |
| Ag | Source of Supply Costs | $9.41 | 22,438 | $ | 211,222 | $ 9.41 | |
| M&I | Source of Supply Costs | $28.24 | 5,725 | $ | 161,679 | | $ 28.24 |
| **Percolation Costs** | | | | | | | |
| Ag | CVP Water Rate[3] | $299.64 | - | $ | - | | |
| M&I | CVP Water Rate[3] | $410.76 | - | $ | - | | |
| | | | | | | | |
| Ag | Power Charge for Percolation | $0.00 | - | | 0 | $ - | |
| M&I | Power Charge for Percolation | $0.00 | - | | 0 | | $ - |
| **Calculated Total** | | | | | | $ 9.41 | $ 28.26 |
| Previous Groundwater Charge (per acre foot) | | | | | | $ 6.45 | $ 24.25 |
| | | | | | | | |
| **CURRENT AND RECOMMENDED CHARGES (per acre foot)** | | | | | | **$ 7.95** | **$ 24.25** |

1 Assumed Volumes
Percolation (based on average of last 3 years of recharge
Groundwater Usage (based on average of past 3 years)
2 Rates=Revenue Requirement/projected usage
3 CVP water rate basis for 2018-2019 water year

Note: Section 70-7.8 (a) of the District Act states that the agricultural rate shall not exceed one-third of the rates for all water other than agricultural water.

**Table F-3. Recent US Bureau of Reclamation Charges per Acre-Foot for CVP Water**

| | Irrigation[1] | | | | | | Municipal & Industrial | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| User Category and Cost Item | Cost of service (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] | Cost of service[2] (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] |
| 1994 | $71.68 | $6.20 | n.a. | | $77.88 | $17.21 | $165.67 | $12.40 | n.a. | | $178.07 | $85.86 |
| 1995 | $66.47 | $6.35 | n.a. | | $72.82 | $17.21 | $132.90 | $12.69 | n.a. | | $145.59 | $85.86 |
| 1996 | $65.63 | $6.53 | n.a. | | $72.16 | $27.46 | $127.40 | $13.06 | n.a. | | $140.46 | $85.86 |
| 1997 | $69.57 | $6.70 | n.a. | | $76.27 | $27.46 | $143.27 | $13.39 | n.a. | | $156.66 | $85.86 |
| 1998 | $61.58 | $6.88 | $5.00 | | $73.46 | $27.46 | $130.88 | $13.76 | $5.00 | | $149.64 | $85.86 |
| 1999 | $60.30 | $6.98 | $2.73 | | $70.01 | $27.46 | $127.91 | $13.96 | $2.73 | | $144.60 | $85.86 |
| 2000 | $64.24 | $7.10 | $6.43 | | $77.77 | $27.46 | $129.59 | $14.20 | $6.43 | | $150.22 | $85.86 |
| 2001 | $69.50 | $7.28 | $2.65 | | $79.43 | $27.46 | $129.40 | $14.56 | $4.15 | | $148.11 | $85.86 |
| 2002 | $68.71 | $7.54 | $6.61 | | $82.86 | $24.30 | $130.32 | $15.08 | $6.61 | | $152.01 | $79.13 |
| 2003 | $72.20 | $7.69 | $5.46 | | $85.35 | $24.30 | $129.07 | $15.38 | $5.46 | | $149.91 | $79.13 |
| 2004 | $74.52 | $7.82 | $6.61 | | $88.95 | $24.30 | $134.86 | $15.64 | $6.61 | | $157.11 | $79.13 |
| 2005 | $77.10 | $7.93 | $7.99 | | $93.02 | $24.30 | $132.01 | $15.87 | $7.99 | | $155.87 | $79.13 |
| 2006 | $91.13 | $8.24 | $9.31 | | $108.68 | $30.93 | $214.41 | $16.49 | $9.31 | | $240.21 | $77.12 |
| 2007 | $93.53 | $8.58 | $9.99 | $0.11 | $112.21 | $30.93 | $215.32 | $17.15 | $9.99 | $0.11 | $242.46 | $80.08 |
| 2008[6] | $28.12 | $8.79 | $10.95 | $0.07 | $47.93 | $30.93 | $33.34 | $17.57 | $10.95 | $0.07 | $61.68 | $33.34 |
| 2009 | $30.20 | $9.06 | $11.49 | $0.07 | $50.82 | $30.20 | $32.77 | $18.12 | $11.49 | $0.07 | $62.45 | $32.77 |
| 2010 | $33.27 | $9.11 | $11.91 | $0.11 | $54.40 | $33.27 | $36.11 | $18.23 | $11.91 | $0.11 | $66.36 | $36.11 |
| 2011 | $38.92 | $9.29 | $9.51 | $0.05 | $57.77 | $38.92 | $42.58 | $18.59 | $9.51 | $0.05 | $70.73 | $42.58 |
| 2012 | $39.71 | $9.39 | $15.20 | $0.05 | $64.35 | $39.71 | $37.95 | $18.78 | $15.20 | $0.05 | $71.98 | $37.95 |
| 2013 | $40.39 | $9.79 | $17.29 | $0.05 | $67.52 | $39.91 | $38.71 | $19.58 | $17.29 | $0.05 | $75.63 | $40.92 |
| 2014 | $46.87 | $9.99 | $28.81 | $0.23 | $85.90 | $46.87 | $29.70 | $19.98 | $28.81 | $0.23 | $78.72 | $29.70 |
| 2015 | $53.82 | $10.07 | $30.66 | $0.23 | $94.78 | $53.82 | $34.74 | $20.14 | $30.66 | $0.23 | $85.77 | $34.74 |
| 2016 | $85.12 | $10.07 | $30.66 | $0.23 | $126.08 | $53.82 | $61.24 | $20.14 | $30.66 | $0.23 | $112.27 | $34.74 |
| 2017 | $66.17 | $10.23 | $14.15 | $0.30 | $90.85 | $39.90 | $49.50 | $20.45 | $14.15 | $0.30 | $84.40 | $22.85 |

Notes:

(1) Total USBR rate given for non-full cost users only, as they represent the majority of water users.

(2) Cost-of-service for agricultural and municipal and industrial users includes a capital repayment rate and an operation and maintenance (O&M) rate. For municipal and industrial customers, cost-of-service also includes a deficit charge, which includes interest on unpaid O&M and interest on capital and on unpaid deficit.

(3) Restoration fund charges apply October 1 through September 30.

(4) Beginning in 1998, the San Luis-Delta Mendota Water Authority instituted this charge to "self-fund" costs associated with maintaining the Delta-Mendota Canal and certain other facilities, which were formerly funded directly by the Bureau of Reclamation. SLDMWA issues preliminary rates in December for the upcoming contract year (March-February). These rates are used for rate-setting purposes; actual rates may vary.

(5) The contract rate is the minimum rate CVP contractors are allowed to pay. To the extent that the contract rate does not cover interest plus actual operation and maintenance costs, a contractor deficit is accumulated that is charged interest at the current-year treasury borrowing rate.

(6) Per the amendatory contract with the USBR "out of basin" capital costs that were previously included in the cost of service are now under a separate repayment contract.

(7) Cost of service rates are inclusive of USBR direct pumping and Project Use Energy costs.

# G WATER BALANCE

## Water Balance Methodology

Annual groundwater balances for water years 2015, 2016 and 2017 were developed for this annual report. Water balance information is required for effective water resources management. The relative magnitude of each water balance element and its changes over time illustrate the mechanisms at work in the basin. The water balance supports decisions related to groundwater replenishment and withdrawals.

The water balance table for each year lists inflows and outflows by subbasin in the same format as in prior annual reports. Any water balance analysis includes uncertainty, which derives from potential errors in data measurement and recording and from necessary use of assumptions when data are lacking. To address uncertainty, items in the water balance tables are estimated using various *independent* methods; combining the estimates into a single table can reveal errors or uncertainty in assumptions or data.

As an additional check on consistency, the tables include two estimates of net annual change in groundwater storage. One estimate equals the difference between total inflows and total outflows, and the other is a volumetric calculation based on aquifer storativity values and changes in observed groundwater elevations. Comparison of the two change-in-storage values allows consideration of the accuracy of the overall water balance estimate.

Future water balances, including the water balances required by SGMA, will be assessed according to those DWR GSP regulations and Best Management Practices. The water balances also will be computed according to DWR groundwater basin definitions. In addition, an updated hydrogeologic conceptual model and improved numerical model will provide comprehensive simulations of historical, current, and sustainable conditions. Comparison of simulated conditions to historical conditions and estimated water balances (in terms of differences between simulated and observed groundwater elevations and flows) will allow identification of data gaps and uncertainties and systematic review and adjustment of water balance analyses.

## Inflows

There are six major sources of inflow to the subbasins in Zone 6 and surrounding areas. These include natural stream percolation, percolation from Hernandez/Paicines releases, direct percolation of imported CVP water, deep percolation (from rainfall and/or irrigation), percolation of reclaimed water, and subsurface groundwater inflow.

**Stream Percolation.** Percolation along local stream channels provides groundwater recharge in many parts of the basin. Percolation can occur from natural flows,  or releases from Hernandez Reservoir in the headwaters of the San Benito River watershed. The three-year period 2015-2017 includes a dry, average, and wet year. Infiltration amounts from reservoir releases were 0 AF in 2015 (a dry year) and substantially increased in the wet year 2017, when releases from Hernandez Reservoir were 23,191 AF and releases from Paicines were 2,407 AF.

Percolation is estimated based on the amount of natural flow in the waterway, the distance that the waterway transverses a subbasin, and the channel percolation capacity. Percolation capacities were estimated from synoptic surveys of changes in flow along each creek completed in the late 1990's (Yates, 2008). The overall percolation capacity and the length of the "losing" reach both decrease when groundwater elevations are high. Because the percolation estimates are based on static values for these variables, there is some uncertainty in the amount of stream flow that percolates in any given year. Flow and percolation rates for local creeks and the San Benito River are shown in **Table G-1**.

**Table G-1. Estimated parameters for stream percolation**

| Name | Watershed Area (ac) | Annual Precipitation (in) | Calibration+ | Subbasin | Length of Percolation (mi) | Maximum Percolation Rate (cfs/mi) |
|---|---|---|---|---|---|---|
| Pacheco Creek | 145.0 | 18 | 1 | Pacheco | 2 | 5.34 |
| Arroyo de las Viboras | 22.1 | 22 | 1 | Pacheco | 2.28 | 6.29 |
| Arroyo Dos Picachos | 16.2 | 20 | 1 | Hollister East | 1.31 | 1.02 |
| Santa Ana Creek | 36.5 | 19 | 1 | Hollister East | 7.58 | 6 |
| Bird Creek*+ | 15.0 | 18 | 0.15 | Hollister West<br>Tres Pinos | -- | -- |
| Pescadero Creek*+ | 38.3 | 18 | 0.15 | Hollister West<br>Tres Pinos | -- | -- |
| Tres Pinos Creek* | -- | -- | 1 | Tres Pinos | -- | -- |
| San Benito River* | -- | -- | 1 | San Juan, Hollister West, Tres Pinos | -- | -- |

*Percolation along these streams is calculated using a combination of USGS gage data and Hernandez/Paicines release information

+Pescadero and Bird Creek flows were reduced by a calibration factor to remain consistent with observed flows

Stream flow gages are only present on Pacheco Creek, Tres Pinos Creek and the San Benito River. Daily flows in ungaged streams are estimated from gaged flows in three reference streams outside the basin (previous water balances used four reference gages but Gabilan Creek is no longer routinely monitored). These streams are listed in **Table G-2**. This regional approach avoids potential errors associated with anomalous rainfall or stream flow conditions at any single reference gage. For each of the local ungaged streams, a daily unit flow was determined by normalizing stream flow by watershed area and annual average precipitation. The unit flows of the four streams were averaged to determine a reference unit flow per day that could be applied to streams within the basin. The unit flow was multiplied by each stream's watershed area and annual average precipitation, **Table G-1**, to develop a daily estimate of flow. The maximum portion of estimated daily flow that could result in recharge was determined by multiplying the length of the percolation reach in the subbasin by the maximum percolation rate in cfs per mile.

**Table G-2. Reference streams used to estimate daily flow on ungaged streams.**

| Name | Watershed Area (ac) | Annual Precip (in) | USGS Station ID | Location | Latitude | Longitude |
|---|---|---|---|---|---|---|
| Gabilan Creek (no longer monitored) | 36.7 | 18 | 11152600 | Salinas, CA | 36.755792 | -121.610501 |
| Cantua Creek | 46.4 | 11 | 11253310 | San Joaquin Valley | 36.402174 | -120.43349 |
| Los Gatos Creek | 95.8 | 16 | 11224500 | Coalinga, CA | 36.2146772 | -120.470712 |
| Corralitos Creek | 27.8 | 35 | 11159200 | Watsonville, CA | 36.9393968 | -121.770507 |

Percolation on the San Benito River can be estimated using two available USGS gages and available percolation rate data from synoptic surveys. However, flow in the river at these gages consists of a combination of natural sources and reservoir releases. In order to estimate the contribution of each source to the stream flow percolation, a more detailed analysis has been required as described in the Reservoir Releases section below.

Because of changing conditions, high groundwater elevations, antecedent moisture conditions, and intensity of precipitation, the percolation rate, volume, and the portion of the stream recharging groundwater also change over time. Because the simple method developed to estimate percolation is based on one set of percolation data (length and rate) and assumes available groundwater storage, it represents a maximum amount of percolation.

**Reservoir Releases.** San Benito River and Tres Pinos Creek flows are augmented by releases from the upstream Hernandez and Paicines Reservoirs. The flow from natural sources (e.g., rainfall) and from reservoir releases were estimated separately to determine the contribution of flow and percolation by source. For the San Benito River, the USGS has continuous gages at two locations: Willow Creek School (upstream of Paicines Valley) and Old Highway 156 (near Hollister). Because reservoir releases from Hernandez and flow at Willow Creek School are both observed, the contribution of the releases to the total flow can be determined by assuming any flow up to the volume of the release is from a reservoir release. The remaining flow can be considered the natural flow component. This simple analysis sometimes leads to a more variable natural flow than expected under the current conceptual model. In previous water balances (water year 2008 and earlier) a regression was used to smooth the streamflow data and reduce variability. However, for this 2017 report was determined on an annual scale that this approach adequately estimates the natural percolation and reservoir release percolation.

Percolation from the San Benito River occurs along the four subbasins it traverses: Paicines Valley, Tres Pinos, Hollister West, and San Juan. The first three of those are between the two USGS gages, and the overall flow loss between the gages is apportioned among the subbasins based on groundwater conditions, accounting for additional flow from Pescadero and Bird Creeks (estimated by the reference stream method discussed above).

Percolation capacity is assumed to be satisfied first by reservoir release flows, because the releases are managed to percolate entirely before leaving the inter-gage reach. The remainder of flow and percolation is assumed to be from natural sources. Flow past the Highway 156 gage is assumed all flow percolates based on observations by District staff.

The portion of percolation that occurs in Paicines Valley is determined through a water budget that estimates groundwater storage depletion during the preceding dry season. River percolation reliably refills the deficit in all but very dry years. The remaining percolation upstream of the Highway 156 gage is apportioned between the Tres Pinos and Hollister West subbasins based on their respective reach lengths and flow and groundwater conditions. The drought that commenced in 2013 resulted in decreased CVP imports, increased groundwater pumping, lower groundwater elevations and very low local stream flow. Accordingly, percolation was not reduced by rejected recharge (as was the case in the early 2000s). Proceeding in downstream order, each subbasin was assumed to percolate up to the amount of available flow or the channel percolation capacity, whichever was smaller.

Percolation releases from Paicines Reservoir were assumed to completely infiltrate along Tres Pinos Creek in the Tres Pinos subbasin. Finally, flow in the San Benito River occasionally reached the gage at old Highway 156, even though the annualized percolation calculations indicated that all river water should have percolated upstream of the gage. The discrepancy results from transient events when flashy river flows temporarily exceed the percolation capacity, and possibly also errors in estimated percolation capacity. However, in 2017 it was assumed all releases percolated before leaving the basin.

**CVP Percolation.** From 1992 to 2005, the District released CVP water to local creek channels for percolation. That practice was discontinued because of the full condition of the basin at the time and the potential for release of invasive mussels from the imported water system. In 2017, the District used two off-stream recharge basins to percolate CVP imports. The Union Road basin in Hollister West percolated 2,209 AF beginning in March 2017, while another pond in Pacheco subbasin was used to percolate 340 AF April through September.

**Deep Percolation.** Deep percolation refers to the portion of water applied to the basin (either through precipitation or irrigation) that percolates through the soil to the groundwater aquifer. A soil moisture budget was prepared to examine the portion of the daily volume of precipitation and irrigation that percolates to the aquifer. A soil moisture budget accounts for several factors including daily precipitation, interception, runoff, infiltration, soil moisture storage, evapotranspiration, and the amount and efficiency of applied irrigation water. The basic concept of a soil moisture budget is that deep percolation is expected to occur only when the maximum moisture-holding capacity of the soil is reached. The budget calculations update soil moisture storage and deep percolation on a daily time step for each recharge zone.

Recharge zones were assigned to one of 22 land use categories, which included six categories of natural vegetation, seven categories of urban or developed uses, and seven categories of irrigated crops. The crop categories reflected groups sharing similar root depths, crop coefficients and growing seasons: pasture, grain, field crops, truck crops (vegetables), deciduous orchard, citrus, and vineyard.

The daily soil moisture capacity can be expressed as:

Soil Moisture Storage = Precipitation– Interception - Runoff –ET demands + Irrigation + Previous Day's Soil Moisture Storage

If the calculated soil moisture storage is greater than the maximum, then deep percolation occurs:

Deep Percolation = Soil Moisture Storage – Maximum Soil Moisture Capacity

Deep percolation accrues to a shallow groundwater storage zone from which groundwater leaks downward to the regional aquifer system at a constant rate or seeps laterally into a creek channel at a rate proportional to shallow groundwater storage. Each of the variables and how they were estimated are discussed below:

**Precipitation** – Daily rainfall (in inches) was obtained from the National Climatic Data Center precipitation station "Hollister 2".

**Interception**— Interception is rain that adheres to leaves and never reaches the ground. It was assumed to range from 0 inches for unvegetated areas to 0.02 inches for deciduous vegetation to as much as 0.08 inches for perennial broad-leaf shrubs and trees. Interception was subtracted from rainfall on each rainy day.

**Runoff** – The amount of rainfall that results in runoff was estimated using a linear equation. Runoff was assumed to commence when daily rainfall exceeded a threshold amount. This threshold was estimated to range from 0.3 inches for urban industrial zones to 1.1 inches for all categories of cropland and natural vegetation on level ground. Above the threshold, 90-96 percent of daily rainfall was assumed to infiltrate, while the remainder became direct runoff, depending on land use category. These values were based on model calibration studies in another central coast groundwater basin (HydroFocus, 2012).

**Evapotranspiration (ET)**– Evapotranspiration refers to the evaporation of water from soil (evaporation) and leaves (transpiration). It was calculated using the common method of multiplying a reference value of ET by a crop coefficient that reflects differences in physical characteristics between the type of vegetation in a recharge zone and the reference conditions. Measured daily reference evapotranspiration (ETo) was downloaded from the California Irrigation Management Information System (CIMIS) for the San Benito station located at the District's offices on the eastern outskirts of Hollister (Station # 126).

Monthly ET crop coefficients (Kc) for each crop type were adapted from several sources (California Department of Water Resources, 1975; Snyder and others, 2007; Williams, 2001; U.N. Food and Agriculture Organization) and are shown in **Table G-3** (located at the end of the section). Note that each recharge zone was assumed to comprise impervious, irrigated and non-irrigated land cover, with the corresponding percentages reflecting the primary land use (residential, industrial, natural, cropland).

**Irrigation** – For irrigated areas, irrigation demand is estimated based on the accumulated soil moisture deficit since the last rainfall or irrigation event. Irrigation is triggered on the day when soil moisture drops below a threshold, which was set to 80 percent of soil moisture capacity for most crops. The amount of irrigation water applied was calculated as the accumulated soil moisture deficit (in inches) divided by the irrigation efficiency. Irrigation efficiency was assumed to be 85 percent for all commercial crops except vineyards. The over-applied water (15 percent of the application in this case) causes the soil moisture profile to over-fill, and the excess becomes deep percolation. Inefficiency due to evaporation of sprinkler spray, overspray onto impervious surfaces, or runoff is not considered.

Vineyards are drip irrigated and typically grown under a "regulated deficit irrigation" (RDI) regimen during mid-July through harvest. RDI deliberately under-irrigates the vines and imposes mild water stress. Drip irrigation was assumed to be 95 percent efficient outside the RDI season and 100 percent efficient during the season.

**Soil Moisture Capacity** - The maximum soil moisture capacity is the total amount of water that can be stored in the root zone of a specific soil with a given land cover. Any additional water introduced into the root zone results in deep percolation to the shallow groundwater zone. Maximum soil moisture capacity is derived from the available capacity of a soil (the moisture range between field capacity and permanent wilting point, in inches per inch) and the rooting depth of the land cover/crop. The rooting depths were compiled from a variety of sources including Blaney and others (1963) for native vegetation, United Nations FAO Irrigation and Drainage Paper No. 56 for crops (2006), and Dunne and Leopold (1978) for bare soils. The available water capacity was based on the Natural Resources

Conservation Service soil survey. The soil moisture budget simulation is continuous, so the ending soil moisture for one year becomes the initial soil moisture balance for the following year. Parameters for the shallow groundwater zone were set to allow all deep percolation from the root zone to become regional groundwater recharge, with no seepage into local stream channels. Accretions to small stream base flow typically occur only when peripheral watershed areas are being simulated.

The soil moisture budget accounting comingles rainfall infiltration and applied irrigation water. For the purposes of the annual report, deep percolation from natural and irrigation sources are reported separately in the water balance tables. The irrigation component is calculated as:

Irrigation deep percolation = Applied irrigation water * (1 – irrigation efficiency)

The natural component equals the remainder of the total deep percolation.

Paicines and Tres Pinos Creek Valleys are outside the area covered by the current groundwater model and were not included in the simulated recharge zones. Irrigation demand and groundwater recharge for those areas were estimated from simulation results for a mix of zones with similar crops within Zone 6.

**Reclaimed Water Percolation.** Several municipalities have wastewater treatment plants (WWTPs) within the basin, including the Tres Pinos, Cielo Vista, and San Juan Bautista WWTPs, one active sites operated by Sunnyslope County Water District near Ridgemark, and the City of Hollister domestic and industrial plants (DWTP and IWTP, respectively). Tres Pinos, SSCWD and the City of Hollister have percolation ponds where treated wastewater is percolated to the groundwater aquifer. The total volume percolated is reported by facility in **Appendix D** for water years 2015 through 2017. The percolation from each facility is assigned to one or more subbasins. The distribution of reclaimed water percolation is shown in **Table G-4**. The proportions of IWTP recharge percolating into the San Juan and Hollister West subbasins are estimated and can change over time.

**Table G-4. Percent of WW percolating in each subbasin**

| | San Juan | Hollister West | Tres Pinos |
|---|---|---|---|
| Hollister -- domestic | 100 | | |
| Hollister -- industrial | 50 | 50 | |
| Ridgemark Estates I & II | | | 100 |
| Tres Pinos | | | 100 |

**Subsurface Inflow.** Subsurface groundwater flow to and from individual subbasins was calculated for 2015-2017 using Darcy's Law. The Darcy's Law estimates for 2015-2017 were derived from the slopes on groundwater contour maps and the flux calculated based on estimated hydraulic conductivity. In prior years, minor adjustments to groundwater inflows and outflows were made if they were consistent with general changes in groundwater elevations and reduced the discrepancies between the two estimates of storage change for the subbasin.

**Table G-4. Inflows and Outflows Based on Darcy's Flow Equation**

| | 2015 Totals (AF) | | 2016 Totals (AF) | | 2017 Totals (AF) | |
|---|---|---|---|---|---|---|
| | Inflow | Outflow | Inflow | Outflow | Inflow | Outflow |
| Pacheco | 2,647 | 1,913 | 2,841 | 2,578 | 3,081 | 1,667 |
| Bolsa South East | 5,398 | 3,485 | 4,142 | 1,909 | 4,317 | 1,465 |
| San Juan | 49 | 11 | 109 | 14 | 74 | 16 |
| Hollister West | 4,288 | 5,398 | 6,908 | 4,142 | 6,775 | 4,317 |
| Hollister East | 4,101 | 2,080 | 3,985 | 2,338 | 3,663 | 2,595 |
| Tres Pinos | 2,310 | 1,379 | 2,859 | 1,877 | 2,610 | 2,332 |
| | | | | | | |
| Bolsa | 6,866 | 0 | 8,055 | 0 | 5,916 | 0 |
| Paicines | 0 | 500 | 0 | 500 | 0 | 500 |
| Tres Pinos Creek Valley | -- | 2,310 | -- | 2,859 | -- | 2,610 |
| Total | 9,176 | 1,379 | 10,914 | 1,877 | 8,526 | 2,332 |

## Outflows

The major outflows from the subbasins in Zone 6 and surrounding areas are groundwater pumping (agricultural and M&I plus domestic) and surface and subsurface outflow.

**Pumping.** Groundwater pumping in Zone 6 is metered by means of hour meters on irrigation wells that are read three times per water year in early spring, summer, and early fall. Groundwater meters are categorized as agriculture use, domestic use, or municipal use. Monthly data for municipal wells are also received directly from the City of Hollister, SSCWD, City of San Juan Bautista, and Tres Pinos Water District. For areas outside of Zone 6 (Bolsa, Pacheco Valley, Tres Pinos Creek Valley, and Paicines), agricultural pumping is estimated using the soil moisture budget. The irrigation needs of the subbasins are based on land use, crop evapotranspiration coefficient, and irrigation efficiency. Domestic and municipal use in the Bolsa and Pacheco subbasins are assumed negligible.

Agricultural pumping is also calculated using the soil moisture balance described in the inflow section. The calculated pumping (estimated groundwater needed to meet the applied water demand of the specific crops) is significantly different than the reported pumping. It is unclear why this discrepancy exists and it is recommended the District is investigating the accuracy of their meters. For purposes of this annual report, the reported groundwater use was used to remain consistent with previous years.

**Groundwater Outflow.** Subsurface outflow is determined by the same method as groundwater inflow. The Darcy's Law estimates for 2015-2017 were derived from the slopes on groundwater contour maps and the flux calculated based on estimated hydraulic conductivity.

## Change in Storage

The change in groundwater storage can be estimated two ways. The first is simply:

Inflows- Outflows = Change in Storage

The second method, described in detail in the groundwater elevations section of the report, involves analysis of the change in groundwater elevations and the regional storativity values.

## Conclusion

The water balance analysis provides independent estimation of each element with consistent methodology, and thereby provides a useful check on the current basin conceptualization. The water balance can be used to help illustrate and document changes in groundwater basin conditions, and can indicate changes in groundwater use, hydrologic conditions, or groundwater management. Consistent with SGMA requirements, the water balance will be analyzed for historical, current, and future conditions in the GSP and then updated and reported annually. As part of GSP preparation, development of an updated hydrogeologic conceptual model, improved numerical model, and expanded monitoring program will support more accurate and reliable water balance analyses. The forthcoming water balances also will address the full extent of the DWR-defined Bolsa, Hollister, and San Juan Bautista groundwater basins.

Table G-5. Water Balance for Water Year 2006 (AFY)

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow* | 1,659 | 0 | 1,410 | 1,134 | 2,681 | 378 | 7,263 | 500 | 238 | 2,521 | 10,522 |
| Reservoir releases | 0 | 0 | 587 | 1,222 | 0 | 407 | 2,217 | 0 | 0 | 0 | 2,217 |
| CVP Percolation | 0 | 0 | 0 | 451 | 0 | 1 | 452 | 0 | 0 | 0 | 452 |
| Deep percolation through soils | | | | | | | | | | | |
| Rainfall+ | 1,763 | 699 | 5,499 | 1,396 | 2,859 | 842 | 13,059 | 3,853 | 451 | 110 | 17,472 |
| Irrigation | 447 | 252 | 1,262 | 194 | 953 | 100 | 3,207 | 623 | 102 | 32 | 3,964 |
| Reclaimed water percolation | 0 | 0 | 2,402 | 606 | 0 | 249 | 3,257 | 0 | 0 | 0 | 3,257 |
| Groundwater inflow | 4,000 | 3,750 | 500 | 2,750 | 1,250 | 4,000 | 16,250 | 6,000 | 500 | 500 | 23,250 |
| Total | 7,869 | 4,700 | 11,660 | 7,753 | 7,743 | 5,978 | 45,704 | 10,976 | 1,290 | 3,162 | 61,133 |
| **Outflows** | | | | | | | | | | | |
| Wells | | | | | | | | | | | |
| Agricultural | 1,029 | 1,856 | 5,822 | 1,422 | 1,263 | 842 | 12,234 | 6,234 | 1,016 | 316 | 19,800 |
| Domestic and M & I | 180 | 8 | 919 | 3,211 | 1,292 | 1,645 | 7,255 | 0 | 0 | 49 | 7,304 |
| Groundwater outflow | 4,250 | 2,000 | 2,000 | 3,750 | 1,500 | 2,750 | 16,250 | 5,250 | 500 | 500 | 22,500 |
| Total | 5,458 | 3,864 | 8,741 | 8,383 | 4,055 | 5,238 | 35,739 | 11,484 | 1,516 | 865 | 49,603 |
| **Storage change** | | | | | | | | | | | |
| Inflows - outflows | 2,411 | 837 | 2,919 | (630) | 3,688 | 741 | 9,965 | (508) | (225) | 2,298 | 11,530 |
| Water level change | 410 | 245 | 442 | 770 | 1,539 | 409 | 3,815 | 1,195 | 0 | 0 | 5,010 |

*rejected recharge was assumed to be 50 % for Pacheco, natural percolation in San Juan subbasin was also decreased by 50 percent to represent rejected recharge
+Deep percolation from rainfall was decreased by 20 percent to account for additional runoff and rejected recharge during wet times

**Table G-6. Water Balance for Water Year 2007 (AFY)**

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow* | 799 | 0 | 25 | 73 | 319 | 24 | 1,241 | 500 | 34 | 2,673 | 4,448 |
| Reservoir releases | 0 | 0 | 767 | 2,297 | 0 | 766 | 3,830 | 0 | 0 | 0 | 3,830 |
| CVP Percolation | 0 | 0 | 0 | 216 | 0 | 88 | 304 | 0 | 0 | 0 | 304 |
| Deep percolation through soils | | | | | | | | | | | |
| Rainfall | 378 | 179 | 1,166 | 287 | 402 | 66 | 2,478 | 759 | 96 | 17 | 3,350 |
| Irrigation | 457 | 257 | 1,218 | 214 | 1,069 | 95 | 3,311 | 709 | 116 | 35 | 4,170 |
| Reclaimed water percolation | 0 | 0 | 2,354 | 614 | 0 | 158 | 3,126 | 0 | 0 | 0 | 3,126 |
| Groundwater inflow | 4,500 | 3,000 | 250 | 3,000 | 1,250 | 3,000 | 15,000 | 6,000 | 500 | 500 | 22,000 |
| Total | 6,135 | 3,436 | 5,781 | 6,701 | 3,040 | 4,197 | 29,290 | 7,968 | 746 | 3,224 | 41,228 |
| **Outflows** | | | | | | | | | | | |
| Wells | | | | | | | | | | | |
| Agricultural | 810 | 1,998 | 6,562 | 1,662 | 2,366 | 849 | 14,247 | 7,086 | 1,156 | 350 | 22,839 |
| Domestic and M & I | 224 | 7 | 1,096 | 3,456 | 1,501 | 2,013 | 8,297 | 0 | 0 | 46 | 8,343 |
| Groundwater outflow | 4,250 | 2,000 | 500 | 2,750 | 1,500 | 1,250 | 12,250 | 1,500 | 500 | 500 | 14,750 |
| Total | 5,284 | 4,005 | 8,158 | 7,868 | 5,367 | 4,112 | 34,794 | 8,586 | 1,656 | 896 | 45,932 |
| **Storage change** | | | | | | | | | | | |
| Inflows - outflows | 851 | (569) | (2,377) | (1,168) | (2,327) | 85 | (5,504) | (618) | (910) | 2,328 | (4,703) |
| Water level change | (958) | (1,466) | (2,530) | (400) | (2,909) | (220) | (8,482) | (862) | 0 | 0 | (9,344) |

*no rejected recharge removed

**Table G-7. Water Balance for Water Year 2008 (AFY)**

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow* | 1,131 | 0 | 496 | 275 | 726 | 92 | 2,719 | 500 | 146 | 2,669 | 6,035 |
| Reservoir releases | 0 | 0 | 412 | 564 | 0 | 188 | 1,164 | 0 | 0 | 0 | 1,164 |
| CVP Percolation | 0 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 | 0 | 6 |
| Deep percolation through soils | | | | | | | | | | | |
| Rainfall | 1,111 | 556 | 4,414 | 898 | 2,150 | 594 | 9,723 | 2,928 | 224 | 41 | 12,916 |
| Irrigation | 322 | 233 | 958 | 151 | 801 | 66 | 2,531 | 789 | 126 | 37 | 3,483 |
| Reclaimed water percolation | 0 | 0 | 2,209 | 629 | 0 | 158 | 2,996 | 0 | 0 | 0 | 2,996 |
| Groundwater inflow | 4,750 | 4,000 | 250 | 3,000 | 1,000 | 3,500 | 16,500 | 7,000 | 500 | 500 | 24,500 |
| Total | 7,314 | 4,790 | 8,739 | 5,522 | 4,678 | 4,597 | 35,639 | 11,217 | 996 | 3,247 | 51,099 |
| **Outflows** | | | | | | | | | | | |
| Wells | | | | | | | | | | | |
| Agricultural | 1,703 | 2,001 | 6,744 | 1,143 | 2,639 | 567 | 14,796 | 7,889 | 1,255 | 372 | 24,313 |
| Domestic and M & I | 197 | 13 | 1,053 | 3,232 | 1,323 | 2,130 | 7,947 | 0 | 0 | 47 | 7,993 |
| Groundwater outflow | 5,500 | 1,250 | 250 | 3,500 | 1,500 | 2,500 | 14,500 | 1,250 | 500 | 500 | 16,750 |
| Total | 7,400 | 3,264 | 8,046 | 7,875 | 5,462 | 5,197 | 37,243 | 9,139 | 1,755 | 919 | 49,056 |
| **Storage change** | | | | | | | | | | | |
| Inflows - outflows | (85) | 1,525 | 693 | (2,353) | (784) | (600) | (1,604) | 2,078 | (759) | 2,328 | 2,043 |
| Water level change | (298) | 2,483 | 174 | 1,009 | (403) | (158) | 2,807 | 1,796 | 0 | 0 | 4,603 |

*no rejected recharge removed

**Table G-8. Water Balance for Water Year 2009 (AFY)**

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow | 771 | 0 | 666 | 1,517 | 449 | 506 | 3,910 | 500 | 0 | 413 | 4,823 |
| Reservoir releases | 0 | 0 | 1,013 | 2,318 | 0 | 773 | 4,104 | 0 | 0 | 0 | 4,104 |
| CVP Percolation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deep percolation through soils | | | | | | | | | | | |
| Rainfall | 767 | 424 | 2,515 | 676 | 748 | 185 | 5,314 | 1,185 | 182 | 31 | 6,712 |
| Irrigation | 494 | 185 | 910 | 340 | 577 | 111 | 2,618 | 721 | 114 | 34 | 3,488 |
| Reclaimed water percolation | 0 | 0 | 2,190 | 214 | 0 | 191 | 2,594 | 0 | 0 | 0 | 2,594 |
| Groundwater inflow | 3,422 | 1,500 | 260 | 2,032 | 1,000 | 1,644 | 9,858 | 4,000 | 0 | -- | 13,858 |
| Total | 5,454 | 2,109 | 7,554 | 7,098 | 2,774 | 3,409 | 28,398 | 6,407 | 296 | 478 | 35,579 |
| **Outflows** | | | | | | | | | | | |
| Wells | | | | | | | | | | | |
| Agricultural | 3,106 | 2,073 | 10,943 | 1,495 | 3,535 | 600 | 21,753 | 7,213 | 1,140 | 344 | 30,451 |
| Domestic and M & I | 264 | 9 | 1,013 | 2,691 | 1,198 | 2,271 | 7,446 | 0 | 0 | 0 | 7,446 |
| Groundwater outflow | 2,000 | 1,000 | 19 | 1,500 | 2,159 | 2,000 | 8,678 | 0 | 0 | 1,644 | 10,322 |
| Total | 5,370 | 3,082 | 11,975 | 5,686 | 6,892 | 4,871 | 37,877 | 7,213 | 1,140 | 1,988 | 48,218 |
| **Storage change** | | | | | | | | | | | |
| Inflows - outflows | 84 | (974) | (4,421) | 1,412 | (4,118) | (1,462) | (9,478) | (807) | (845) | (1,510) | (12,639) |
| Water level change | 1,639 | (5,338) | (437) | (431) | 4,710 | 1,913 | 2,055 | (3,372) | (343) | (366) | (2,026) |

Adjustments

- Adjusted Bolsa SE/Hollister West subsurface flow
- Adjusted Bolsa/Pacheco subsurface flow
- Adjusted Bolsa/Bolsa SE subsurface flow
- Assumed all San Benito River flows percolate within the basin

**Table G-9. Water Balance for Water Year 2010 (AFY)**

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow | 671 | 0 | 701 | 993 | 467 | 331 | 3,164 | 500 | 0 | (316) | 3,348 |
| Reservoir releases | 0 | 0 | 829 | 1,755 | 0 | 585 | 3,169 | 0 | 0 | 0 | 3,169 |
| CVP Percolation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deep percolation through soils | | | | | | | | | | | |
| Rainfall | 806 | 407 | 2,611 | 749 | 717 | 152 | 5,444 | 1,403 | 231 | 43 | 7,121 |
| Irrigation | 433 | 150 | 766 | 301 | 472 | 88 | 2,210 | 629 | 103 | 33 | 2,975 |
| Reclaimed water percolation | 0 | 0 | 1,940 | 18 | 0 | 191 | 2,150 | 0 | 0 | 0 | 2,150 |
| Groundwater inflow | 2,870 | 2,874 | 36 | 2,021 | 1,041 | 1,901 | 10,742 | 6,600 | 0 | -- | 17,341 |
| Total | 4,780 | 3,431 | 6,883 | 5,837 | 2,698 | 3,248 | 26,877 | 9,132 | 334 | (240) | 36,103 |
| **Outflows** | | | | | | | | | | | |
| Wells | | | | | | | | | | | |
| Agricultural | 2,517 | 1,896 | 8,745 | 1,614 | 3,739 | 575 | 19,087 | 6,294 | 1,032 | 326 | 26,740 |
| Domestic and M & I | 36 | 0 | 816 | 2,467 | 721 | 1,111 | 5,152 | 0 | 0 | 0 | 5,152 |
| Groundwater outflow | 3,108 | 1,473 | 19 | 2,874 | 1,619 | 2,000 | 11,093 | 0 | 0 | 1,901 | 12,994 |
| Total | 5,661 | 3,370 | 9,580 | 6,955 | 6,079 | 3,686 | 35,332 | 6,294 | 1,032 | 2,227 | 44,885 |
| **Storage change** | | | | | | | | | | | |
| Inflows - outflows | (881) | 61 | (2,697) | (1,118) | (3,382) | (438) | (8,455) | 2,838 | (698) | (2,467) | (8,782) |
| Water level change | (1,335) | 5,443 | (811) | (477) | (2,032) | (2,485) | (1,696) | 4,631 | (2,036) | (1,067) | (168) |

Adjustments

- Bolsa SE not adjusted due to uncertainty in the observed groundwater levels
- Reduced Pacheco and Hollister East stream flow to 25 % of calculated
- Reduced subsurface outflow from Pacheco
- Reduced subsurface inflow from Pacheco outside basin
- Reduced subsurface inflow into Tres Pinos
- Assumed 50% of San Benito River flows out of the basin

**Table G-10. Water Balance for Water Year 2011 (AFY)**

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow | 896 | 0 | 2,272 | 1,948 | 693 | 812 | 6,622 | 500 | 1,304 | 3,003 | 11,428 |
| Reservoir releases | 0 | 0 | 846 | 764 | 0 | 318 | 1,929 | 0 | 511 | 0 | 2,440 |
| CVP Percolation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deep percolation through soils | | | | | | | | | | | |
| Rainfall | 1,627 | 475 | 3,034 | 1,383 | 1,230 | 348 | 8,097 | 1,919 | 452 | 120 | 10,588 |
| Irrigation | 435 | 150 | 767 | 301 | 446 | 88 | 2,187 | 577 | 101 | 32 | 2,898 |
| Reclaimed water percolation | 0 | 0 | 2,040 | 233 | 0 | 202 | 2,475 | 0 | 0 | 0 | 2,475 |
| Groundwater inflow | 3,037 | 3,055 | 100 | 2,019 | 900 | 2,003 | 11,115 | 6,676 | 0 | -- | 17,791 |
| Total | 5,995 | 3,680 | 9,059 | 6,648 | 3,269 | 3,772 | 32,424 | 9,672 | 2,369 | 3,155 | 47,620 |
| **Outflows** | | | | | | | | | | | |
| Wells | | | | | | | | | | | |
| Agricultural | 1,910 | 2,775 | 4,664 | 1,801 | 1,247 | 390 | 12,786 | 5,775 | 1,013 | 322 | 19,896 |
| Domestic and M & I | 82 | 6 | 322 | 2,139 | 700 | 2,064 | 5,315 | 0 | 0 | 0 | 5,315 |
| Groundwater outflow | 3,191 | 1,500 | 3,600 | 3,055 | 2,000 | 2,000 | 15,346 | 0 | 0 | 2,003 | 17,349 |
| Total | 5,183 | 4,281 | 8,587 | 6,995 | 3,947 | 4,454 | 33,447 | 5,775 | 1,013 | 2,325 | 42,560 |
| **Storage change** | | | | | | | | | | | |
| Inflows - outflows | 812 | (601) | 473 | (347) | (678) | (682) | (1,023) | 3,897 | 1,356 | 830 | 5,060 |
| Water level change | 389 | (2,508) | (523) | (198) | 570 | 228 | (2,042) | (2,239) | 852 | 2,334 | (1,095) |

Adjustments

Reduced Pacheco stream flow to 25% of calculated
Assumed 58% of San Benito River flows out of the basin
Reduced deep peroclation in San Juan and parts of Bolsa
Adjusted Holliseter West/Tres Pinos interaction
Reduced subsurface inflow from Pacheco outside basin and Holliser East
Increased groundwater outflow from San Juan

**Table G-11. Water Balance for Water Year 2012 (AFY)**

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow | 564 | 0 | 42 | 0 | 261 | 0 | 867 | 0 | 24 | 429 | 1,320 |
| Reservoir releases | 0 | 0 | 0 | 0 | 0 | 1,321 | 1,321 | 0 | 122 | 0 | 1,443 |
| CVP Percolation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deep percolation through soils | | | | | | | | | | | |
| Rainfall | 3,560 | 944 | 4,804 | 1,779 | 4,752 | 1,013 | 16,852 | 6,529 | 799 | 129 | 24,309 |
| Irrigation | 1,096 | 364 | 1,687 | 492 | 2,049 | 278 | 5,964 | 1,928 | 107 | 43 | 8,043 |
| Reclaimed water percolation | 0 | 0 | 2,043 | 303 | 0 | 196 | 2,541 | 0 | 0 | 0 | 2,475 |
| Groundwater inflow | 3,109 | 2,476 | 132 | 2,024 | 980 | 1,849 | 10,571 | 6,676 | 0 | -- | 17,791 |
| Total | 8,257 | 4,363 | 8,673 | 4,522 | 7,962 | 4,817 | 38,594 | 15,133 | 1,053 | 601 | 55,381 |
| **Outflows** | | | | | | | | | | | |
| Wells | | | | | | | | | | | |
| Agricultural | 5,303 | 1,546 | 5,205 | 2,589 | 5,217 | 1,590 | 21,450 | 14,869 | 1,072 | 432 | 35,800 |
| Domestic and M & I | 158 | 4 | 528 | 2,568 | 624 | 2,233 | 6,115 | 0 | 0 | 0 | 6,142 |
| Groundwater outflow | 2,766 | 1,324 | 1,213 | 2,476 | 1,926 | 2,000 | 11,705 | 0 | 0 | 2,003 | 17,349 |
| Total | 8,661 | 3,052 | 9,335 | 8,216 | 7,851 | 5,823 | 42,937 | 12,847 | 1,072 | 2,435 | 59,291 |
| **Storage change** | | | | | | | | | | | |
| Inflows - outflows | (404) | 1,311 | (662) | (3,693) | 112 | (1,005) | (4,343) | 2,285 | (19) | (1,834) | (3,911) |
| Water level change | (882) | 53 | 0 | 640 | (1,096) | 601 | (683) | 2,144 | 0 | 0 | 1,461 |

Adjustments

Agricultural pumping is based on reported groundwater use

**Table G-12. Water Balance for Water Year 2013 (AFY)**

| | Pacheco | Bolsa Southeast | San Juan | Hollister West | Hollister East | Tres Pinos | Zone 6 Subtotal | Bolsa | Paicines | Tres Pinos Creek Valley | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inflows** | | | | | | | | | | | |
| Stream percolation | | | | | | | | | | | |
| Natural streamflow | 340 | 0 | 214 | 0 | 163 | 0 | 716 | 0 | 69 | 246 | 1,031 |
| Reservoir releases | 0 | 0 | 0 | 0 | 0 | 677 | 677 | 0 | 151 | 0 | 828 |
| CVP Percolation | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Deep percolation through soils | | | | | | | | | | | |
| Rainfall | 1,036 | 248 | 1,530 | 549 | 1,210 | 313 | 4,886 | 1,891 | 293 | 24 | 7,094 |
| Irrigation | 1,134 | 375 | 1,681 | 515 | 1,970 | 312 | 5,987 | 2,231 | 140 | 64 | 8,422 |
| Reclaimed water percolation | 0 | 0 | 1,055 | 166 | 0 | 209 | 1,430 | 0 | 0 | 0 | 2,475 |
| Groundwater inflow | 3,109 | 2,476 | 132 | 2,024 | 980 | 1,849 | 10,571 | 6,676 | 0 | -- | 17,791 |
| Total | 5,547 | 3,678 | 5,565 | 3,316 | 4,243 | 3,507 | 25,856 | 10,798 | 654 | 334 | 37,641 |
| **Outflows** | | | | | | | | | | | |
| Wells | | | | | | | | | | | |
| Agricultural | 4,056 | 2,344 | 10,497 | 2,999 | 4,420 | 580 | 24,896 | 14,869 | 1,404 | 639 | 42,728 |
| Domestic and M & I | 101 | 4 | 548 | 2,656 | 1,009 | 1,872 | 6,190 | 0 | 0 | 0 | 6,191 |
| Groundwater outflow | 2,766 | 1,324 | 1,213 | 2,476 | 1,926 | 2,000 | 11,705 | 0 | 0 | 2,003 | 17,349 |
| Total | 9,421 | 3,176 | 13,294 | 6,983 | 8,832 | 5,648 | 47,353 | 14,869 | 1,404 | 2,642 | 66,267 |
| **Storage change** | | | | | | | | | | | |
| Inflows - outflows | (3,873) | 502 | (7,729) | (3,667) | (4,589) | (2,141) | (21,497) | (4,071) | (750) | (2,309) | (28,627) |
| Water level change | (597) | (918) | (6,239) | (1,730) | 351 | (586) | (9,718) | (674) | 0 | 0 | (10,392) |

Adjustments

Agricultural pumping is based on reported groundwater use

# H SGMA SUPPORT

## List of Documents

- Resolution No. 2017-03
- MOU with SCVWD

**RESOLUTION NO. 2017-03**

**A RESOLUTION OF THE BOARD OF DIRECTORS SAN BENITO COUNTY WATER DISTRICT'S DECISION TO BECOME THE GROUNDWATER SUSTAINABILITY AGENCY FOR THE BOLSA, HOLLISTER, AND SAN JUAN SUBBASINS WITHIN SAN BENITO COUNTY**

**WHEREAS**, on September 16, 2014, the Sustainable Groundwater Management Act (SGMA) was signed into law and adopted into the California Water Code, commencing with Section 10720; and

**WHEREAS**, the legislative intent of SGMA is to provide for the sustainable management of groundwater basins, to enhance local management of groundwater, to establish minimum standards for sustainable groundwater management; and to provide local groundwater agencies with the authority and the technical and financial assistance necessary to sustainably manage groundwater; and

**WHEREAS,** Water Code Sections 10725 et al. and 10726 et al. detail additional new powers and authorities granted to Groundwater Sustainability Agencies to implement sustainable groundwater management in the basins under their jurisdictions; and

**WHEREAS**, the San Benito County Water District Act (California Water Code Appendix, Chapter 70) provides the District with broad groundwater management authority, including the authority to conserve water for beneficial and useful purposes by spreading, storing, retaining, and causing such waters to percolate into the soil within or without the District; and

**WHEREAS**, the District's statutory boundary overlies the Bolsa, Hollister, and San Juan Subbasins within San Benito County; and

**WHEREAS**, the Bolsa, Hollister, and San Juan Subbasins are deemed by the California Department of Water Resources (DWR) to be medium-priority basins and therefore require the development of a Groundwater Sustainability Plan; and

**WHEREAS**, establishing the District as the Groundwater Sustainability Agency will enable the District to prepare and implement a Groundwater Sustainability Plan (GSP) for the Bolsa, Hollister, and San Juan Subbasins within San Benito County, and to best work with DWR and the State Water Resources Control Board to resolve groundwater and surface water issues related to the Bolsa, Hollister, and San Juan Subbasins within San Benito County; and

**WHEREAS**, the District is committed to its legislatively created mandate to manage the surface water and groundwater resources within its jurisdiction; and

**WHEREAS**, prior to adopting a resolution of intent to establish the District as a Groundwater Sustainability Agency, Water Code Section 10723 requires the local agency to hold a public hearing, after publication of notice pursuant to California Government Code Section 6066, on whether or not to adopt a resolution to establish a Groundwater Sustainability Agency; and

**WHEREAS**, pursuant to Government Code 6066, notices of a public hearing on whether or not to adopt a resolution to establish a Groundwater Sustainability Agency were published on January 27, 2017 and February 3, 2017; and

**WHEREAS**, on February 8, 2017, this District held a public hearing regarding the adoption of a resolution to establish the District as the Groundwater Sustainability Agency for the Bolsa, Hollister, and San Juan Subbasins within San Benito County;

NOW, THEREFORE BE IT RESOLVED that the Board of Directors of the San Benito County Water District:

1. Hereby establishes the District as the Groundwater Sustainability Agency for the Bolsa, Hollister, and San Juan Subbasins within San Benito County; and

2. Hereby authorizes the District Manager or his designee to provide a copy of this resolution and a Notice of Intent to the California Department of Water Resources within 30 days and to otherwise comply with the requirements of Water Code Section 10723.B(a); and

3. All the recitals in this Resolution are true and correct and the District so finds, determines, and represents.

**PASSED AND ADOPTED** at a Special Meeting of the Board of Directors of San Benito County Water District by the following vote on February 8, 2017:

AYES: Tobias, Tonascia, Bettencourt, Flores & Huenemann
NOES: None
ABSENT: None
ABSTAIN: None

John Tobias
President

ATTEST:

Sara Singleton
Assistant Manager

# MEMORANDUM OF UNDERSTANDING BETWEEN SANTA CLARA VALLEY WATER DISTRICT AND SAN BENITO COUNTY WATER DISTRICT FOR SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE

THIS MEMORANDUM OF UNDERSTANDING ("MOU"), made in the State of California on July 5, 2017, is by and between the Santa Clara Valley Water District ("SCVWD"), and the San Benito County Water District ("SBCWD"), each a "Party" and collectively the "Parties."

This MOU sets forth the respective roles and responsibilities of the Parties regarding coordination to sustainably manage groundwater in the Hollister Area Subbasin and San Juan Bautista Area Subbasin.

## RECITALS

WHEREAS, the SCVWD, an independent special district created by the Legislature of the State of California, manages groundwater and is the primary water resource agency for Santa Clara County, supplying wholesale water, providing flood protection and serving as environmental steward for clean, safe creeks and healthy ecosystems; and

WHEREAS, the SBCWD, a water conservation and flood control district, preserves the economic and environmental health and well-being of San Benito County through the control, management and conservation of waters and the provision of water services in a practical, cost-effective and responsible manner; and

WHEREAS, the Sustainable Groundwater Management Act ("Act"), enacted by the State of California, provides that local agencies may become a Groundwater Sustainability Agency ("GSA") and adopt a Groundwater Sustainability Plan ("GSP") to manage groundwater basins within the local agency's statutory jurisdiction; and

WHEREAS, the Act and this MOU define "basin" as a basin or subbasin identified and defined in California Department of Water Resources (DWR) Bulletin 118; and

WHEREAS, the Act requires that the entirety of each medium- and high-priority basin, as defined by DWR, be covered by a GSA by June 30, 2017 to avoid potential state intervention; and

WHEREAS, the service area of each Party overlies two common groundwater basins as defined by the Act and DWR: the Hollister Area Subbasin (DWR Basin 3-3.03) and the San Juan Bautista Area Subbasin (DWR Basin 3-3.04), collectively the "Common Basins"; and

WHEREAS, the SBCWD manages groundwater within San Benito County, including the majority of the Common Basins and the entirety of the Bolsa Area Subbasin (DWR Basin 3-3.02); and

WHEREAS, small portions of the Common Basins are located within Santa Clara County; and

WHEREAS, in terms of surface area, Santa Clara County contains less than ten percent of the Hollister Area Subbasin and less than one percent of the San Juan Bautista Area Subbasin; and

WHEREAS, the SCVWD has not previously conducted groundwater management activities in the Santa Clara County portions of the Common Basins other than permitting the construction, modification, and destruction of wells; and

WHEREAS, following a public hearing on February 8, 2017, the SBCWD Board of Directors adopted Resolution 2017-03 establishing the SBCWD as the GSA for the portions of the Common Basins located within San Benito County; and

WHEREAS, following a public hearing on June 13, 2017, the SCVWD Board of Directors adopted Resolution 17-38 establishing the SCVWD as the GSA for the portion of the Common Basins in Santa Clara County; and

WHEREAS, the action of each Party to adopt a resolution to become the GSA and submit related notification to DWR ensures the entirety of the Common Basins is covered by a GSA with no areas of overlap; and

WHEREAS, each Party is a local agency qualified to prepare and adopt a GSP under the Act; and

WHEREAS, the entirety of each basin subject to the Act that is not in a condition of critical overdraft must be addressed by a GSP by January 31, 2022; and

WHEREAS, if there are multiple GSAs within a basin, the GSAs can develop a single GSP for the entire basin or separate GSPs, provided there is a related coordination agreement; and

WHEREAS, for the purposes of this MOU, "GSP" is defined as one or more GSPs developed by the Parties for the entirety of the Common Basins; and

WHEREAS, GSAs are responsible for ensuring long-term groundwater sustainability through implementation of a GSP; and

WHEREAS, the Parties wish to provide a framework for cooperative groundwater management efforts in the Common Basins to ensure the Act is implemented effectively, efficiently, fairly, and at the lowest reasonable cost.

NOW, THEREFORE, in consideration of the recitals and mutual obligations of the Parties expressed herein, the Parties agree as follows:

**1. Purpose**

The purpose of this MOU is to establish an understanding between the Parties with regard to preparing a GSP for the Common Basins, including responsibilities and funding obligations.

**2. Term**

a) This MOU shall become effective upon its execution by both Parties.

b) This MOU will terminate when the Parties agree, in writing, that the GSP is complete to the satisfaction of DWR.

c) Payment obligations under Article 6, Cost Sharing and Payment, and Article 11, Cancellation, shall survive discharge or termination of this MOU until obligations are satisfied.

**3. Responsibilities of the Parties**

General responsibilities of the Parties regarding the Common Basins are as follows:

a) Ensure all required GSA filings are complete and submitted to DWR by the June 30, 2017 statutory deadline.

b) Develop a schedule to prepare a GSP for the Common Basins for consideration by the Board of Directors of both Parties.

c) Share relevant data on geology, hydrogeology, operations, or other information that may be needed to develop or implement a GSP.

d) Coordinate to conduct stakeholder outreach related to GSP development and adoption.

e) Submit the GSP to DWR by the January 31, 2022 statutory deadline.

f) Ensure all work related to this MOU is performed in accordance with the California Environmental Quality Act and other applicable laws.

g) Coordinate to respond to public comments on the GSP for the Common Basins, as applicable.

h) Address any issues or deficiencies raised by DWR during their review of the GSP within the required time.

i) Explore the role of each Party in implementing the GSP to ensure long-term sustainability and compliance with the Act. The role of each Party will be documented in a future MOU or other agreement. This MOU does not obligate either Party to implement specific groundwater management actions in the Common Basins.

**4. Responsibilities of SBCWD**

a) SBCWD will act as the contracting entity under this MOU. Subject to approval by SBCWD's authorized representative, SBCWD shall be responsible for executing any Consultant Contract(s) to undertake development of the GSP. SBCWD shall conduct a consultant procurement process that satisfies its own internal consultant procurement policies/criteria.

b) Share relevant data and information with SCVWD as requested.

c) Notify SCVWD of the Consultant(s) selected to develop the GSP.

d) Solicit SCVWD comments on any Consultant Contract(s) related to GSP development prior to execution.

e) Review Consultant invoices for approval and report disputes, if any, to SCVWD within five (5) working days of receipt of invoice. Pay approved invoices and provide copies of invoices to SCVWD with requests for reimbursement as described in Article 6.

f) Solicit SCVWD comments on Consultant deliverables prior to acceptance.

**5. Responsibilities of SCVWD**

a) Share relevant data and information with SBCWD as requested.

b) Provide comments on proposed Consultant Contract(s) within five (5) working days of receipt.

c) Provide comments on Consultant deliverables within five (5) working days, or other schedule as mutually agreed upon. The SCVWD technical review period for the draft GSP will be a minimum of ten (10) working days.

d) Reimburse SBCWD in accordance with Article 6.

**6. Cost Sharing and Payment**

The estimated Consultant cost to develop a GSP for the Common Basins is expected to be less than $250,000. Additional Consultant work may be needed to respond to issues raised during DWR review of the GSP. SCVWD agrees to reimburse SBCWD for 10% of the total Consultant cost, with a maximum contribution of $35,000, unless additional funding is authorized in writing through an amendment pursuant to Article 13 of this MOU.

a) SBCWD shall request reimbursement from SCVWD by submitting invoice(s) for incurred Consultant contract costs no more than once a calendar quarter. The invoice(s) shall clearly indicate the SCVWD cost share and shall be accompanied by adequate supporting documentation of related Consultant contract costs, including the hourly rates, hours spent, and information on activities performed in support of the scope of services specified in the Consultant contract(s).

b) Following review and approval of an invoice by SCVWD, SCVWD shall disburse to SBCWD the approved amount within thirty (30) days of receipt of the invoice.

c) An invoice may be rejected by SCVWD only if the invoice contains a material error or paying the invoice would result in SCVWD exceeding its maximum contribution described in this Article. SCVWD shall notify SBCWD of any invoice so rejected, and the reasons therefore.

d) Costs incurred by SBCWD for "in-kind" services including staff time and overhead costs, as well as costs for Consultant oversight, meetings, travel, and incidental expenses shall not be reimbursable by SCVWD.

## 7. Hold Harmless, Indemnification, Remedies, and Insurance

To the extent permitted by California State law and in proportion to fault, each Party will indemnify, defend, and hold all other Parties and their directors, officers, agents, and employees safe and harmless from any and all claims, suits, judgments, damages, penalties, costs, expenses, liabilities and losses (including without limitation, sums paid in settlement of claims, actual attorneys' fees, paralegal fees, consultant fees, engineering fees, expert fees, and any other professional fees) that arise from or are related in any way to each Party, its employees, officers, or other agents in the operation and/or performance of this MOU; provided, however, that no Party shall indemnify or hold harmless another Party for that Party's own negligent acts, errors, or omissions, or willful misconduct, in the operation and/or performance of this MOU or the performance of the Consultant(s).

Notwithstanding the preceding paragraph, where more than one Party is named in a suit challenging the GSP regarding the Common Basins, or made subject to a claim or penalty regarding the same, the Parties shall coordinate and undertake a joint defense, utilizing a joint defense agreement to the extent possible, subject to the approval of the Parties. Each Party agrees that, to the greatest extent practicable, it shall cooperate in such defense and execute any waivers and/or tolling agreements that may be necessary in order to provide for a single joint defense of such a suit, claim, or imposition of penalty. Any communications between the Parties and any of their respective consultants and attorneys engaged in the joint defense shall be privileged as joint defense communications. Work performed during the joint defense by Consultants or attorneys, to the extent allowed by law, shall be considered attorney work product. Nothing in this paragraph is intended to require a joint defense under circumstances where it would be legally impermissible or under circumstances where it is wholly impractical.

This indemnity provision shall survive the termination of this MOU and the termination of any Party's participation in this MOU. Further, each Party will be liable to the other Party for attorneys' fees, costs, and expenses, and all other costs and expenses whatsoever, which are incurred by the other Party in enforcing this indemnity provision.

In all Consultant contracts funded in whole or part by the Parties, SBCWD shall name the SCVWD and its respective officers, agents, and employees as additional insureds and additional indemnitees in the insurance coverage and indemnity provisions customarily used in the SBCWD professional service contracts.

## 8. Disputes

Any claim that a Party may have against the other Party regarding the performance of this MOU including, but not limited to, claims for compensation will be submitted to such other Party. The Parties will attempt to negotiate a resolution of such claim and if necessary process an amendment to this MOU or a settlement agreement to implement the terms of any such resolution.

## 9. Cancellation

If a Party elects to terminate its participation in this MOU, it may do so by delivering to the other Party a written notice of intention to terminate. Termination shall take effect thirty days following the receipt of notice by the other Party. No portion of the terminating Party's financial contribution provided under this MOU shall be refunded to the terminating Party.

## 10. Maintenance and Inspection of Books, Records, and Reports

The Parties will, upon reasonable advance written notice, make available for inspection by the other Party all records, books, and other documents directly relating to the GSP or groundwater management for the Common Basins. Prior to release of such documents (other than in response to a request under the California Public Records Act, a subpoena, or court order), all draft information shall be approved by both Parties for finalization and release.

## 11. MOU Not a Precedent

The Parties intend that the provisions of this MOU will not bind the Parties as to the provisions of any future agreement between them. This MOU was developed specifically for the specified MOU term and purpose.

## 12. Notices

Any notice, demand, or request made in connection with this MOU must be in writing and will be deemed properly served if delivered in person or sent by Unites States mail, postage prepaid, to the addresses specified herein.

Santa Clara Valley Water District
Attention: Garth Hall, Deputy Operating Officer, Water Supply
5750 Almaden Expressway
San Jose, CA 95118

San Benito County Water District
Attention: Jeff Cattaneo, District Manager
30 Mansfield Road, PO Box 899
Hollister, CA 95024

Any Party may change such contact or address by notice given to the other Party as provided herein.

## 13. Amendments

The MOU may be amended in the form of written amendment executed by both Parties.

## 14. Assignment

No Party shall assign, sublet, or transfer this MOU or any of the rights or interests in this MOU without the written consent of the other Party.

## 15. Severability

The partial or total invalidity of one or more parts of this MOU will not affect the intent or validity or remaining parts of this MOU.

**16. Governing Law**

This MOU will be deemed a contract under the laws of the State of California and for all purposes shall be interpreted in accordance with such laws.

**17. Interpretation**

This MOU shall be deemed to have been prepared equally by both Parties, and its individual provisions shall not be construed or interpreted more favorably for one Party on the basis that the other Party prepared it.

**18. Contractual Restriction on Consultant's Use of Study Materials**

Each Party shall ensure that reasonable contractual restrictions on the consultant's use of the study material and handling of confidential material are included in a written agreement with the consultant.

**19. No Third-Party Beneficiaries**

This MOU does not and is not intended to confer any rights or remedies upon any person or entity other than the Parties.

*Remainder of Page Intentionally Left Blank*

In WITNESS WHEREOF, the parties have executed this MOU as of the effective date.

**San Benito County Water District**

Approved as to Form

NAME DAVID E. PIPAL
General Counsel

Jeff Cattaneo
General Manager

7/5/17
Date

**Santa Clara Valley Water District**

Approved as to Form

Erick Soderlund
Assistant District Counsel

Norma Camacho
Interim Chief Executive Officer

6/19/2017
Date

I

# LIST OF ACRONYMS

| | |
|---|---|
| AF | acre-foot |
| AFY | acre-foot per year |
| ag | agriculture |
| CASGEM | California Statewide Groundwater Elevation Monitoring |
| CDHSPH | California Department of Public Health |
| CEQA | California Environmental Quality Act |
| cfs | cubic feet per second |
| CIMIS | California Irrigation Management Information System |
| COC | Constituent of Concern |
| CVP | Central Valley Project |
| District or SBCWD | San Benito County Water District |
| DWR | California Department of Water Resources |
| DWTP | Domestic Wastewater Treatment Plant |
| ET | evapotranspiration |
| ft | feet |
| gpd | gallons per day |
| GSA | Groundwater Sustainability Agency |
| GSP | Groundwater Sustainability Plan |
| gw | groundwater |
| IRWMP | Integrated Regional Water Management Plan |
| ITRC | Irrigation Training and Research Center, California Polytechnic State University |
| IWTP | Industrial Wastewater Treatment Plant |
| M&I | Municipal and Industrial |
| MGD | million gallons per day |
| OCR | Optical Character Recognition |
| pdf | Adobe Acrobat Portable Document Format |
| PVWMA | Pajaro Valley Water Management Agency |
| RW | recycled water |
| RWQCB | Regional Water Quality Control Board |
| SCVWD | Santa Clara Valley Water District |
| SEIR | Supplemental Environmental Impact Report |
| SGMA | Sustainable Groundwater Management Act |
| SLDMWA | San Luis & Delta-Mendota Water Authority |
| SSCWD | Sunnyslope County Water District |
| USBR | U.S. Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| WRA | Water Resources Association of San Benito County |
| WTP | Water Treatment Plant |
| WWTP | Wastewater Treatment Plant |
| WY | water year |

# San Benito County Water District

## Annual Groundwater Report 2018

TODD GROUNDWATER

# ANNUAL GROUNDWATER REPORT

December 2018

TODD GROUNDWATER

2490 Mariner Square Loop, Suite 215
Alameda, CA 94501
510.747.6920
www.toddgroundwater.com

# SIGNATURE PAGE

Iris Priestaf, PhD

President



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# Appendices (following text)

# EXECUTIVE SUMMARY

This Annual Groundwater Report for San Benito County Water District (District) describes groundwater conditions in the San Benito County portion of the Gilroy-Hollister Basin. Prepared at the request of the District Board of Directors and consistent with the special act of the State that established the District, it documents water sources and uses, groundwater elevations and storage, and management activities for water year 2018 and provides recommendations.

2018 was a dry year. However, Central Valley Project (CVP) water allocations for agriculture and for municipal uses for March 2017-February 2018 were set at 100 percent of the contract and for March 2018-February 2019 were set at 50 percent and 75 percent respectively. The District is using this available imported water, providing it to agricultural users, treating CVP water in the newly-expanded Lessalt and newly-completed West Hills water treatment plants for municipal users, and percolating CVP water in off-stream ponds. In 2018, groundwater elevations generally rose across the basin. Overall, the basin is recovering from the most recent drought (2011-2016) but at a slower rate than in the wet year of 2017. Groundwater storage increased overall despite local declines in Pacheco and Bolsa subbasins.

The District has effectively managed water resources in San Benito County for decades. Working collaboratively with other agencies, the District has eliminated historical overdraft, developed and managed multiple sources of supply, established an effective water conservation program, protected water quality, and provided annual reporting.

Passage of the Sustainable Groundwater Management Act (SGMA) in 2014 has created a new framework for groundwater basin management, monitoring, and reporting by local agencies and the District has responded proactively, becoming the exclusive Groundwater Sustainability Agency (GSA) for the subbasins of the Gilroy-Hollister Basin within San Benito County and the adjoining Tres Pinos Valley Basin. As of 2018, SBCWD is progressing toward consolidation of these basins into a single North San Benito Basin and has initiated preparation of a Groundwater Sustainability Plan (GSP) for the North San Benito Basin. In 2018, SBCWD was awarded a State-funded grant of $830,000 to help fund preparation of the GSP.

GSP development in the North San Benito Basin is based on a strategy to:

- Build on existing monitoring, management, and reporting
- Extend existing monitoring, management, and reporting to the entire North San Benito Basin
- Update and refine existing plans, programs, and management tools to address SGMA criteria
- Comply with SGMA requirements and preserve local control of groundwater management.

This strategy recognizes that, while historical management has been effective, SGMA has requirements that are more detailed and comprehensive than ever before. This affects the Annual Reports, which are being modified to satisfy SGMA and GSP regulations, while continuing to fulfill requirements of the District Act. Consistent with the District Act, recommendations are provided regarding continuation of District importation of CVP water and percolation activities and definition of groundwater charges. A key recommendation is to expand the District's groundwater monitoring network to the entire North San Benito Groundwater Basin and to improve the monitoring program to ensure accurate and consistent data for the Annual Reports and for GSP development.

# 1-INTRODUCTION

The San Benito County Water District (District or SBCWD) was formed in 1953 by a special act (District Act) of the State with responsibility and authority to manage groundwater. The District Act allows the Board of Directors to require an annual investigation and report on groundwater conditions of the District and its zones of benefit, such as Zone 6, the area for distribution of Central Valley Project (CVP) water. As documented in **Appendix A,** the District Act specifies the minimum content of the report should the District choose to prepare one. Annual Reports have been prepared historically to analyze the status of the groundwater basin, to evaluate conditions in the next year, and to provide management recommendations. Previous Annual Reports have focused on portions of the Gilroy-Hollister Basin within San Benito County and on Zone 6.

With passage of the Sustainable Groundwater Management Act (SGMA) in 2014, the State has created a new framework for groundwater basin management, monitoring, and reporting by local agencies. The District has responded proactively. In 2017, the District became the exclusive Groundwater Sustainability Agency (GSA) for the subbasins of the Gilroy-Hollister Basin within San Benito County and in 2018 became GSA for the adjoining Tres Pinos Valley Basin. Santa Clara Valley Water District (SCVWD) is the GSA for small portions of the Gilroy-Hollister basin in Santa Clara County. Recognizing that the Gilroy-Hollister and Tres Pinos Valley basins are hydraulically connected, SBCWD is seeking their consolidation into a single basin, termed the North San Benito Basin. SBCWD currently is preparing a Groundwater Sustainability Plan (GSP) for the North San Benito Basin in cooperation with SCVWD for the small portions of the newly defined basin within Santa Clara County. In 2018, SBCWD was awarded a State-funded grant of $830,000 to help fund preparation of the GSP.

Consistent with the District Act and prepared at the request of the District, this Annual Report documents water supply sources and use, groundwater elevations and storage, and District management activities from October 2017 through September 2018. It fulfills the minimum content for a District Annual Report and presents an overview of the state of the groundwater basin with recommendations for management. It conveys considerable information, including tables and figures, which are provided largely in **Appendices B through E**. **Appendix F** provides information on water rates and charges and **Appendix G** contains a list of acronyms.

The sections of this Annual Groundwater Report have been reorganized relative to recent Annual Reports; this reorganization is intended to support a transition to annual reporting as required by SGMA and the SGMA GSP Regulations. As development of the GSP proceeds over the next three years, the SBCWD Annual Reports may be modified further to ensure compliance with SGMA. While complying with GSP regulations, Annual Reports will also adhere to requirements for SBCWD annual reporting, as described in the District Act.

## Acknowledgments

This report was prepared by Iris Priestaf, PhD, Maureen Reilly, PE, and Chad Taylor, PG, CHG of Todd Groundwater. We appreciate the assistance of San Benito County Water District staff, particularly Jeff Cattaneo, Sara Singleton, Garrett Haertel, and David Macdonald.

# 2-GEOGRAPHIC AREA

As described below, the geographic area and boundaries of local groundwater basins have been defined differently by the District and by the California Department of Water Resources (DWR) for their specific purposes. Like previous annual reports, this Annual Report focuses on the northern San Benito County portions of the Gilroy-Hollister Groundwater Basin, including the Bolsa, Hollister, and northern San Juan Bautista subbasins. Nonetheless, it is recognized that the North San Benito Basin (Basin) extends farther to the south and the entire basin is the subject of the GSP. To support a transition to SGMA, the monitoring program is being improved and extended south; a summary is provided in this report.

## District-Defined Subbasins

For the past 22 years, the Annual Reports have focused on subbasins delineated in 1996 and based on hydrogeologic and other local factors (e.g., Zone 6 boundaries). These subbasins are shown in **Figure 2-1.** Six of these subbasins are defined within Zone 6, including Bolsa Southeast (SE), Pacheco, Hollister East (North and South), Tres Pinos, Hollister West, and San Juan subbasins. The seventh is the Bolsa subbasin; of the subbasins shown on the map, only the Bolsa subbasin receives no direct CVP deliveries and relies on local groundwater.

## DWR-Defined Basins

As the District proceeds with SGMA planning and implementation, its area of focus is changing from the 1996-defined subbasins to the North San Benito Basin and GSP area outlined in **Figure 2-2**. The GSP area includes the Bolsa, Hollister, and San Juan Bautista subbasins of the Gilroy-Hollister Basin and the Tres Pinos Valley Basin previously defined by DWR. Groundwater basins wholly or partially in San Benito County as defined historically by DWR are shown in Figure C-1 in Appendix C.

The Plan Area is predominantly in San Benito County with small portions of the Hollister and San Juan Bautista subbasins extending into Santa Clara County. Recognizing that these basins are contiguous, hydraulically connected, and comprehensively managed, in 2018 SBCWD submitted a request to DWR to consolidate the four basins into a single basin, termed the North San Benito Basin. As of November 29, this consolidation has draft DWR approval. Over the next few years, the annual report will transition from examining trends by subbasin to management areas. These management areas will be defined as part of the GSP process.

## Monitoring Programs

Data from monitoring programs undertaken by local, state, and federal agencies are summarized below as currently incorporated in the Annual Report. The District data compilation and monitoring programs are likely to be expanded and revised in the future as data needs are identified in the GSP, for example to address topics such as subsidence and to represent the entire North San Benito Basin.

**Climate.** Climate data are regularly compiled from DWR's California Irrigation Management Information System (CIMIS) and include: total solar radiation, soil temperature, air temperature/relative humidity, wind direction, wind speed, and precipitation. Two CIMIS stations are active in the GSP Area, both of which also measure evapotranspiration (ETo):

- #126 San Benito, located at the SBCWD office on Mansfield Road with a record beginning in June 1994
- #143, San Juan Valley, located at the San Juan Oaks Golf Course with a record beginning in January 1998.

Historical rainfall data are available for Hollister dating back to 1874. For the Annual Groundwater Reports, historical annual precipitation has been compiled and reported using the Hollister rain gage for water years 1875-1995 and the CIMIS San Benito station thereafter. Monthly precipitation and evapotranspiration data for the Hollister #126 CIMIS station are tabulated in **Appendix B**.

**Surface water flows and percolation.** Surface water monitoring is summarized in **Appendix C** of the Annual Groundwater Reports (e.g., Todd, 2017). **Appendix C** includes Figure C-1 showing groundwater basins and Figure C-2 showing the location of five active and eight inactive USGS stations in and near the San Benito River system. The period of record also is shown; streamflow data are regularly downloaded. Figure C-3 shows 30 locations (including Pacheco Creek in Santa Clara County) with miscellaneous surface water measurements taken by the District. These measurements were associated with various studies, many involving evaluation of streamflow percolation to groundwater. While these locations have not been monitored since 2013, the data may provide useful as part of GSP planning and implementation, specifically in considering historical groundwater-surface water interactions and in evaluating potential managed aquifer recharge.

**Appendix D** summarizes reservoir water budget information for Hernandez, Paicines, and San Justo reservoirs and provides annual total releases from Hernandez and Paicines reservoirs from Water Year 1996 to present. For Water Year 1994 to present, percolation of imported CVP water is documented in Table D-3 and percolation of wastewater is shown in Tables D-4 and D-5.

**Wells and groundwater pumping.** SBCWD monitors groundwater pumping in Zone 6. Pumping amounts are calculated semiannually by metering the number of hours of pump operation and multiplying by the average discharge rate, which is measured a few times per year. This monitoring program began in about 1990 (soon after CVP imports started) and was based on recognition that CVP imports resulted in reduced pumping, increased recharge, and sustainable groundwater storage with regional benefits. This contrasts with other California basins where imported water was used to increase irrigated acreage (L&S, 1991) without managing effectively for sustainability. Irrigation pumping beyond Zone 6 is not monitored but has been estimated for regular water budget updates based on land use information and water use factors. Groundwater pumping data and estimates are summarized by major use category and subbasin in **Appendix E.**

**Groundwater levels.** SBCWD has had a semi-annual groundwater level monitoring program since Water Year (WY) 1977; groundwater level data gathered by USGS and other agencies are available as early as 1913 (Clark, 1924). The Annual Groundwater Reports provide quarterly groundwater level data in **Appendix C** for each year. The data are the basis for groundwater level contour maps, change maps, hydrographs, groundwater level profiles, and storage change computations presented in the Annual Reports. The SBCWD monitoring program includes wells in the Pacheco Valley in Santa Clara County. SCVWD's monitoring program provides data for the southern Llagas Basin; these shared data are used in the SBCWD annual groundwater level maps.

SBCWD is the designated CASGEM monitoring agency for the GSP Area; CASGEM data are available from DWR's online Groundwater Information Center Interactive Map (GICIMA).

**Land use.** Land use maps have been prepared by DWR for San Benito County, with the earliest maps in 1967. GIS-based land use maps are available online for 1997, 2002, and 2014 with the DWR Land Use Viewer (DWR, 2018b). In 2012, SBCWD prepared an update of the 2002 map to 2010 using 2010 aerial photography. The 1997, 2002, and 2010 maps were used in preparing the Salt and Nutrient Management Plan (Todd, 2014) and in updating water budgets for the 2014 Annual Groundwater Report.

**Water quality**. In 1997, SBCWD initiated a program for monitoring nitrate and electrical conductivity (EC) in wells. In 2004, SBCWD established a comprehensive water quality database that contains over 450,000 records from water systems and regulated facilities. The database has been updated on a triennial basis as part of the Annual Reports; for the 2016 update, maps and data are provided in an appendix of that report. SBCWD surface water quality monitoring sites also are identified. Monitoring for the Salt and Nutrient Management Plan is closely coordinated.

State-wide sources of groundwater quality data include the Water Data Library (WDL), Geotracker/GAMA program, and the State Water Resources Control Board's Division of Drinking Water. These are accessed for the triennial update of the SBCWD Water Quality Database.

**Units and accuracy**. Throughout this report, water volumes and changes in storage are shown to the nearest acre-foot (AF). These values are accurate to one to three significant digits (depending on the measurement). All digits are retained in the text to maintain as much accuracy as possible during subsequent calculations, but results should be rounded appropriately.

## Improvements in Monitoring

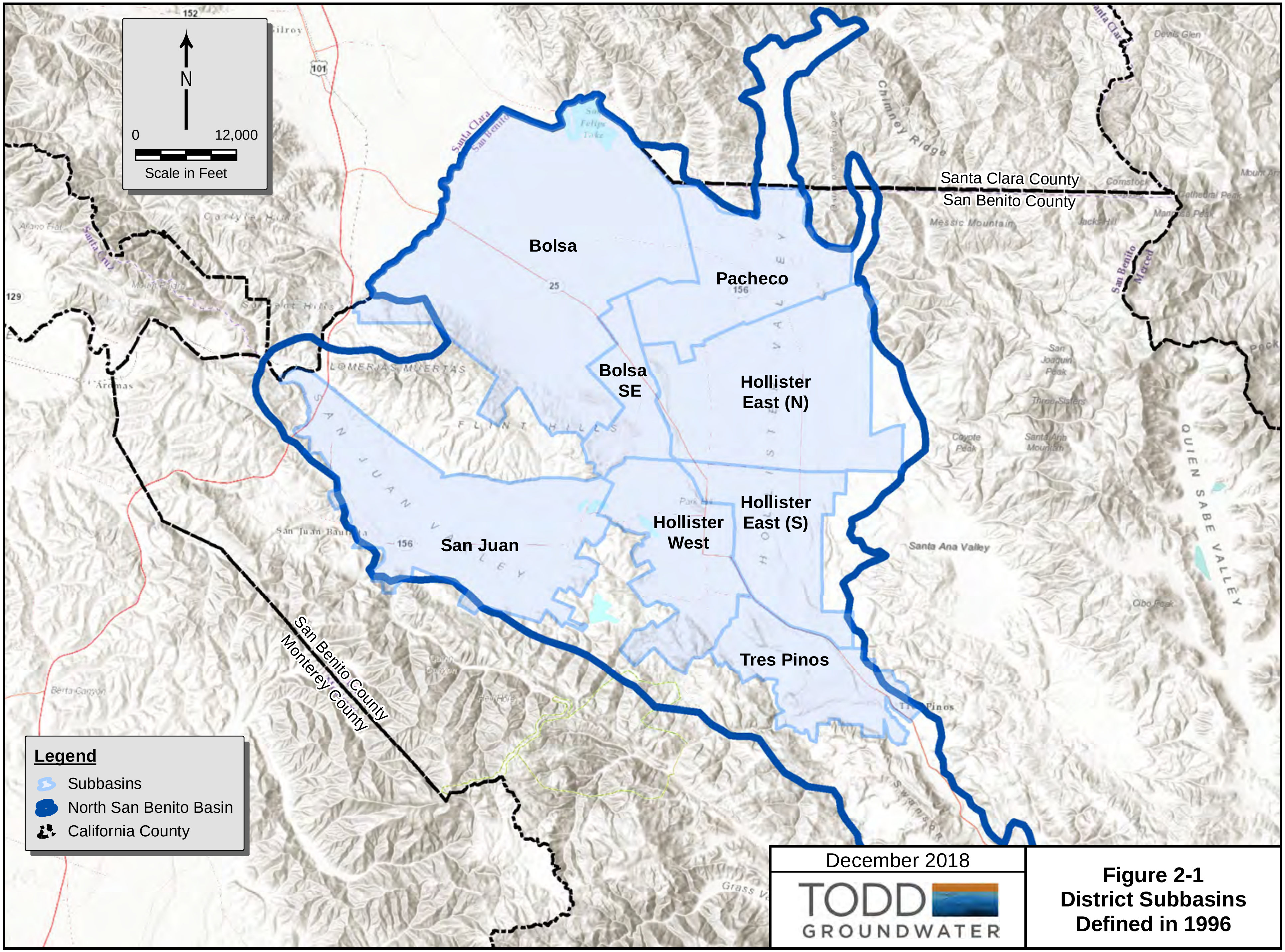
In 2018, the District initiated a program to increase the number of wells for the groundwater level and groundwater quality monitoring programs. This recognizes that recent years have been marked by a declining number of wells in the program. Gradual attrition in monitored wells is a common problem where private production wells are used for monitoring and then become unavailable, for example due to loss of access or loss of the well (damaged or destroyed). Nonetheless, such attrition results in gaps in the monitoring network, interruptions in historical trend data, and an inability to analyze annual and long-term storage changes (because such analysis requires consistent pairing of annual measurements). The District program recognizes that the GSP process requires more comprehensive and rigorous monitoring.

Accordingly, the District has developed a plan to identify new locations and has detailed the process in a memorandum (**Appendix C**). Figure C-7 depicts the Basin in terms of groundwater monitoring coverage and shows target areas where additional monitoring sites are needed. The District's methodology to select existing wells or new well locations for addition to the program includes:

- Identifying Assessor Parcel Numbers in areas indicated as needing additional monitoring
- Searching through District well permit files to find existing wells in the areas of need
- Examining aerial photographs to verify the locations of permitted wells, and
- Examining the aerial photographs to identify other wells with subsequent documentation or confirmation of the well by APN or another identifier
- Identifying the well owner, requesting permission to access the well for water level measurements and/or sampling of water quality
- Once permission is granted, visiting the site and determining the method of measurement/testing
- Evaluating wells previously monitored but no longer active. This involves communicating with the owner and assessing the need for renewed access or repair.

Subsequently, information on the wells under consideration for monitoring will be summarized. The summary will include a map showing locations relative to the areas of need, tabulation of major well characteristics (construction, depth, use), and other considerations. This summary will be used to select and prioritize wells for incorporation into the program and to develop an action plan and schedule for implementation of the program. The District also is considering the possibility of pursuing grant funding for construction of dedicated monitoring wells.

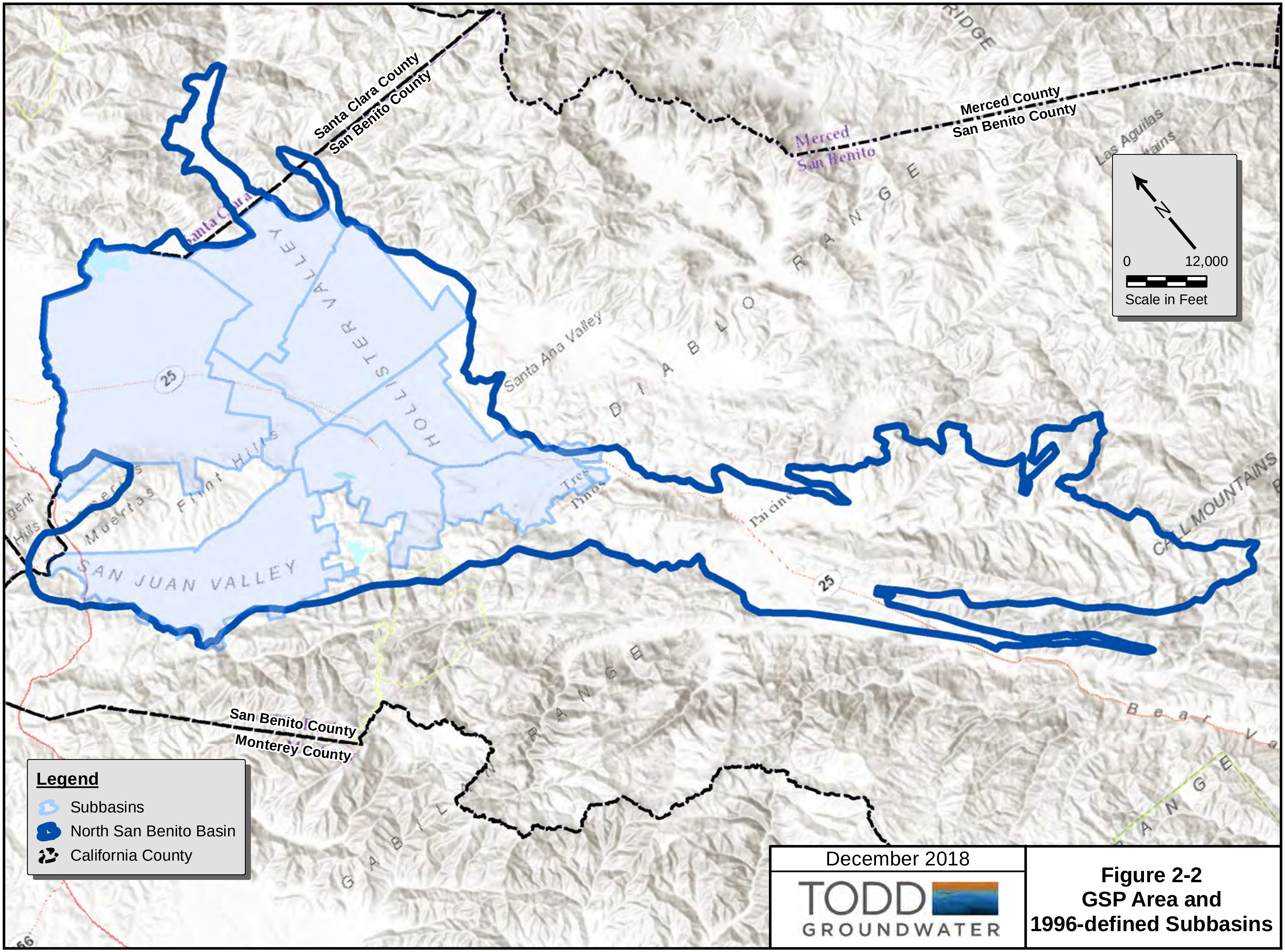
This process of identifying, evaluating, and securing new monitoring sites will recur throughout the SGMA process. The GSP now under preparation will address the design of a monitoring program (including monitoring network and protocols); subsequently, SGMA requires GSP updates every five years.




December 2018

TODD GROUNDWATER

**Figure 2-1**
**District Subbasins Defined in 1996**




December 2018

TODD GROUNDWATER

**Figure 2-2**
**GSP Area and**
**1996-defined Subbasins**

# 3-BASIN CONDITIONS

The Annual Report summarizes basin conditions including climate, groundwater elevations, groundwater storage, and groundwater level trends. Overall, Water Year 2018 was a dry hydrologic year, but CVP allocations remained high following the wet year of 2017.

## Climate

Assessment of climatic conditions begins with collection of climate data (rainfall and evapotranspiration), which are summarized in **Appendix B**. Local rainfall amounts are compiled on a monthly basis and reviewed as an increasingly variable factor that affects basin inflows (e.g., deep percolation) and outflows (groundwater pumping). Recognizing that drought often is extensive across California, local dry years also may be indicative of regional drought and reduced CVP allocations. Dry years often are characterized by increased groundwater pumping for agricultural irrigation to offset lack of rainfall and reduced CVP allocations.

In 2018, overall precipitation was 8.3 inches as shown in **Figure 3-1** and documented in **Appendix B**. As shown in **Figure 3-2**, most years have been below- or near-average rainfall and relatively few years have abundant rainfall, especially since 1998. Water year 2018 was 65 percent of normal, reflecting a dry year. The basin is still recovering from the drought of 2011-2016 and another dry year may further stress groundwater reserves. With a weak-moderate El Nino expected for the 2018-2019 winter, rainfall predictions remain uncertain.

The Annual Report has relied on CIMIS station #126 since Water Year 1995. The station, located in Hollister, is maintained by the District. In recent years, the precipitation data have been affected by periodic irrigation overspray that has been recorded on the sensors. The District is considering means to resolve this problem.

## Water Year Type

SGMA requires categorization of *water year type,* which is a classification of the amount of annual precipitation in a basin. Water year type is intended to aid in the evaluation of information such as water level hydrographs and groundwater storage changes. **Table 3-1** documents the classification developed for North San Benito, which uses five water year types (critically dry, dry, normal, above normal, wet). The methodology for defining the water year types is based on DWR's Water Budget Best Management Practice (BMPs) Document (DWR, 2016) and is consistent with DWR water year typing in the Central Valley which has been applied to years back to 1924. For North San Benito, the annual rainfall amounts in Hollister over the past 30 years (1988-2018) were expressed as percentages of average annual rainfall. These were then sorted into quintiles, reflecting the five categories. The sorting into quintiles resulted in the classification shown in Table 3-1. The water years from 1924 to 2018 were then classified using the numeric values in Table 3-1. The classified years are illustrated in **Figure 3-3.**

The water year classification is based on local Hollister rainfall as representative of the Basin and San Benito River watershed. Local precipitation is important for the overall water balance of the area. While CVP allocations are based on precipitation patterns in the Sierra and Central Valley and are critical to avoiding overdraft, local precipitation has a larger impact by volume on the groundwater basin. Surface water recharge, deep percolation, and irrigation demand are all dependent on local rainfall.

**Table 3-1. Water Type Classification**

| Water Year Type | | Range of percent normal |
|---|---|---|
| Wet | W | >125 |
| Above Normal | AN | 100-125 |
| Below Normal | BN | 80-100 |
| Dry | D | 65-80 |
| Critically Dry | C | <65 |

## Groundwater Elevations

In October 2018, the District collected groundwater elevations in 97 wells. **Table 3-2** tallies the number of monitored wells by subbasin and **Figure 3-4** shows the well locations in the current monitoring network and the groundwater elevation contours for October 2018.

Groundwater elevations have generally risen throughout the basin over 2018, except for northern portions of Bolsa and Pacheco. Overall, the basin is still recovering from the most recent drought (2011-2016) but at a slower rate than in the wet year of 2017. More information is in **Appendix C.**

**Table 3-2. 2018 Monitoring Network**

| Subbasin | Number of Wells |
|---|---|
| San Juan | 12 |
| Hollister West | 9 |
| Tres Pinos | 12 |
| Pacheco | 13 |
| Northern Hollister East | 10 |
| Southern Hollister East | 2 |
| Bolsa SE | 1 |
| Bolsa | 14 |
| Other Subbasins | 24 |
| **Total** | **97** |

## Change in Storage

Groundwater elevation changes from October 2017 to October 2018 were used to determine the change in storage. **Figure 3-5** displays change data spatially with a color ramp, ranging from red that indicates as much as a 60-foot decline in groundwater levels to blue that indicates as much a 60-foot increase in storage. Groundwater levels and storage continue to recover across the basin. Most areas have shown slight increases (less than 20 feet) from 2017, except portions of Pacheco and Bolsa.

Change is storage is the net volume of water added to or removed from the basin over the water year. The change in storage was calculated using the change in groundwater elevations (feet) and multiplying by the total area (acres) to determine the total bulk volume of change. This bulk volume of change was then multiplied by the average storativity of the subbasin to represent the amount of water that a given volume of aquifer will produce. The storativity values for each subbasin were derived from a numerical model of the basin developed by Yates and Zhang (2001). **Table 3-3** documents the change in groundwater storage.

**Figure 3-6** shows the cumulative change in storage for each subbasin over time; the graph extends from 2005 to present, reflecting available data and consistent methodology, but may be extended into the past for the GSP. As shown, groundwater storage was relatively steady from 2005 to 2012. Water years 2012 through 2016 show the decline in storage due to decreased recharge and increased groundwater production during the drought. All subbasins showed recovery in 2017 and most continued this recovery in 2018. San Juan subbasin had the most significant decline in groundwater storage and while recovering, groundwater elevations have not returned to pre-drought levels.

**Table 3-3. 2018 Change in Groundwater Storage**

| Subbasin | Subbasin Area (Acres) | Average Change in Groundwater Height (feet) | Change in Volume (Acre-Feet) | Average Storativity | Change in Storage (Acre-Feet) |
|---|---|---|---|---|---|
| San Juan | 11,708 | 3.55 | 41,538 | 0.05 | 2,077 |
| Hollister West | 6,050 | 9.51 | 57,559 | 0.05 | 2,878 |
| Tres Pinos | 4,725 | 0.91 | 4,314 | 0.05 | 216 |
| Pacheco | 6,743 | -2.41 | -16,281 | 0.03 | -488 |
| Northern Hollister East | 10,686 | 2.55 | 27,281 | 0.03 | 818 |
| Southern Hollister East | 5,175 | 7.23 | 37,418 | 0.03 | 1,123 |
| Bolsa SE | 2,691 | 7.17 | 19,286 | 0.08 | 1,543 |
| **TOTAL ZONE 6** | | | **171,115** | | **8,166** |
| Bolsa | 20,003 | -2.57 | -51,374 | 0.01 | -514 |
| **TOTAL BASIN-WIDE** | | | **119,741** | | **7,652** |

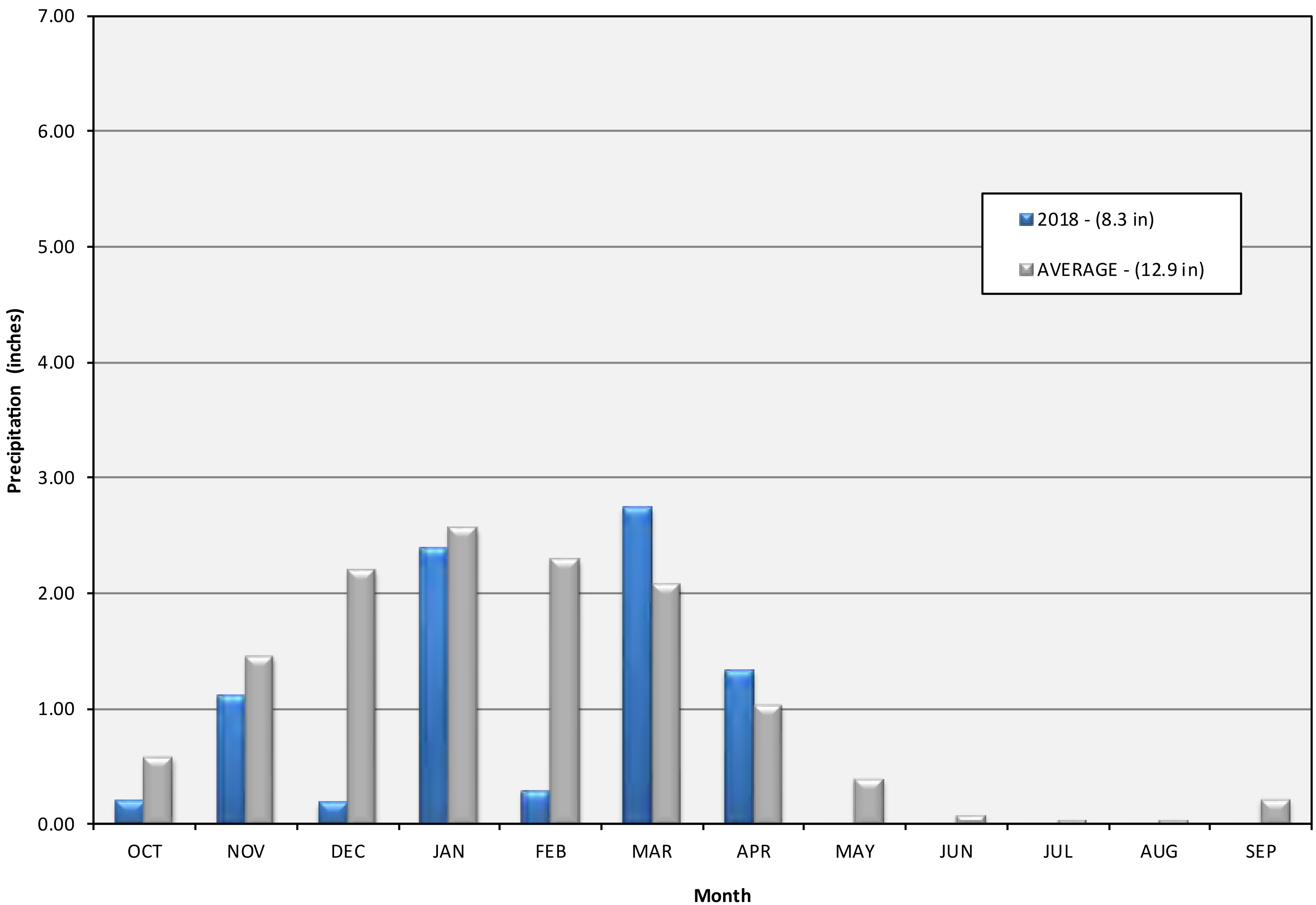
## Groundwater Trends

Long term changes in groundwater elevations are illustrated in composite hydrographs; such hydrographs have been prepared annually since the early 1990s. These composite hydrographs are generated by averaging elevations from key wells from each subbasin for each monitoring event. The key well locations are shown on **Figure 3-7** and **Figure 3-8** shows the composite hydrographs. It should be noted that these subbasin hydrographs represent average conditions in each subbasin and illustrate long-term trends, but do not show localized variations in groundwater elevations. Review of the composite graphs reveals recovery from historical overdraft, effects of dry and wet years, and seasonal effects.

SGMA and GSP regulations require preparation of groundwater level hydrographs for specific sites (i.e., not composite) that depict long-term groundwater elevations and historical high and lows. This Annual Report presents seven such hydrographs in **Figure 3-9**, which have been selected for their geographic distribution across the basin and for their respective long and relatively complete historical records. Groundwater levels are expressed in terms of feet above mean sea level (msl). Review of the hydrographs shows the following major features:

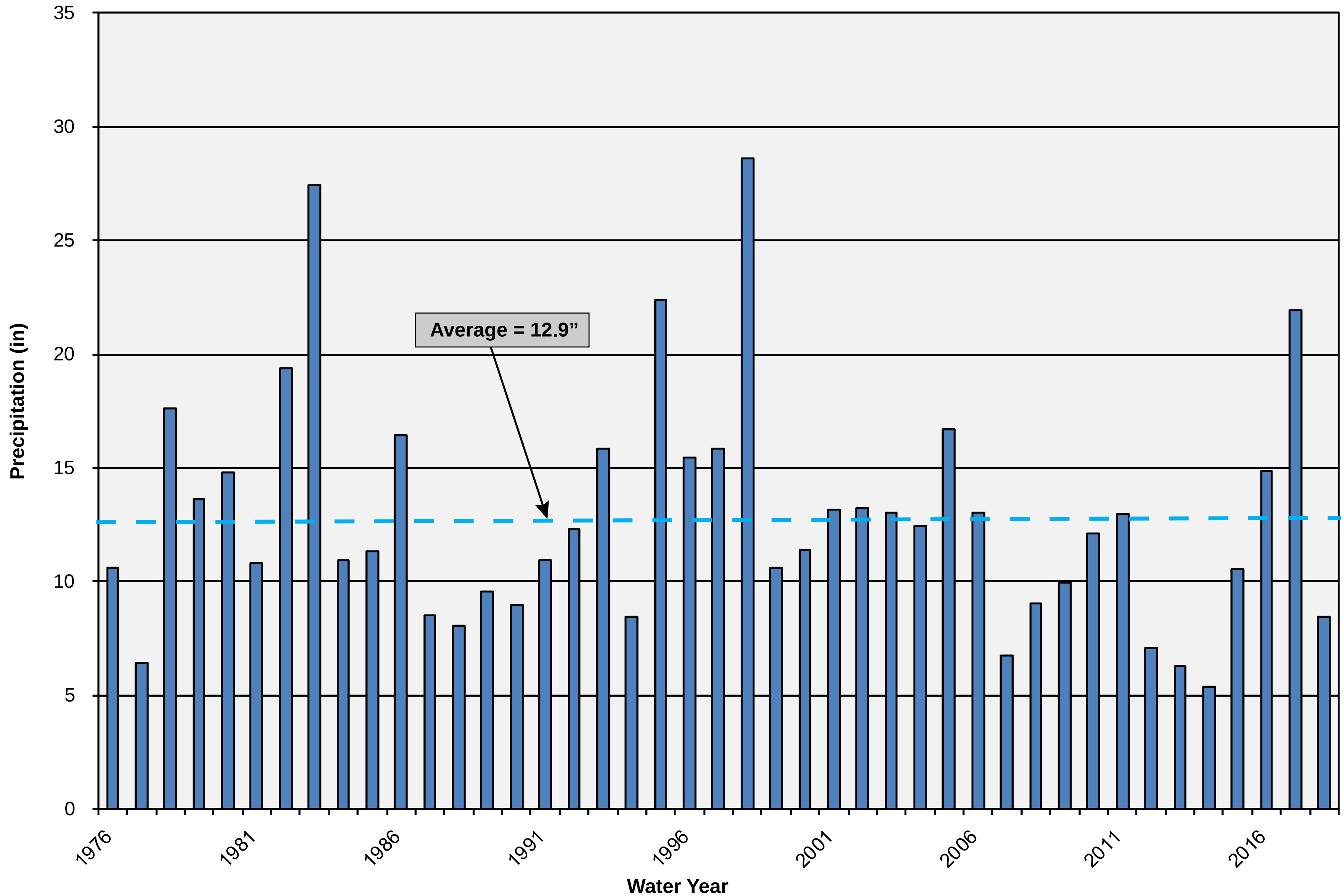
- Effects of historical overdraft on groundwater levels. Prior to the first delivery of CVP water (beginning September 1987), a state of overdraft affected the basin. This is most clearly shown by the hydrograph for Hollister East (which shows groundwater level declines from 200 feet msl to nearly sea level) but is apparent in other hydrographs.
- Recovery from historical overdraft after 1987 is apparent in the rise of groundwater levels, followed by general flattening of groundwater level trends with conjunctive management. This is apparent in the Hollister West and San Juan graphs among others.
- Groundwater levels also respond to wet cycles and drought; for example, the wet years in the early 1980s are apparent from groundwater level increases in Pacheco, Hollister West, and San Juan and likely reflect substantial stream percolation. Response to drought is indicated, for example, by groundwater level declines during the recent drought.

The District Act (see Appendix A) requires presentation of estimates of annual overdraft for the current water year and ensuing water year. Consistent with previous Annual Reports, this is interpreted as long-term groundwater level declines with accounting for rainfall conditions and CVP imports. As of 2018, groundwater elevation trends do not indicate overdraft. Recovery following the drought indicates that overdraft is not anticipated for 2019.




Data have been affected by irrigation overspray.

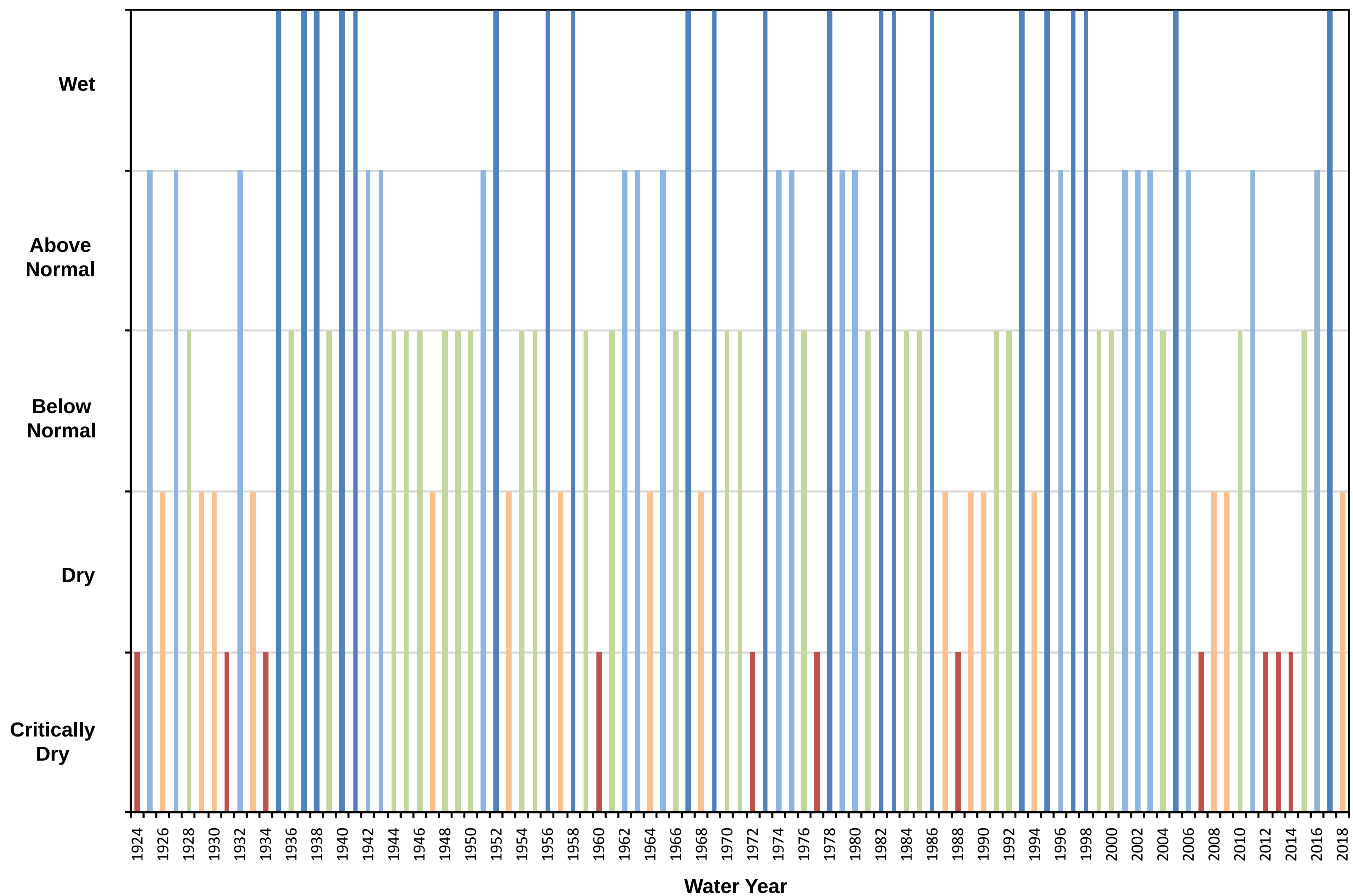
| December 2018 | Figure 3-1 |
| --- | --- |
| TODD GROUNDWATER | Water Year 2018 Precipitation |




December 2018

TODD GROUNDWATER

**Figure 3-2**
**Annual Precipitation**
**1976 - 2018**

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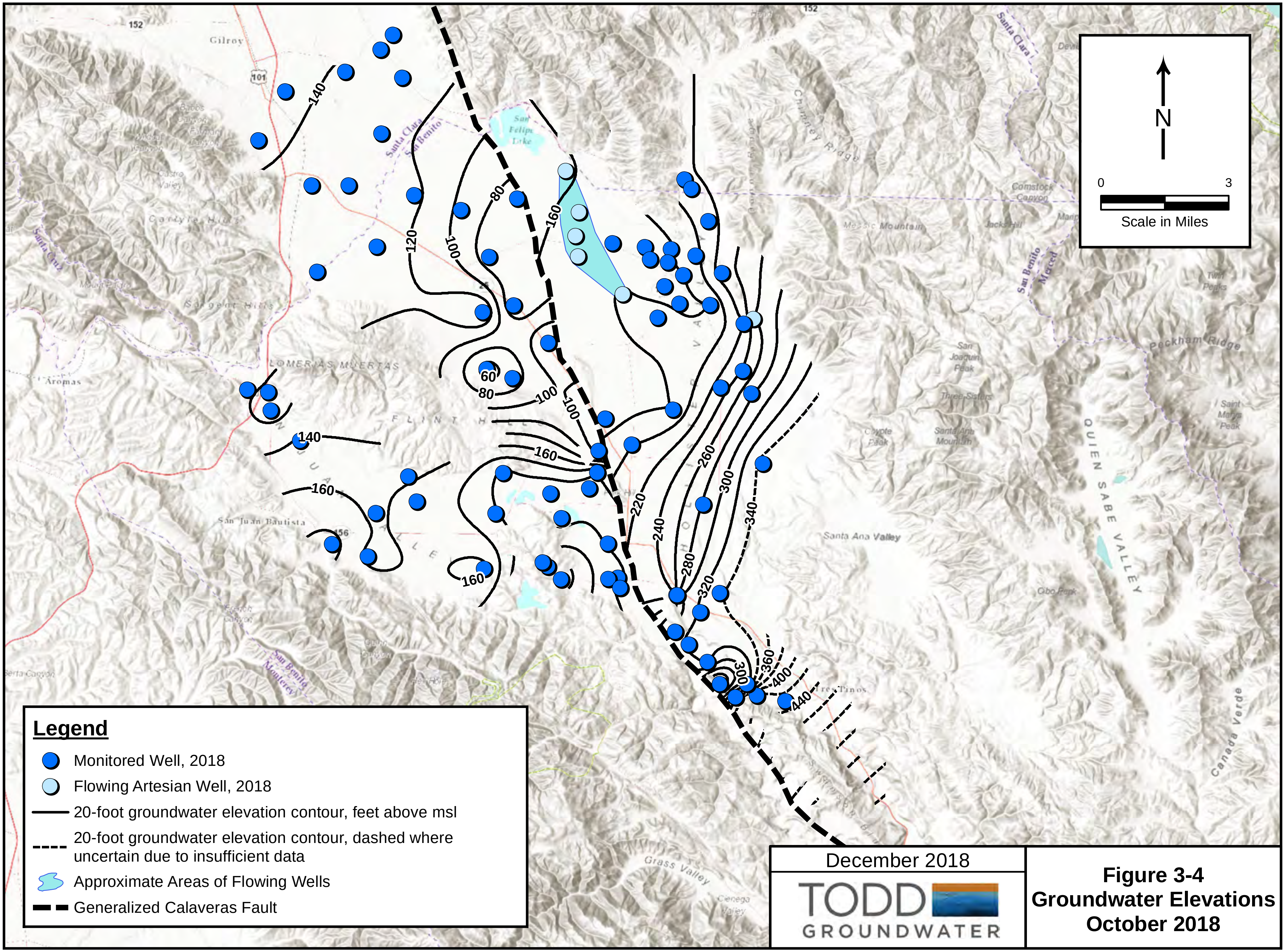
TODD GROUNDWATER

**Figure 3-3**
**Water Year Classification**




December 2018

TODD GROUNDWATER

**Figure 3-4**
**Groundwater Elevations**
**October 2018**

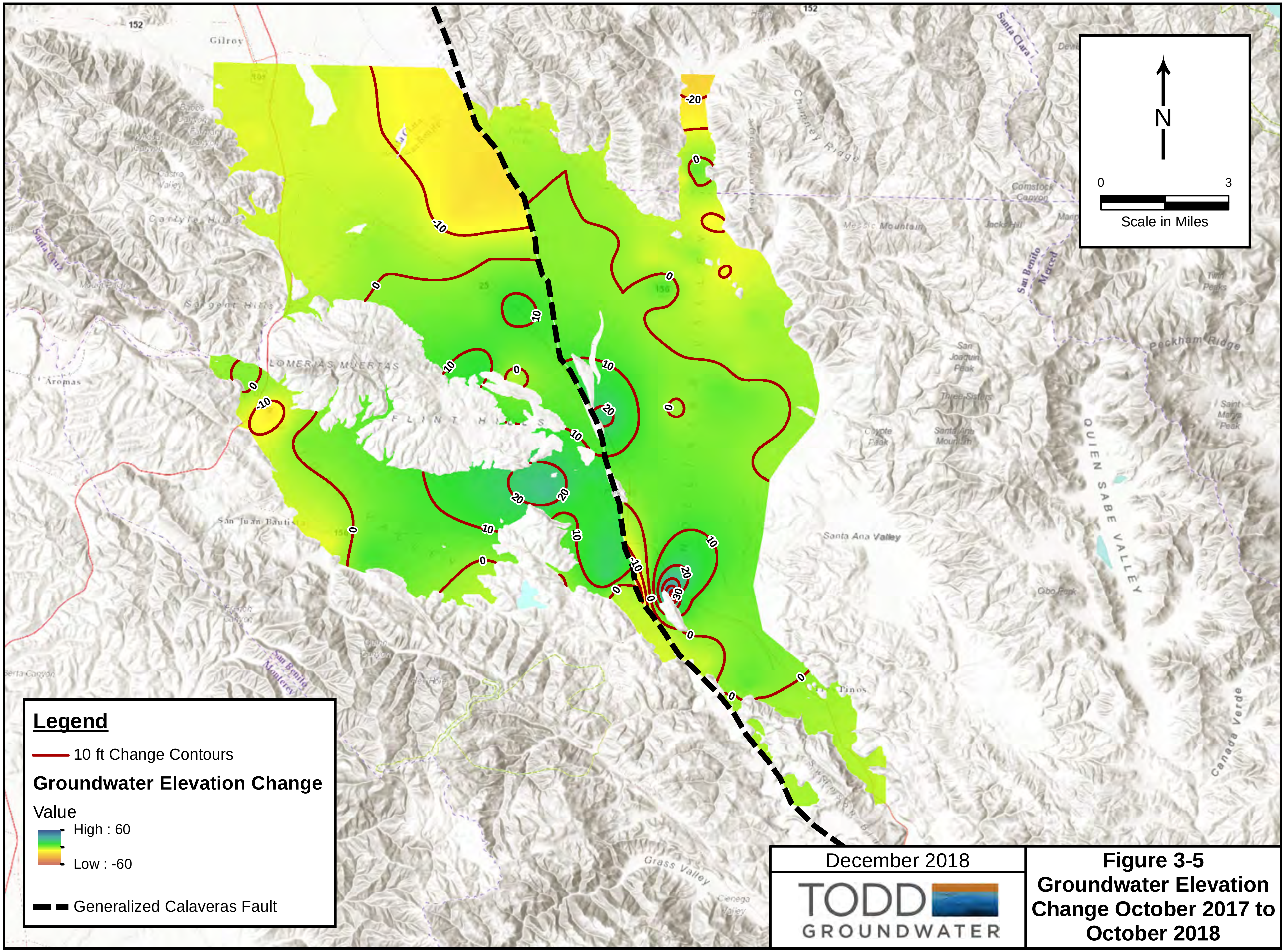
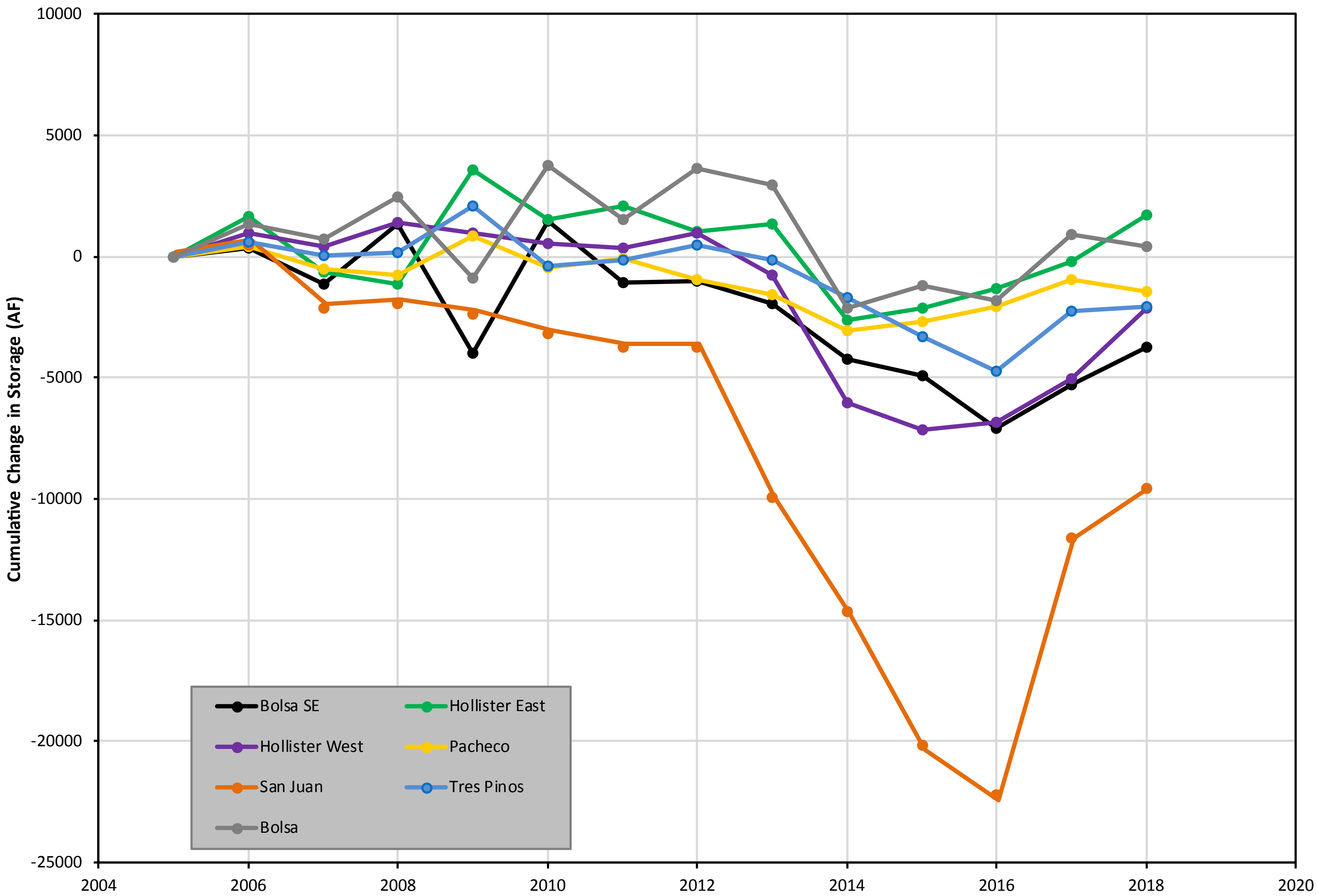


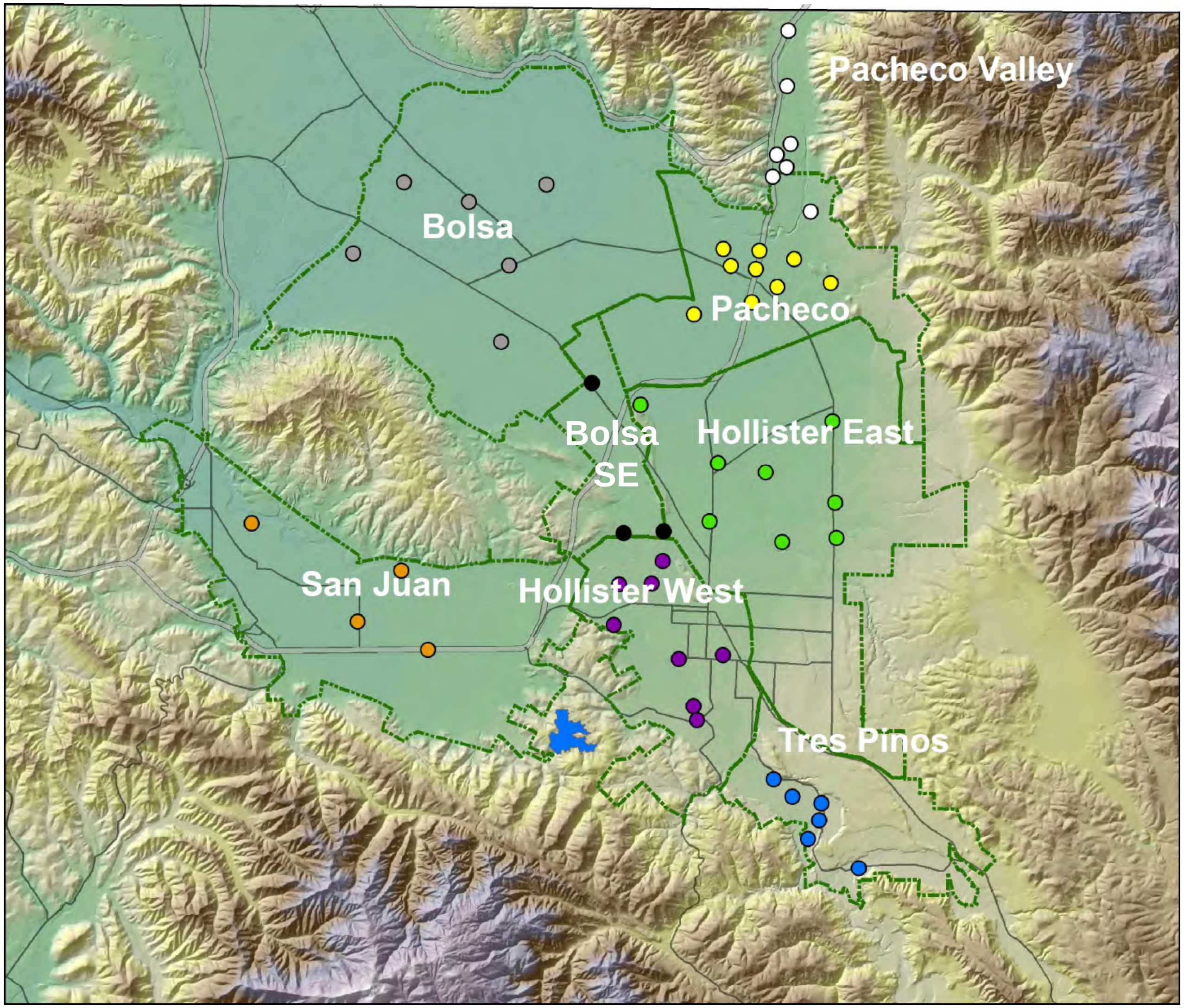

Figure 3-5
Groundwater Elevation Change October 2017 to October 2018




December 2018

TODD GROUNDWATER

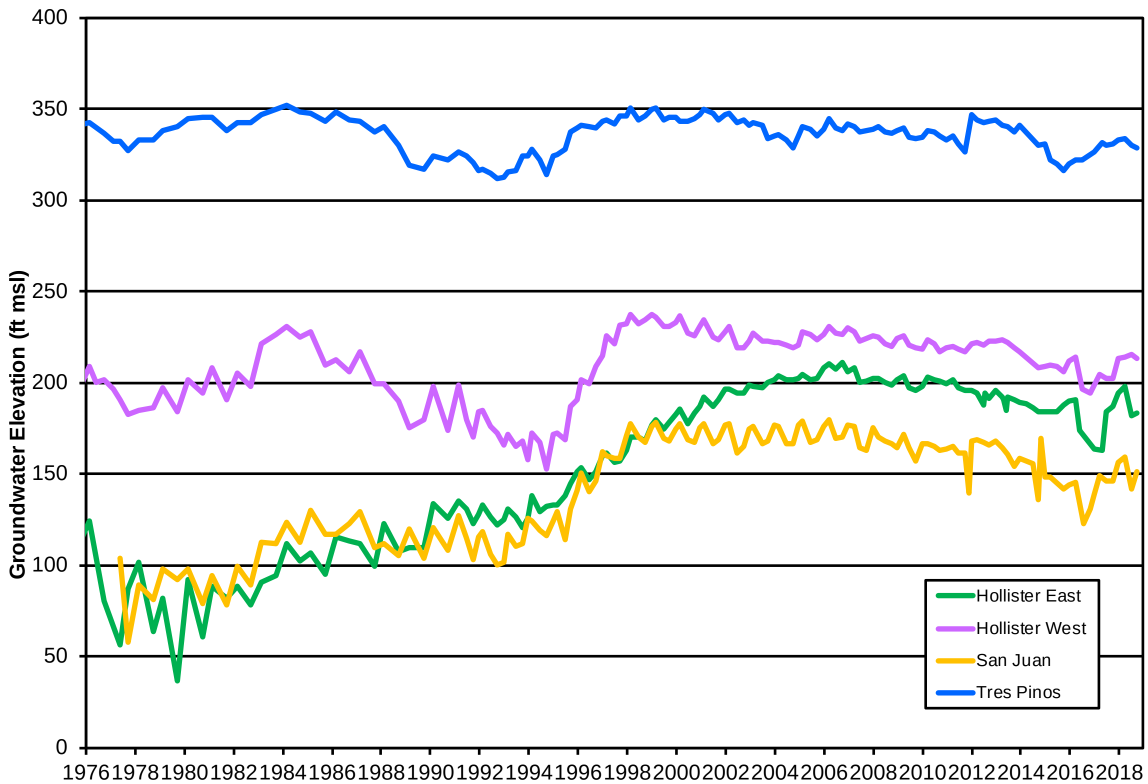
**Figure 3-6**
**Cumulative Change in Storage**
**2005 - 2018**

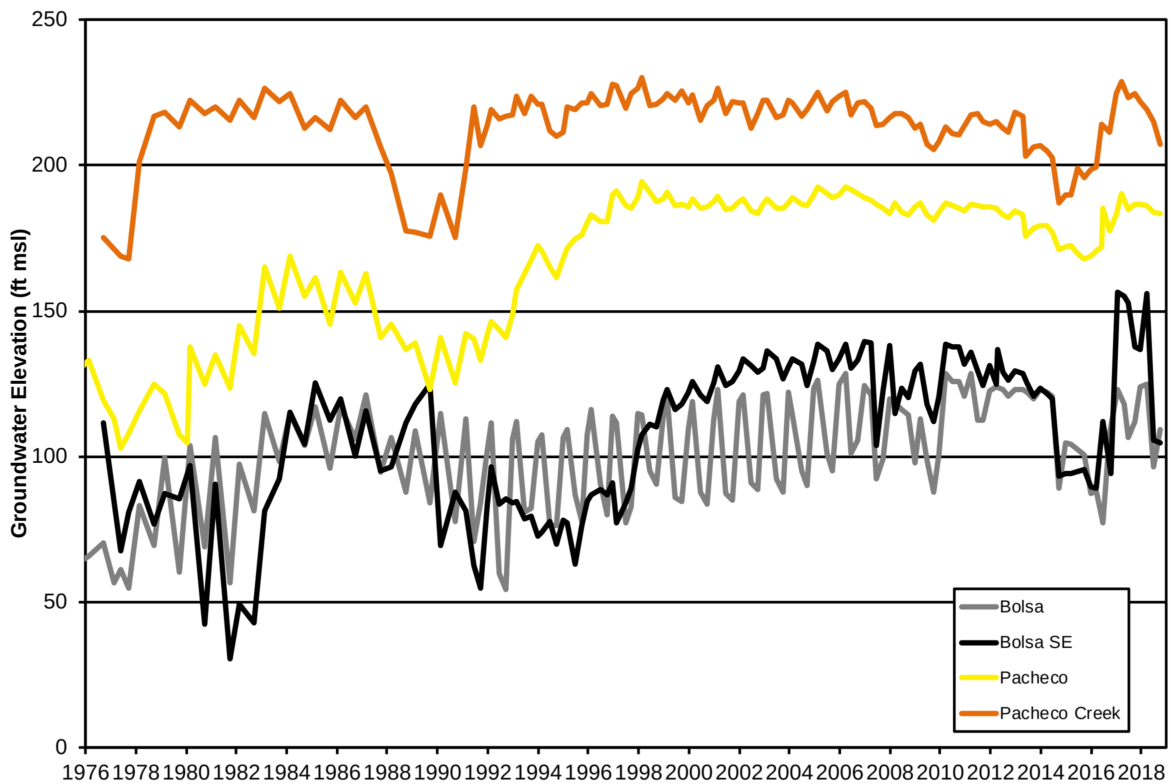



December 2018

TODD GROUNDWATER

**Figure 3-7**
**Locations of Key Wells Used in Hydrographs**




December 2018

TODD GROUNDWATER

**Figure 3-8**
**Composite Hydrographs**

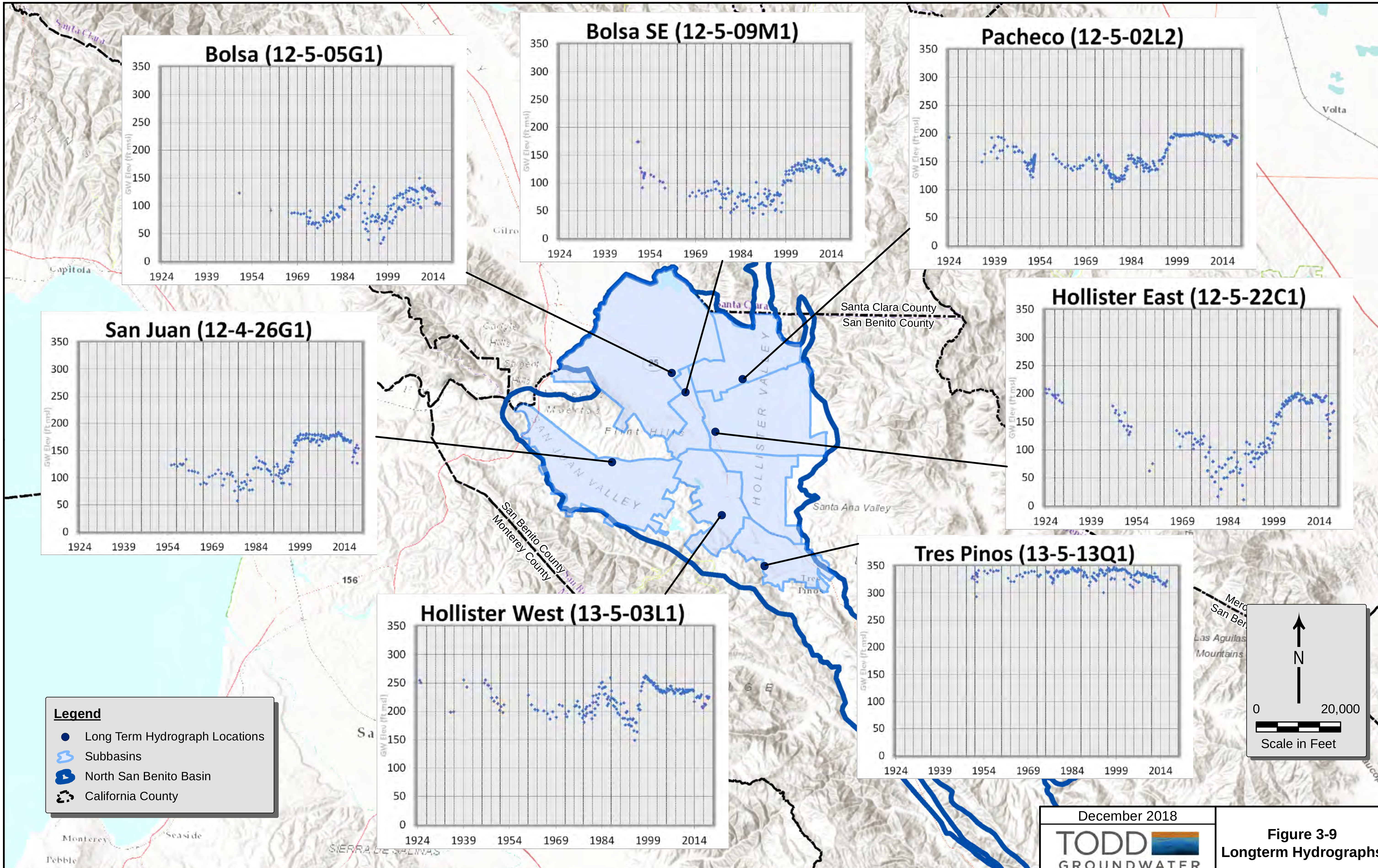



Figure 3-9
Longterm Hydrographs

# 4-WATER SUPPLY AND USE

## Water Supply Sources

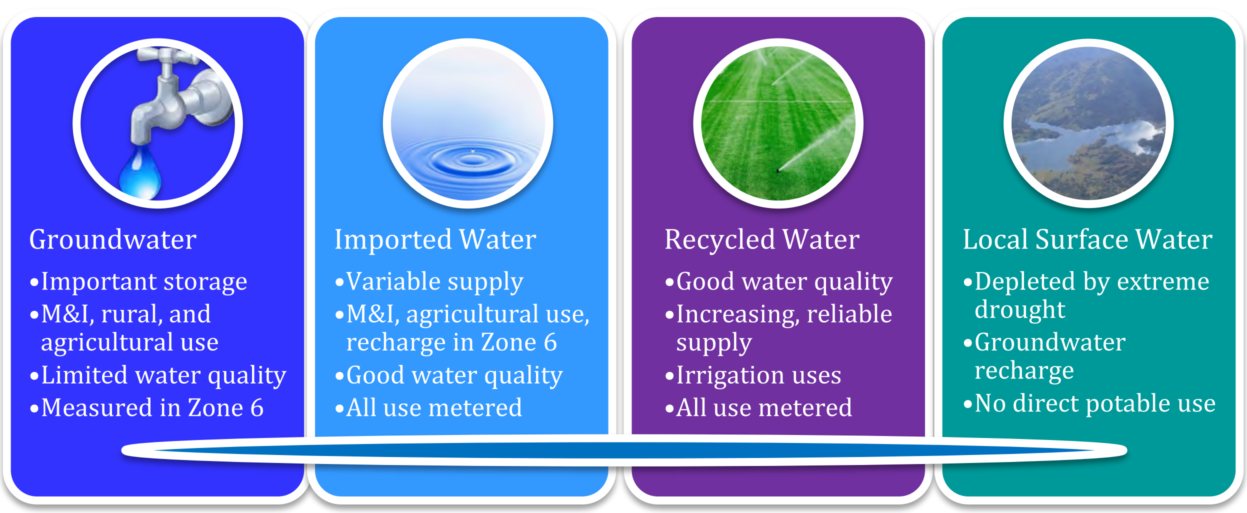
Four major sources of water supply are available for municipal, rural, and agricultural water demands. These are summarized below; for more data and graphs, see **Appendix E.**

**Local Groundwater.** Groundwater is pumped by private irrigation and domestic wells and by public water supply retailers. The District does not directly produce or sell groundwater but has the responsibility and authority to manage groundwater throughout San Benito County.

**Imported Water.** The District purchases Central Valley Project (CVP) water from the U.S. Bureau of Reclamation (USBR) and distributes to customers in Zone 6. Some CVP water has also been released for groundwater recharge. The District has a 40-year contract (extending to 2027 and renewable thereafter) for a maximum of 8,250 AFY of M&I water and 35,550 AFY of agricultural water.

**Recycled Water.** Water recycling began in 2010 with landscape irrigation at Riverside Park. Recycled water currently is provided to selected landscape irrigation and agricultural users. This source is reliable during drought and helps secure a sustainable water supply.

**Local Surface Water.** Surface water is not used directly for potable or irrigation use in the basin, but creek percolation is a significant source of groundwater recharge. Releases from the District's Hernandez and Paicines reservoirs were below average in 2018, but still contributed to recharge of the groundwater basin. Stormwater capture currently is limited to some diversion by the City of Hollister to the Hollister Industrial WWTP (via a combined sewer system) with subsequent treatment and discharge to percolation and evaporation ponds.



## Available Imported Water

The District distributes CVP water to agricultural and M&I customers in Zone 6. The allocation of the contract for each year is potentially quite variable and contingent on total available supply of the CVP system. In dry years, the allocation may be zero and in wet years, it may be 100 percent of the contract amount. The USBR contract years are March through February, so water year 2018 (Oct 2017-Sept 2018) overlapped two contract years. In this water year, the effects of the previous wet year continue to be seen in the allocations for the March 2017-February 2018.

For USBR contract year 2017 (March 2017 - February 2018), both agriculture and M&I customers were provided the full contract allocation, for the first time since 2006. In the current USBR contract year 2018 (March 2018 - February 2019), agriculture customers received 50 percent of their allocation and M&I customers were provided the 75 percent of the allocation. **Table 4-1** shows the contract entitlements and recent allocations (SLDMWA 2017).

**Table 4-1. Allocation for USBR Water Years 2017-2018**

| March 2017 - February 2018 | | | |
|---|---|---|---|
| | Contract Amount | % Allocation | Allocation Volume (AF) |
| Agriculture | 35,550 | 100% | 35,550 |
| M&I | 8,250 | 100% | 8,250 |
| TOTAL | 43,800 | | 43,800 |
| | | | |
| March 2018 - February 2019 | | | |
| | Contract Amount | % Allocation | Allocation Volume (AF) |
| Agriculture | 35,550 | 50% | 17,775 |
| M&I | 8,250 | 75% | 6,188 |
| TOTAL | 43,800 | | 23,963 |

## Water Use

**Table 4-2** shows the total water use in Zone 6 by source and user type for water years 2017 and 2018. Total water use increased 27 percent. The increased availability of CVP imported water is reflected in the volume of CVP delivered to agricultural users in both years. As a point of comparison, in 2016 the allocation for agriculture use was a mere 5 percent and the total CVP water delivered to agricultural customers was 3,700 AF. CVP water used for M&I almost doubled in 2018. This year was the first full year of production for the new West Hills Water Treatment Plant (WTP) and newly expanded Lessalt WTP. Both WTPs are designed to treat and deliver CVP water to urban users.

**Figure 4-1** shows Zone 6 total water use by source and use over the past 30 years. Overall, the graph indicates that water use has a general declining trend. However, 2018 was marked by a significant increase in the total water use. Both CVP and groundwater demand increased from 2017, by approximately 24 and 30 percent, respectively. **Figure 4-2** illustrates the changing relative proportion of groundwater and CVP supply in Zone 6 (with recycled water after 2010). The graph shows the general increase in CVP water until 2006 and the corresponding decrease in groundwater as a supply. Thereafter, the graph illustrates the variability of CVP supply because of drought and wet years and other restrictions. To be specific, when CVP supply has been reduced, groundwater supply has been available, reflecting conjunctive management. While the total volume of supply was higher in 2018, the relationship between CVP and groundwater remained similar to water year 2017, with CVP accounting for 42 percent and 45 percent for 2018 and 2017 respectively (**Figure 4-2)**. Due to the variability in CVP allocations, the percent of supply satisfied by imported water is also variable. For example, in 2016 only 16 percent of supply was from CVP, and in 2018, CVP supply increased to 42 percent.

**Table 4-2. Total Water Use in Zone 6 by User and Water Source 2017-2018**

| | CVP Water | | Groundwater | | Recycled Water | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2017 | 2018 | 2017 | 2018 | 2017 | 2018 |
| Agriculture | 13,288 | 14,453 | 14,727 | 21,108 | 258 | 364 | 28,273 | 35,925 |
| M&I | 2,909 | 5,679 | 5,088 | 4,748 | 108 | 107 | 8,105 | 10,533 |
| TOTAL | 16,197 | 20,131 | 19,815 | 25,856 | 366 | 471 | 36,378 | 46,458 |

Groundwater use for agricultural customers increased by 50 percent from 2017 to 2018. The reasons for the increased use are not specifically known but could be attributed to the cost of CVP water. It could also be that during the drought, growers improved their infrastructure (drilling new wells, installing pipelines, etc.) and continue to use these even as CVP allocations were increased. The largest increase in agricultural groundwater use was in Bolsa South East, but all subbasins except Tres Pinos showed increased groundwater pumping by agricultural use. There was a slight decrease in groundwater use for M&I, largely due to the increase in CVP water available to municipal users. Overall, M&I demand increased 29 percent, possibly reflecting the combined effect of urban growth, decreased public attentiveness of water conservation measures after the drought, and other factors. Recycled water showed a slight increase as more recycled water has been delivered to agricultural users.

**Table 4-3** shows the breakdown of total water use by each subbasin in Zone 6. Consistent with past patterns, San Juan is the largest producer of groundwater and the second largest user of CVP supplies, mainly for agricultural irrigation. Hollister East is the largest user of CVP for both agricultural users and municipal uses. This is the first full year when both water treatment plants have been online to treat CVP water for municipal use.

**Table 4-3. Zone 6 Water Use by User and Water Source 2017-2018**

| | CVP Water | | Groundwater | | Recycled Water | |
|---|---|---|---|---|---|---|
| Subbasin | Agriculture | Domestic & Municipal | Agriculture | Domestic & Municipal | Agriculture | Domestic & Municipal |
| Bolsa South East | 291 | 0 | 3,021 | 43 | 3 | 0 |
| Hollister East | 6,190 | 3,496 | 3,404 | 295 | 0 | 0 |
| Hollister West | 64 | 1,990 | 1,912 | 2,010 | 361 | 107 |
| Pacheco | 1,456 | 72 | 4,207 | 168 | 0 | 0 |
| San Juan | 6,310 | 74 | 8,258 | 673 | 0 | 0 |
| Tres Pinos | 142 | 47 | 306 | 1,559 | 0 | 0 |
| **TOTAL** | **14,453** | **5,679** | **21,108** | **4,748** | **364** | **107** |

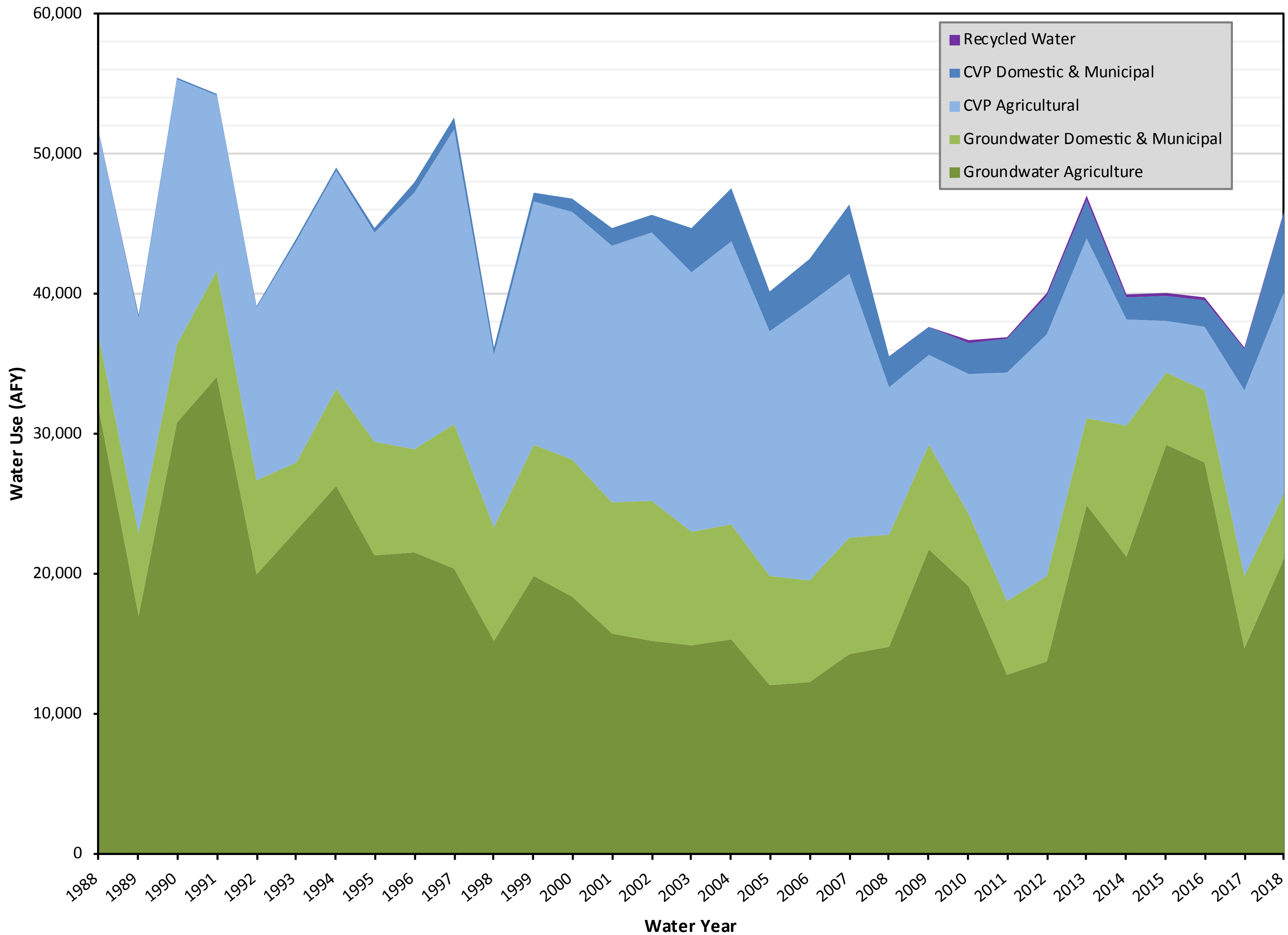
**Table 4-4** shows the subbasin areas, total water use, total pumping, and rate of pumping (total pumping over area). This allows a general comparison by area, normalizing for the size of the basin. **Figure 4-3** shows the distribution of pumping by subbasin. While the volume of pumping is highest in San Juan, **Table 4-4** shows that the rate of pumping is also one of the highest, at 0.76 AFY per acre. The table also shows the percent of total supply from groundwater for each subbasin. Bolsa, an area that does not receive CVP water, is 100 percent reliant on groundwater, with Bolsa SE and Tres Pinos also relying on groundwater for 91 percent of total supply.

**Table 4-4. Pumping Patterns by Subbasin**

| Subbasin | Subbasin Area (Acres) | Total Water Use (AFY) | Total Groundwater Use (AFY) | Rate of pumping (AFY/Acre) | % GW |
|---|---|---|---|---|---|
| Bolsa SE | 2,691 | 3,358 | 3,063 | 1.14 | 91% |
| Hollister East | 15,860 | 13,385 | 3,699 | 0.23 | 28% |
| Hollister West | 6,050 | 6,444 | 3,922 | 0.65 | 61% |
| Pacheco | 6,743 | 5,904 | 4,375 | 0.65 | 74% |
| San Juan | 11,708 | 15,315 | 8,932 | 0.76 | 58% |
| Tres Pinos | 4,725 | 2,053 | 1,865 | 0.39 | 91% |
| Bolsa* | 20,003 | 6,245 | 6,245 | 0.31 | 100% |

*based on 2017 water balance estimate

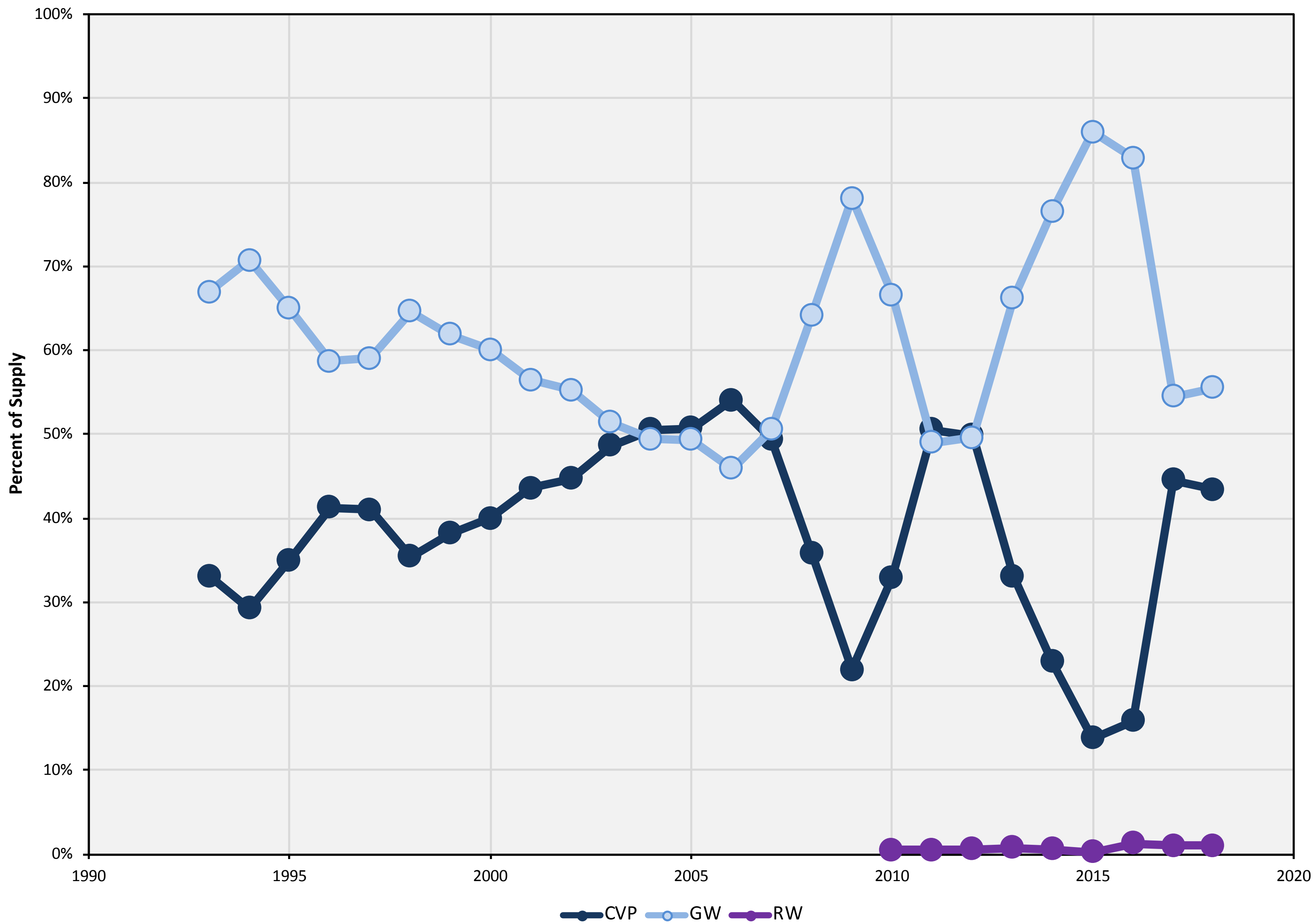
The percent of subbasin supply met by groundwater can vary widely over time and by subbasin. **Figure 4-4** shows the percent of total subbasin supply provided by groundwater. The trend lines show the same general pattern as **Figure 4-2**, with groundwater supply decreasing until 2006 (as CVP supply increased) and then fluctuating considerably as imported water and groundwater are used conjunctively. The substantial variability in groundwater use (i.e., in Pacheco, San Juan, and Hollister East) indicate significant structural capacity and flexibility for local water users to use groundwater or CVP.




December 2018

TODD GROUNDWATER

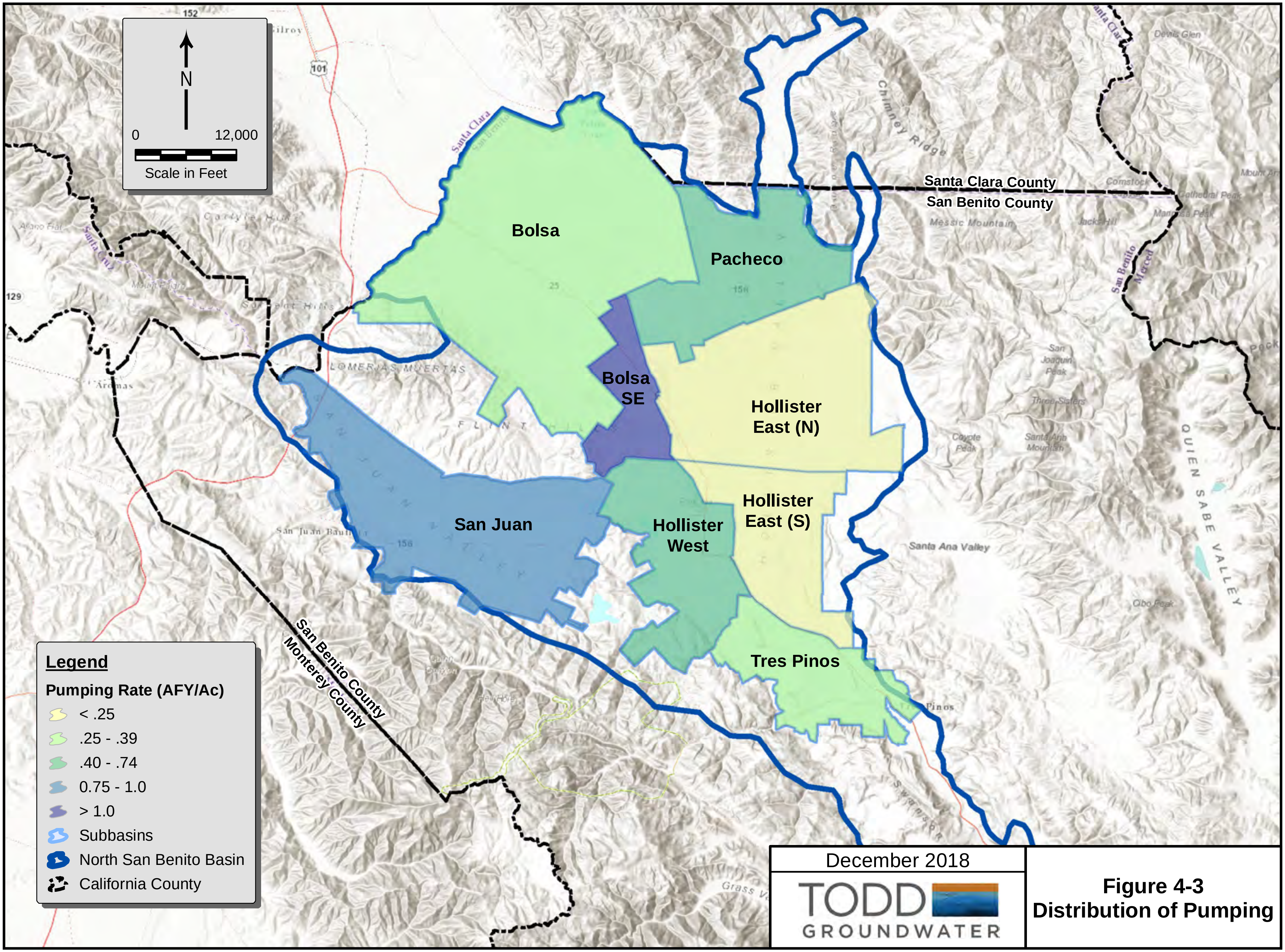
**Figure 4-1**
**Total Water Use by Source and Use**
**Zone 6**




December 2018

TODD GROUNDWATER

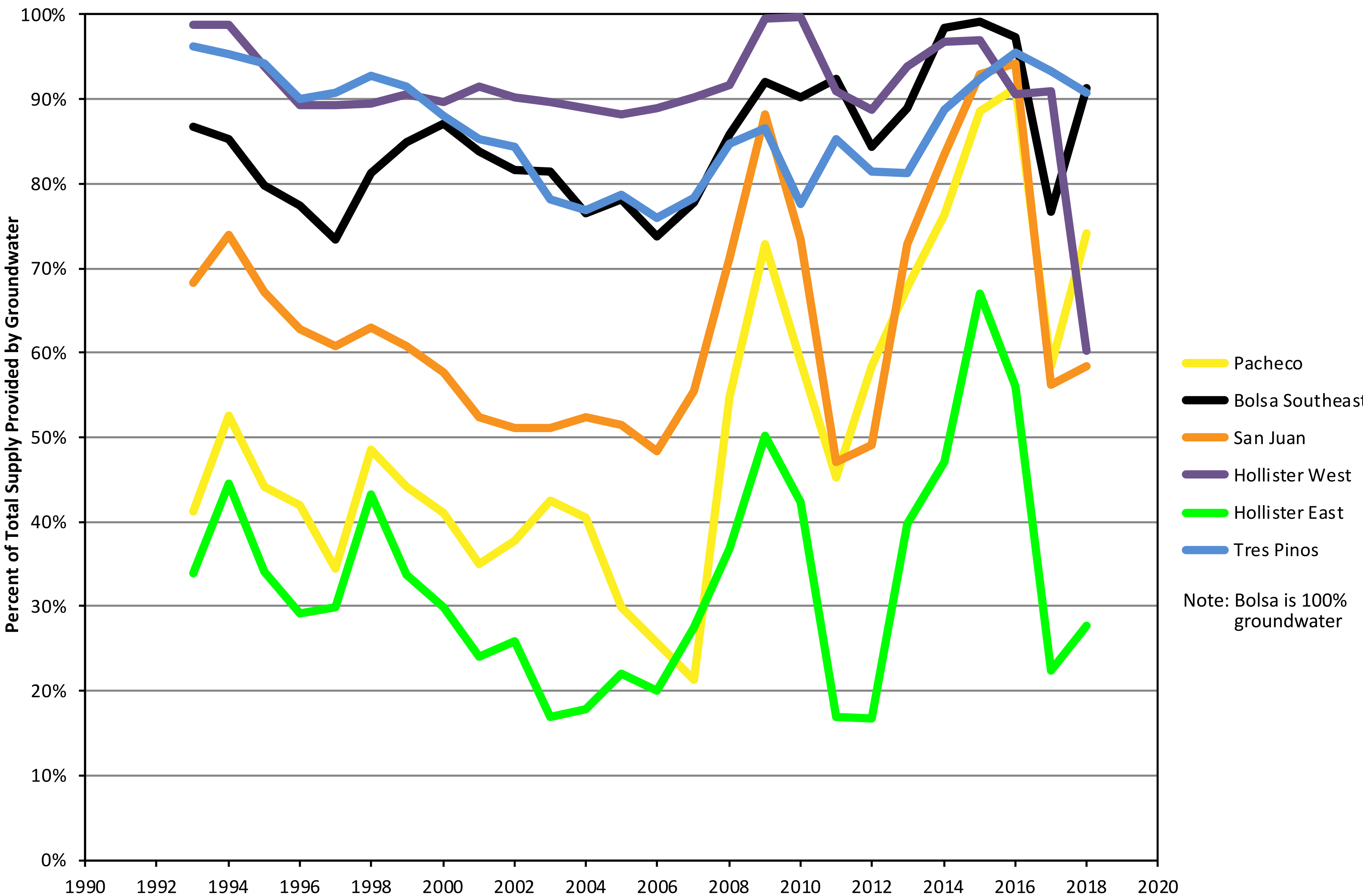
**Figure 4-2**
**Percent of Supply by Source**
**Zone 6**




December 2018

TODD GROUNDWATER

**Figure 4-3**
**Distribution of Pumping**




December 2018

TODD GROUNDWATER

**Figure 4-4**
**Percent of Subbasin Supply by Groundwater**

# 5-WATER MANAGEMENT ACTIVITIES

District water management activities include comprehensive monitoring (summarized in Section 2) and importation and distribution of CVP water in Zone 6 (Section 4). In addition, the District provides water resources planning, water conservation support services, and managed percolation of local surface water to augment groundwater; these are summarized in this section. Sources of revenue to support District operations also are presented here.

## Water Resources Planning

The District has used multiple planning efforts to support groundwater sustainability. These have included water management plans such as the Groundwater Management Plan (1998 and 2003), Integrated Regional Water Management Plan (2007), Salt and Nutrient Management Plan (2014), Agricultural Water Management Plan (2015), and Urban Water Management Plans (2016). These plans have addressed the full range of groundwater sustainability issues with advancement of conjunctive use of imported water, local surface water, recycled water and groundwater; with water conservation, and with protection of water quality. Current efforts and recent accomplishments are summarized below.

**Hollister Urban Area Water Project.** This project is an ongoing collaborative effort with local agencies to provide a secure and stable water supply to the region. The project has involved provision of water treatment for CVP water, which allows its direct use for municipal and industrial (M&I) purposes. It also allows delivery of improved quality water to customers. 2018 was the first full year of production for the new West Hills WTP and newly expanded Lessalt WTP. The District also has worked cooperatively for years with the City of Hollister to implement recycled water use primarily for agricultural irrigation, which continued to increase in 2018.

**Pacheco Reservoir Expansion Project.** In 2018, SCVWD was awarded $484.5 million in funding from the State of California for the Pacheco Reservoir Expansion Project, which is a collaborative effort of SBCWD, SCVWD, and Pacheco Pass Water District. This project would establish a new dam and expanded reservoir on the North Fork of Pacheco Creek in Santa Clara County. The expanded reservoir, with a capacity of 140,000 acre-feet, would allow storage of CVP supplies and local inflows for use by the water districts, provide more flexibility for use of CVP water, enhance the continuity of flows in Pacheco Creek, reduce flood risks downstream, and benefit downstream habitats along Pacheco Creek and the local steelhead population.

## Water Conservation

Water conservation is an important tool to manage demands on the groundwater basin, particularly during drought. During the most recent drought, intensified water conservation efforts were successful in reducing water demands to meet State and local goals. Water conservation efforts in San Benito

County are conducted through the Water Resources Association (WRA). WRA is a cooperative effort among the District, City of Hollister, City of San Juan Bautista, and Sunnyslope County Water District.

Activities in 2018 have included provision of information, home surveys, and rebates. To keep the public informed, the WRA has prepared bill inserts that highlight water conservation programs and provide updates on water conditions; the October 2018 bill insert describes SGMA and how it may affect the groundwater users. Provision of information by WRA staff also has included school presentations to over 660 students last year and presentations to local organization such as the Chamber of Commerce and Rotary Club. In addition, print articles promoting water conservation have been published in the Free Lance newspaper and Benito Link.

The Home Water Survey allows the WRA to directly work with customers who have a leak or large water bill. The WRA has been able to reach approximately 400 people a year with this service.

WRA also provides various rebates (toilets, landscape hardware, etc.) The most popular rebate program is the water softener demolishing/replacement program; with provision of CVP supply for municipal use, the delivered water quality has improved, and customers are willing to abandon unneeded water softeners. This program has the benefit of improving the water quality of municipal wastewater and recycled water.

## Managed Percolation

**Percolation of Local Surface Water.** In most years, local surface water released from Hernandez and Paicines reservoirs is percolated along the San Benito River and Tres Pinos Creek. Releases are managed to maximize percolation along the stream channels of the San Benito River and Tres Pinos Creek and to avoid any losses out of the basin. Hernandez Reservoir releases in 2018 were below average (reflecting the below normal rainfall), amounting to 6,054 AF. Releases from Paicines were 384 AF, also below average.

**Percolation of Wastewater.** Wastewater is percolated by the City of Hollister at its Domestic and Industrial plants, by SSCWD at its Ridgemark Facilities, and by Tres Pinos Water District. Recent changes in operation of the wastewater facilities (including increased water recycling) and decreased municipal water use have decreased the volume percolating to the groundwater. Information about the amount of groundwater recharged from these wastewater facilities is found in **Appendix D**.

**Percolation of CVP Water.** In Water Year 2018, the District percolated 2,965 AFY of CVP water in offline stream channels in San Juan, Tres Pinos, and Pacheco subbasins; locations are shown in **Figure 5-1.** This amount is slighter higher than the 2,549 AFY percolated in 2017. With carryover water from 2017-18 (100% allocation) and a late allocation of 50% agricultural and 75% municipal and industrial water (2018-19) the District had additional CVP water to percolate that would have otherwise gone unused. Before this recent wet year, the District had not percolated water since the last year with 100 percent allocation (2006-2007).

## Financial Information

The District derives its operating revenue from charges levied on landowners and water users. Non-operating revenue is generated from property taxes, interest, standby and availability charges, and grants. District zones of benefit are listed in Appendix A. Zone 6 charges, relating to the importation and distribution of CVP water, are the focus of this section.

**Table 5-1** presents the groundwater charges for Zone 6 water users, which reflect costs associated with monitoring and management. A full worksheet of how groundwater charges are determined can be found in **Appendix F**. Groundwater charges are adjusted annually in March. For March 2018 – February 2019, District rates are $7.95 for agricultural use and $24.25 for M&I use. The District is in the process of adopting groundwater rates for the next three years. The proposed rates for March 2019 – February 2020 are subject to Board adoption at a public hearing to be held January 30, 2019.

**Table 5-1. Current and Proposed Groundwater Charges**

| Year | Agriculture | M&I |
|---|---|---|
| 2018-2019 | $7.95 | $24.25 |
| 2019-2020 (proposed) | $12.75 | $38.25 |

CVP rates (provided by the USBR) include the cost of service, restoration fund payment, charges for maintenance of San Luis Delta Mendota Water Authority facilities, and other fees (the breakdown is found in **Appendix F**). The District's blue valve rates (paid by users of CVP water) include a water charge and a power charge. Additionally, the standby and availability charge is a $6 per-acre charge assessed on all parcels with access to CVP water (an active or idle turnout from the distribution system). The 2019-2020 proposed CVP water charges, like the groundwater charges, are subject to Board adoption at a public Hearing to be held January 30, 2019. **Table 5-2** shows the CVP water charge and **Table 5-3** shows the CVP power charge.

**Table 5-2. Current and Proposed Blue Valve Water Charges**

| | Blue Valve Water Charge ($/AF) | | | |
|---|---|---|---|---|
| | Agricultural | | | |
| Year | Non - Full Cost | Full Cost (1a) | Full Cost (1b) | Municipal & Industrial |
| 2018-2019 | $209.00 | $382.00 | $400.00 | $363.00 |
| 2019-2020 (proposed) | $254.00 | $386.00 | $407.00 | $379.00 |

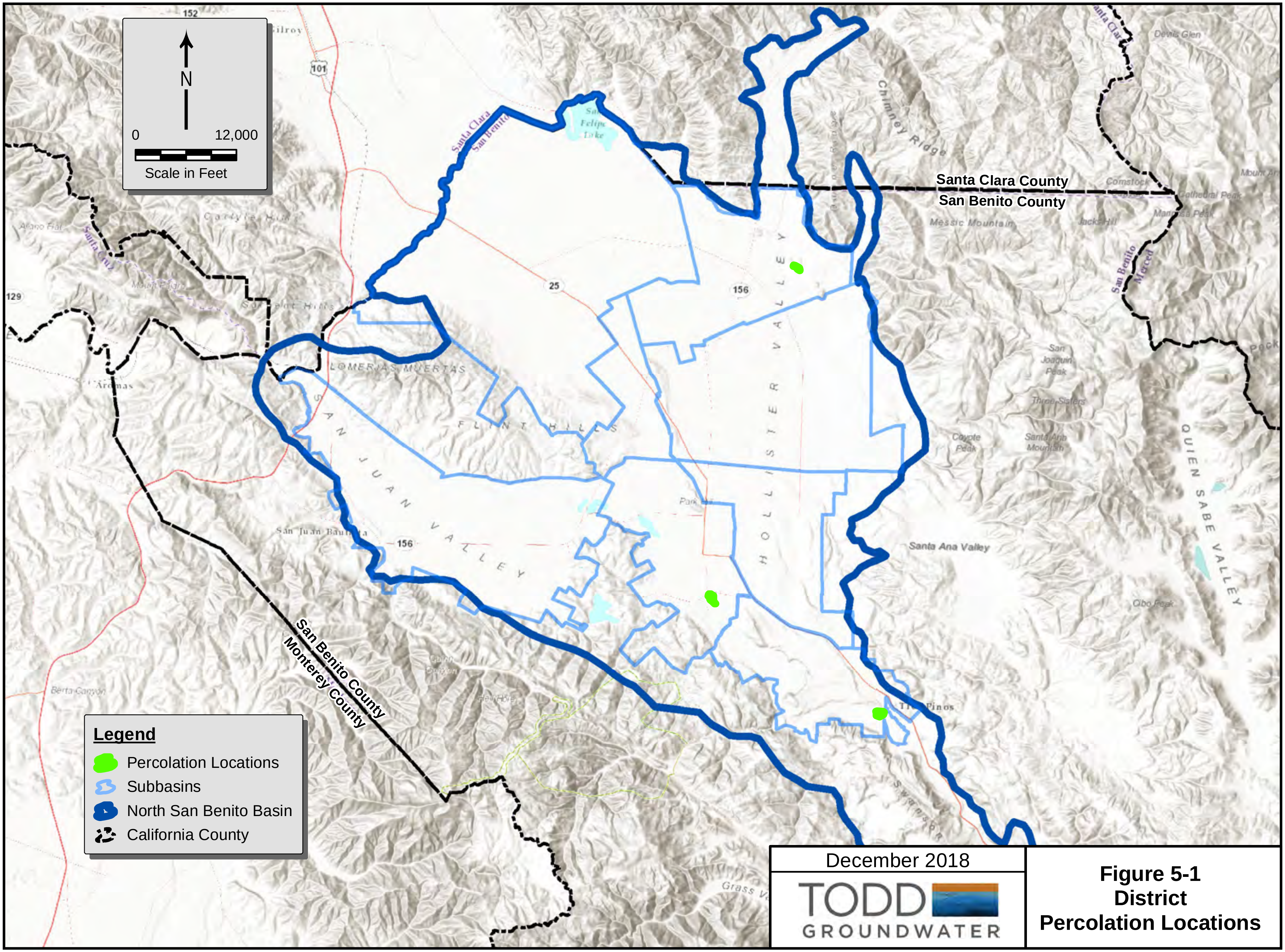
**Table 5-3. Current and Proposed Blue Valve Power Charges**

| Blue Valve Power Charge ($/acre-foot) | Subsystem 2 | Subsystem 6H | Subsystem 9L | Subsystem 9H | All other subsystems |
|---|---|---|---|---|---|
| 2018-2019 | $130.60 | $80.25 | $116.65 | $172.45 | $70.10 |
| 2019-2020 (proposed) | $68.00 | $37.10 | $73.80 | $105.40 | $33.00 |

Recycled water charges (**Table 5-4**) are set to recover current operating and maintenance costs related to the water service. Recycled water rates include those associated with water supply, water quality, and infrastructure.

**Table 5-4. Current Recycled Water Charges**

| Recycled Water | | |
|---|---|---|
| Effective | Agriculture Rate | Power Charge |
| Mar-17 | $183.45 | $59.45 |
| Mar-18 | $183.45 | $59.45 |




December 2018

TODD GROUNDWATER

**Figure 5-1**
**District**
**Percolation Locations**

# 6-GROUNDWATER SUSTAINABILITY

## Sustainable Groundwater Management Act (SGMA)

The Sustainable Groundwater Management Act (SGMA) requires sustainable management of priority groundwater basins and empowers local Groundwater Sustainability Agencies (GSAs) to manage groundwater resources in a sustainable manner. San Benito County Water District GSA (SBCWD GSA), in partnership with Santa Clara Valley Water District GSA (SCVWD GSA) for the small portions of the basin in Santa Clara County, is developing a Groundwater Sustainability Plan (GSP) for the North San Benito Basin, which encompasses the historically-defined Bolsa, Hollister, and San Juan Bautista Subbasins of the Gilroy-Hollister Basin and the Tres Pinos Valley Basin. This GSP is being funded in part with a $830,000 grant from the California Department of Water Resources (DWR) and with GSA cost sharing.

**Figure 2-2** shows the GSP area, which is mostly in San Benito County with small portions extending into Santa Clara County. The groundwater subbasin area highlighted in Figure 2-2 has been managed and monitored by SBCWD for decades, although the definition of basin boundaries and the focus of various studies have differed over the years. In 2018, recognizing that the basins are contiguous, hydraulically connected, and comprehensively managed, SBCWD requested DWR to consolidate the four basins into a single basin, termed the North San Benito Groundwater Basin. This consolidation allows preparation of a single, comprehensive GSP.

## Groundwater Sustainability Plan Development

GSP development in the North San Benito Basin is based on a strategy to:

- Build on existing monitoring, management, and reporting
- Extend existing monitoring, management, and reporting to DWR-defined basin boundaries
- Update and refine existing plans, programs, and management tools to address SGMA criteria
- Comply with SGMA requirements and preserve local control of groundwater management.

DWR has defined comprehensive and detailed requirements for development of GSPs, but also recognizes and supports local control of groundwater management. Hence, the GSP being developed for North San Benito County is building on decades of local monitoring and management, while complying with DWR regulations and recognizing future challenges such as increasing uncertainty of limited imported water supplies and growing demand for local supplies. Consistent with the intent of local control, the GSP also is being developed with engagement of local groundwater users, agencies, stakeholders, and the public. This community engagement, sustained throughout the GSP process, supports the effectiveness, credibility, and acceptance of the GSP.

**Figure 6-1** illustrates the major steps toward development of the GSP within the context of community engagement and with reference to an approximate timeframe. These steps will be documented in a series of deliverables—including GSP sections, memoranda, and technical reports—that will be compiled into the draft and final GSP. The GSP process, initiated in June 2018, will be completed in late 2021, meeting the deadline of January 31, 2022 for GSP completion, adoption by the GSAs, and submittal to DWR. While adoption and approval are the culmination of initial GSP development, the GSP process continues in the future with implementation of management activities, preparation of Annual Reports, and GSP updates every five years; this is intended to be an ongoing, adaptive process.

**Figure 6-1. Major Steps in GSP Development**


The major technical steps in developing the initial GSP are as follows:

**Plan Area/Institutional Setting.** The first step in developing the GSP is description of the Plan Area and the institutional setting. This is accomplished in the first two sections of the GSP document: Introduction and Plan Area. The *Introduction* presents the North San Benito Basin and the authority of the GSAs to prepare a GSP. The *Plan Area* section provides basic information on the North San Benito Basin including its physical boundaries, jurisdictions of water and land use planning agencies, water sources and water use sectors, existing monitoring and management, land use planning, and well permitting.

The Introduction also will summarize the estimated cost of GSP implementation and the means of funding GSP implementation, when this information is developed later in the GSP process. SBCWD has existing funding sources (e.g., through Zones 3 and 6); however, GSP implementation (monitoring, management, and reporting) is likely to be more intensive than ever before (because of increasing water demand and uncertainties) and is required for the entire North San Benito Basin. Accordingly, the GSP process will include evaluation of a fiscal structure to fund implementation fairly across the Basin. This evaluation will account for estimated ongoing costs of GSP monitoring and management in the context of current funding sources. This funding evaluation is scheduled to begin in early 2020.

**Data Compilation/Data Management System.** SBCWD has an annual program of collecting and compiling groundwater data into a data management system (DMS) that includes groundwater elevation, water quality, and water use data for the Annual Groundwater Reports. The effort for the GSP will be to review and update the DMS, to identify data gaps, and to support the GSP monitoring program. Available information will support the entire GSP including analysis of the hydrologic setting, groundwater conditions, sustainability criteria, and potential projects and management actions.

**Hydrogeologic Conceptual Model/Groundwater Conditions.** The third major step includes development of the hydrogeologic conceptual model (HCM), which is a description of the structural and physical characteristics that govern groundwater occurrence, flow, storage, and quality. These characteristics—described in text, tables, maps, and cross-sections—include regional geology, soils, geologic structures (such as faults) and boundaries (including bottom of the basin), aquifer properties. This step also includes documentation of historical and current groundwater conditions. This includes groundwater levels and flow, groundwater quality, land subsidence, and interactions of groundwater and surface water. In brief, this step describes how the local surface water-groundwater system works. It also will be an important basis for definition of *management areas*, involving subdivision of the North San Benito Basin to facilitate sustainable groundwater management.

**Water Budgets.** In the fourth major step, water budgets will be quantified for historical and current conditions. This will involve use of past studies, the existing numerical model, and recent monitoring data and investigations. Water balances developed by SCVWD for the adjacent Llagas Basin also will be reviewed to promote a consistent approach. The GSP Water Budgets will build on past Annual Report water balances and include use of available data and best available science to quantify inflows, outflows, and change in storage, including sustainable yield and potential overdraft. As shown here, this step includes numerical modeling that will be used to explore how the groundwater systems works, to assess potential management actions and projects, and to demonstrate how a GSP will achieve sustainable basin operation. SBCWD has a numerical model (Yates, 2001) that will be updated, expanded to cover the entire basin, and improved for application in the GSP.

**Sustainability Criteria**. While SBCWD has a long history of groundwater management, such management has not included systematic quantification of undesirable results, minimum thresholds, or measurable objectives to the extent required by SGMA. The fifth step of the GSP process will address the five undesirable results/sustainability indicators relevant to North San Benito Basin and indicated by the icons below. These include: chronic lowering of groundwater levels, groundwater storage depletion, water quality degradation, land subsidence, and depletion of interconnected surface water. Each of these will be defined in terms of minimum thresholds where occurrence of an undesirable result becomes significant and unreasonable and in terms of measurable management objectives.

**Management Actions/Monitoring.** In the sixth step, the GSP will present management actions—policies, programs, and projects—that will address the sustainability criteria and provide for sustainable management into the future. This step also will establish the GSP monitoring network and protocols that: 1) provides data to inform the hydrogeologic conceptual model, water budget and numerical model, 2) provides tracking and early warning regarding groundwater conditions and undesirable results, and 3) demonstrates progress toward and achievement of sustainability.

**Plan Development.** The GSP preparation process will culminate with development of GSP document including GSP sections with text, tables, and graphics plus appendices. The GSP document will be provided on the SBCWD website as a draft; following a comment period, a final GSP document will be presented for GSA consideration and adoption.

## Technical Advisory Committee (TAC)

As suggested by the technical steps described above, development of an effective and credible GSP is a multi-disciplinary process that combines engineering, science, and planning with local stakeholder interests and community values. To help guide this process, a Technical Advisory Committee (TAC) was organized in 2018. The purpose of the TAC is to incorporate community and stakeholder interests into consensus recommendations on SGMA implementation for consideration by the GSA Board in its decision-making process. The TAC members are responsible for reviewing draft products and materials and providing recommendations to support a technically sound GSP. Members of the TAC have been selected to represent GSP-related subject areas, including but not limited to environmental, technical, and land use planning fields. The TAC members began their quarterly meetings in August 2018 and are working collaboratively with SBCWD GSA staff and consultants. TAC meetings are open to the public.

## Community Engagement

The GSP process seeks to engage the diverse public, stakeholders, and groundwater interests. This will be accomplished with provision of information materials (e.g., posters and fact sheets), public workshops and other meetings, media (e.g., press releases) and the District website, and other outreach opportunities (e.g., fairs and festivals). In 2018, the following were accomplished:

- SGMA section on the redesigned SBCWD website: http://scbwd.com that provides information, announcements, and access to draft GSP documents
- Community Engagement Plan, poster, and three fact sheets addressing SGMA, the GSP process, and existing water management
- Two TAC meetings (August 15 and November 7), open to the public
- First Public Workshop (November 14) in Hollister, which provided an overview of SGMA and the GSP process and a forum for discussion of groundwater conditions, concerns, and challenges.

# 7-RECOMMENDATIONS

District policies and programs have served to effectively manage water resources for many years. The District, working collaboratively with other agencies, has eliminated historical overdraft through importation of CVP water, has developed and managed multiple sources of supply to address drought, has established an active and effective water conservation program, has initiated programs to protect water quality, and has improved delivered water quality to many municipal customers. The District also has provided consistent reporting and outreach. The following recommendations are responsive to the District Act and look forward to continuing effective management consistent with SGMA.

## Monitoring Programs

The District monitoring programs should be expanded to the entire North San Benito Groundwater Basin and improved to ensure accurate and consistent data for the Annual Reports and for GSP development.

- A high-priority task is to update and expand the groundwater level and quality monitoring network as discussed in the District November 21, 2018 technical memorandum.
- CIMIS station #126, maintained by the District, provides important data on increasingly variable climate conditions. However, the rain gage data have been compromised by spray irrigation. The irrigation system and practices need to be corrected to ensure that the CIMIS rain gage (part of a state-wide network) collects only precipitation.

## Groundwater Charges

The groundwater charge for the USBR contract year (March 2019-February 2020) is recommended to be $12.75 for agricultural use in Zone 6 and a groundwater charge of $38.25 is recommended for M&I use in Zone 6, subject to Board approval at the Public Hearing January 30, 2019.

## Groundwater Production and Replenishment

Past District percolation operations helped to reverse historical overdraft and then accumulate a water supply reserve. The District currently manages groundwater storage and surface water to minimize excessively high or low groundwater elevations on a temporal and geographic basis. The District should continue to operate Hernandez and Paicines to improve downstream groundwater conditions, including completion of the implementation and calibration of the new operations planning tool. In 2018, the District provided off-channel percolation of CVP water; this too should be continued given availability of CVP water and persistence of local low groundwater levels. Given the decreased reliability of imported supplies and continuing threat of drought, such replenishment operations are critical to sustainable groundwater supply.

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# APPENDIX A REPORTING REQUIREMENTS

## List of Tables

# APPENDIX A REPORTING REQUIREMENTS

The San Benito County Water District Act (1953) is codified in California Water Code Appendix 70. Section 70-7.6 authorizes the District Board of Directors to require the District to prepare an annual groundwater report; this report addresses groundwater conditions of the District and its zones of benefit for the water year, which begins October 1 of the preceding calendar year and ends September 30 of the current calendar year. The Board has consistently ordered preparation of Annual Reports, and the reports have included the contents specified Section 70-7.6:

- An estimate of the annual overdraft for the current water year and for the ensuing water year
- Information for the consideration of the Board in its determination of the annual overdraft and accumulated overdraft as of September 30 of the current year
- A report as to the total production of water from the groundwater supplies of the District and its zones as of September 30 of the current year
- Information for the consideration of the Board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the District and its zones
- The amount of water the District is obligated to purchase during the ensuing water year
- A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the District and its zones during the ensuing water year
- A recommendation as to whether or not a groundwater charge should be levied in any zone(s) of the District in the ensuing water year and if so, a rate per acre-foot for all water other than agricultural water for such zone(s)
- Any other information the Board requires.
- The full text of Appendix 70, Section 70-7.6 through 7.8 is enclosed at the end of this appendix.
- Each water year a special topic is identified for further consideration. These topics have included water quality, salt loading, shallow wells, and others. Additional analyses and documentation provided in previous annual reports are summarized in the following table.

District management of water resources is focused on three Zones of Benefit, listed below.

**Table A-1. District Zones of Benefit**

| Zone | Area | Provides |
|---|---|---|
| 1 | Entire County | Specific District administrative expenses |
| 3 | San Benito River Valley (Paicines to San Juan) and Tres Pinos River Valley (Paicines to San Benito River) | Operation of Hernandez and Paicines reservoirs and related groundwater recharge and management activities |
| 6 | San Juan, Hollister East, Hollister West, Pacheco, Bolsa SE, and Tres Pinos subbasins | Importation and distribution of CVP water and related groundwater management activities |

**Table A-2. Special Topics in Previous Annual Reports**

| Water Year | Additional Analyses and Reporting |
|---|---|
| 2000 | Methodology to calculate water supply benefits of Zone 3 and 6 operations |
| 2001 | Preliminary salt balance |
| 2002 | Investigation of individual salt loading sources |
| 2003 | Documentation of nitrate in supply wells, drains, monitor wells, San Juan Creek |
| 2004 | Documentation of depth to groundwater in shallow wells |
| 2005 | Tabulation of waste discharger permit conditions and recent water quality monitoring results |
| 2006 | Rate study |
| 2007 | Water quality update |
| 2008 | Water budget update |
| 2009 | Water demand and supply |
| 2010 | Water quality update |
| 2011 | Water budget update |
| 2012 | Land use update |
| 2013 | Water quality update |
| 2014 | Water balance update and Groundwater Sustainability |
| 2015 | Groundwater Sustainability – Basin Boundaries and GSAs |
| 2016 | Water quality update |
| 2017 | Water budget update |
| 2018 | GSP Update |

# APPENDIX A REPORTING REQUIREMENTS

Water Code Appendix 70 Excerpts

Section 70-7.6. Groundwater; investigation and report: recommendations San Benito County

Sec. 7.6. the board by resolution require the district to annually prepare an investigation and report on groundwater conditions of the district and the zones thereof, for the period from October 1 of the preceding calendar year through September 30 of the current year and on activities of the district for protection and augmentation of the water supplies of the district and the zones thereof. The investigation and report shall include all of the following information:

(a) Information for the consideration of the board in its determination of the annual overdraft.

(b) Information for the consideration of the board in its determination of the accumulated overdraft as of September 30 of the current calendar year.

(c) A report as to the total production of water from the groundwater supplies of the district and the zones thereof as of September 30 of the current calendar year.

(d) An estimate of the annual overdraft for the current water year and for the ensuing water year.

(e) Information for the consideration of the board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the district and the zones thereof for the ensuing water year.

(f) The amount of water the district is obligated to purchase during the ensuing water year.

(g) A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the district and the zones thereof the ensuing water year.

(h) A recommendation as to whether or not a groundwater charge should be levied in any zone or zones of the district during the ensuing year.

(i) If any groundwater charge is recommended, a proposal of a rate per acre-foot for agricultural water and a rate per acre-foot for all water other than agricultural water for such zone or zones.

(j) Any other information the board requires.

(Added by Stats. 1965, c. 1798, p.4167, 7. Amended by Stats.1967,c.934, 5, eff. July27,1967; Stats. 1983, c. 402, 1; Stats. 1998, c. 219 (A.B.2135), 1.)

**Section 70-7.7. Receipt of report; notice of hearing; contents; hearing**

Sec. 7.7. (a) On the third Monday in December of each year, the groundwater report shall be delivered to the clerk of the board in writing. The clerk shall publish, pursuant to Section 6061 of the Government Code, a notice of the receipt of the report and of a public hearing to be held on the second Monday of January of the following year in a newspaper of general circulation printed and published within the district, at least 10 days prior to the date at which the public hearing regarding the groundwater report shall be held. The notice shall include, but is not limited to, an invitation to all operators of water producing facilities within the district to call at the offices of the district to examine the groundwater report.

(b) The board shall hold, on the second Monday of January of each year, a public hearing, at which time any operator of a water-producing facility within the district, or any person interested in the condition of the groundwater supplies or the surface water supplies of the district, may in person, or by representative, appear and submit evidence concerning the groundwater conditions and the surface water supplies of the district. Appearances also may be made supporting or protesting the written groundwater report, including, but not limited to, the engineer's recommended groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4167, 8. Amended by Stats. 1983, c. 02,2; Stats. 1998, c. 219 (A.B.2135,2.)

Section 70-7.8. Determination of groundwater charge; establishment of rates; zones; maximum charge; clerical errors

Sec. 7.8. (a) Prior to the end of the water year in which a hearing is held pursuant to subdivision (b) of Section 7.7, the board shall hold a public hearing, noticed pursuant to Section 6061 of the government Code, to determine if a groundwater charge should be levied, it shall levy, assess, and affix such a charge or charges against all persons operating groundwater- producing facilities within the zone or zones during the ensuing water year. The charge shall be computed at fixed and uniform rate per acre-foot for agricultural water, and at a fixed and uniform rate per acre-foot for all water other than agricultural water. Different rates may be established in different zones. However, in each zone, the rate for agricultural water shall be fixed and uniform and the rate for water other than agricultural water shall be fixed and uniform. The rate for agricultural water shall not exceed one-third of the rate for all water other than agricultural water.

(b) The groundwater charge in any year shall not exceed the costs reasonably borne by the district in the period of the charge in providing the water supply service authorized by this act in the district or a zone or zones thereof.

(c) Any groundwater charge levied pursuant to this section shall be in addition to any general tax or assessment levied within the district or any zone or zones thereof.

(d) Clerical errors occurring or appearing in the name of any person or in the description of the water-producing facility where the production of water there from is otherwise properly charged, or in the making or extension of any charge upon the records which do not affect the substantial rights of the assesse or assesses, shall not invalidate the groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4168, 9. Amended by Stats. 1983, c. 402, 3; Stats.1983, c. 402, 3; Stats. 1998, c. 219 (A.B.2135), 3.)

# APPENDIX B CLIMATE DATA

## List of Tables and Figures

**Table B-1. Monthly Precipitation at the SBCWD CIMIS Station (inches)**

| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.1 | 0 | 2.2 | 4.4 | 4.5 | 1.6 | 1.3 | 1.3 | 0 | 0 | 0 | 0 | **15.5** | **120%** |
| 1997 | 1.0 | 3.2 | 4.3 | 6.8 | 0.2 | 0.1 | 0.2 | 0 | 0.1 | 0 | 0 | 0 | **15.9** | **123%** |
| 1998 | 0.2 | 3.8 | 2.6 | 4.9 | 9.1 | 2.7 | 2.3 | 2.4 | 0.1 | 0 | 0 | 0.1 | **28.1** | **218%** |
| 1999 | 0.5 | 1.9 | 0.8 | 2.5 | 2.5 | 1.5 | 0.7 | 0.1 | 0.1 | 0 | 0 | 0 | **10.6** | **82%** |
| 2000 | 0.1 | 1.0 | 0.1 | 4.1 | 4.5 | 0.7 | 0.4 | 0.5 | 0.1 | 0 | 0 | 0 | **11.5** | **89%** |
| 2001 | 3.5 | 0.8 | 0.2 | 2.9 | 2.8 | 0.6 | 2.2 | 0 | 0 | 0 | 0 | 0 | **13.1** | **101%** |
| 2002 | 0.7 | 11.5 | 11.9 | 0.7 | 1.2 | 1.6 | 0.4 | 0.3 | 0 | 0 | 0 | 0 | **28.1** | **218%** |
| 2003 | 0.0 | 1.7 | 5.0 | 0.8 | 1.4 | 1.1 | 3.1 | 0.1 | 0 | 0 | 0.1 | 0 | **13.1** | **102%** |
| 2004 | 0.2 | 0.6 | 5.3 | 1.3 | 4.2 | 0.6 | 0.3 | 0.1 | 0 | 0 | 0 | 0 | **12.5** | **97%** |
| 2005 | 2.0 | 0.5 | 3.5 | 2.5 | 2.9 | 3.4 | 0.8 | 0.6 | 0.4 | 0 | 0 | 0 | **16.7** | **129%** |
| 2006 | 0.1 | 0.3 | 3.1 | 1.5 | 1.0 | 5.0 | 1.7 | 0.4 | 0 | 0 | 0 | 0 | **13.0** | **101%** |
| 2007 | 0.2 | 0.7 | 1.7 | 0.6 | 2.2 | 0.3 | 0.6 | 0 | 0 | 0 | 0 | 0.4 | **6.7** | **52%** |
| 2008 | 0.7 | 0.7 | 0.9 | 4.6 | 2.1 | 0.1 | 0.1 | 0 | 0 | 0 | 0 | 0 | **9.1** | **70%** |
| 2009 | 0.3 | 1.1 | 1.9 | 0.4 | 3.7 | 1.8 | 0.2 | 0.5 | 0 | 0 | 0 | 0.2 | **10.0** | **77%** |
| 2010 | 0.5 | 0 | 1.3 | 2.3 | 2.2 | 1.7 | 3.4 | 0.6 | 0 | 0 | 0 | 0 | **12.1** | **94%** |
| 2011 | 0.7 | 1.9 | 2.6 | 1.6 | 2.6 | 2.3 | 0.2 | 0.8 | 0 | 0 | 0 | 0 | **13.0** | **100%** |
| 2012 | 0.7 | 1.0 | 0.1 | 0.8 | 0.5 | 2.3 | 1.4 | 0.3 | 0 | 0 | 0 | 0 | **7.1** | **55%** |
| 2013 | 0.0 | 2.2 | 1.2 | 1.4 | 0.6 | 0.5 | 0.3 | 0.0 | 0 | 0 | 0 | 0 | **6.3** | **49%** |
| 2014 | 0.1 | 0.4 | 0.2 | 0.2 | 1.9 | 1.6 | 0.9 | 0.0 | 0 | 0 | 0 | 0 | **5.4** | **41%** |
| 2015 | 1.6 | 0.5 | 5.8 | 0.0 | 1.2 | 0.2 | 0.2 | 0.9 | 0.0 | 0.0 | 0.1 | 0.1 | **10.6** | **82%** |
| 2016 | 0.2 | 3.7 | 1.6 | 4.0 | 0.6 | 3.7 | 0.8 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | **14.9** | **115%** |
| 2017 | 1.8 | 2.5 | 3.3 | 4.7 | 6.1 | 1.7 | 1.1 | 0.5 | 0.3 | 0.0 | 0.0 | 0.0 | **21.9** | **170%** |
| 2018 | 0.2 | 1.1 | 0.2 | 2.4 | 0.3 | 2.7 | 1.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | **8.3** | **64%** |
| AVG | **0.6** | **1.5** | **2.2** | **2.6** | **2.3** | **2.1** | **1.0** | **0.4** | **0.1** | **0.0** | **0.0** | **0.2** | **12.9** | **102%** |

Note: The average precipitation is based on the period of record (1875-2018).
-The CIMIS value for September 2017 (2.4") includes measurement error due to irrigation overspray. The corrected District value is 0".
-The CIMIS value for February, May, June, and August 2018 (0.8", 2.6", 0.1", 0.03") includes measurement error due to irrigation overspray. The corrected District value is 0.3" for February and 0" for all other months.
-Previous years of CIMIS data may have also been affected by irrigation overspray - the data before 2017 have not been corrected.

**Table B-2. Reference Evapotranspiration at the SBCWD CIMIS Station (inches)**

| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 3.9 | 2.2 | 1.2 | 1.5 | 1.9 | 3.7 | 5.1 | 6.1 | 6.7 | 7.4 | 6.7 | 4.7 | **51.0** | **104%** |
| 1997 | 3.8 | 1.8 | 1.4 | 1.4 | 2.5 | 4.3 | 5.8 | 7.5 | 7.1 | 7.2 | 6.7 | 5.7 | **55.2** | **113%** |
| 1998 | 3.9 | 1.8 | 1.5 | 1.3 | 1.4 | 2.8 | 4.3 | 4.5 | 5.3 | 6.9 | 6.8 | 4.7 | **45.2** | **92%** |
| 1999 | 3.5 | 1.7 | 1.5 | 1.5 | 1.8 | 3.0 | 4.7 | 5.8 | 6.7 | 6.9 | 5.9 | 4.7 | **47.8** | **98%** |
| 2000 | 4.0 | 2.0 | 1.9 | 1.2 | 1.6 | 3.7 | 5.1 | 6.0 | 6.7 | 6.7 | 6.2 | 4.7 | **50.0** | **102%** |
| 2001 | 2.9 | 1.7 | 1.5 | 1.5 | 1.8 | 3.1 | 3.9 | 6.2 | 6.5 | 6.0 | 6.2 | 4.8 | **46.0** | **94%** |
| 2002 | 3.5 | 1.9 | 1.2 | 1.5 | 2.3 | 3.7 | 4.2 | 6.4 | 7.1 | 7.2 | 6.1 | 5.4 | **50.5** | **103%** |
| 2003 | 3.6 | 1.9 | 1.3 | 1.6 | 1.8 | 3.9 | 3.8 | 6.0 | 6.5 | 7.3 | 6.2 | 5.1 | **48.8** | **100%** |
| 2004 | 4.1 | 1.7 | 1.2 | 1.3 | 1.7 | 4.0 | 5.2 | 6.4 | 6.7 | 6.6 | 6.0 | 5.3 | **50.3** | **103%** |
| 2005 | 3.1 | 1.7 | 1.4 | 1.3 | 1.7 | 3.0 | 4.4 | 5.7 | 6.4 | 6.9 | 6.1 | 4.6 | **46.2** | **94%** |
| 2006 | 3.6 | 2.0 | 1.2 | 1.4 | 2.2 | 2.4 | 3.0 | 5.5 | 6.4 | 7.0 | 5.6 | 4.4 | **44.7** | **91%** |
| 2007 | 3.3 | 1.7 | 1.4 | 1.8 | 1.8 | 4.1 | 4.8 | 6.3 | 6.9 | 6.8 | 6.5 | 4.7 | **49.8** | **102%** |
| 2008 | 3.5 | 2.2 | 1.4 | 1.3 | 2.0 | 3.8 | 5.2 | 6.0 | 6.9 | 6.7 | 6.3 | 5.0 | **50.2** | **103%** |
| 2009 | 3.8 | 1.9 | 1.4 | 1.7 | 1.7 | 3.5 | 4.8 | 5.5 | 6.3 | 7.1 | 6.3 | 5.3 | **49.3** | **101%** |
| 2010 | 3.5 | 2.2 | 1.7 | 1.3 | 1.8 | 3.5 | 3.9 | 5.4 | 6.7 | 6.3 | 5.9 | 5.0 | **47.0** | **96%** |
| 2011 | 3.0 | 1.9 | 1.1 | 1.6 | 2.1 | 2.7 | 4.4 | 5.3 | 6.0 | 6.6 | 5.7 | 4.6 | **45.0** | **92%** |
| 2012 | 3.3 | 1.9 | 1.8 | 1.8 | 2.5 | 3.3 | 4.4 | 6.4 | 6.8 | 6.6 | 6.0 | 4.6 | **49.5** | **101%** |
| 2013 | 3.3 | 1.8 | 1.2 | 1.5 | 2.1 | 3.7 | 5.4 | 6.3 | 6.4 | 6.5 | 6.0 | 4.8 | **48.8** | **100%** |
| 2014 | 3.5 | 2.0 | 1.8 | 2.1 | 1.9 | 3.6 | 4.9 | 6.8 | 6.6 | 6.4 | 6.0 | 4.7 | **50.4** | **103%** |
| 2015 | 3.9 | 1.9 | 1.5 | 1.8 | 2.2 | 4.1 | 5.1 | 5.0 | 6.4 | 6.5 | 6.5 | 5.3 | **50.2** | **102%** |
| 2016 | 4.1 | 2.1 | 1.4 | 1.3 | 2.7 | 3.4 | 4.7 | 5.7 | 7.5 | 7.2 | 5.7 | 5.2 | **51.0** | **104%** |
| 2017 | 3.4 | 2.1 | 1.5 | 1.6 | 1.8 | 3.7 | 4.5 | 6.3 | 6.8 | 7.6 | 6.0 | 5.2 | **50.4** | **103%** |
| 2018 | 4.2 | 1.9 | 2.0 | 1.6 | 2.7 | 3.3 | 4.8 | 5.8 | 7.3 | 7.7 | 6.6 | 5.2 | **52.9** | **108%** |
| AVG | 3.6 | 1.9 | 1.4 | 1.5 | 2.0 | 3.5 | 4.6 | 6.0 | 6.6 | 6.8 | 6.2 | 4.9 | **49.0** | **100%** |

Note: The averages are for the available period of record, 1995 for reference evapotranspiration.

# APPENDIX C HYDROLOGICAL DATA

## List of Tables and Figures



## Other Documents

**Table C-1. Groundwater Elevations October 2017 through October 2018**

| Well Number | Well Depth (feet) | Depth to Top of Screens (feet) | Subbasin | Key Well | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Oct-17 | Jan-18 | Apr-18 | Jul-18 | Oct-18 |
| **Bolsa SE** | | | | | | | | | |
| 12-5-09M1 | 240.00 | 105.00 | BSE | * | 115.6 | 118.4 | 121.6 | 124.3 | 123.7 |
| 12-5-21Q1 | 500.00 | 0.00 | BSE | * | 260.0 | 260.0 | 260.0 | | |
| 12-5-22N1 | 372.00 | 250.00 | BSE | * | 77.7 | 84.6 | 86.9 | 86.9 | 85.6 |
| **Hollister East** | | | | | | | | | |
| 2317 | 0.00 | 0.00 | HE | | 221.5 | 224.1 | 224.2 | 223.8 | 222.7 |
| 12-5-14N1 | 0.00 | 0.00 | HE | * | 229.0 | 229.0 | 229.0 | | |
| 12-5-22C1 | 237.00 | 102.00 | HE | * | 146.3 | 182.9 | 182.9 | 166.7 | 169.7 |
| 12-5-22J2 | 355.00 | 120.00 | HE | * | 190.1 | 194.6 | 195.7 | 192.3 | 199.5 |
| 12-5-23A20 | 862.00 | 178.00 | HE | * | 182.6 | 181.8 | 183.6 | 187.0 | 181.0 |
| 12-5-36B20 | 500.00 | 430.00 | HE | | | | | | 191.0 |
| 12-6-07P1 | 147.00 | 0.00 | HE | | 243.9 | 245.3 | 248.5 | 244.2 | 240.2 |
| 12-6-18G1 | 198.00 | 70.00 | HE | | 273.6 | 267.5 | 270.2 | 266.4 | 277.2 |
| 12-6-30E1 | 0.00 | 0.00 | HE | | 348.9 | 348.6 | 349.0 | 348.0 | 347.5 |
| 13-6-07D2 | 0.00 | 0.00 | HE | | 332.9 | 336.9 | 337.0 | 338.0 | 337.9 |
| ROSSI 1 | 0.00 | 0.00 | HE | | 222.4 | 218.6 | 222.9 | 227.3 | 229.0 |
| **Hollister West** | | | | | | | | | |
| 12-5-27E1 | 175.00 | 0.00 | HW | * | 181.7 | 198.3 | 199.8 | 195.2 | 198.8 |
| 12-5-28J1 | 220.00 | 0.00 | HW | * | 198.6 | 210.2 | 211.7 | 209.7 | 210.7 |
| 12-5-28N1 | 408.00 | 168.00 | HW | | | | | | 217.7 |
| 12-5-33E2 | 121.00 | 81.00 | HW | * | 205.4 | 212.9 | 213.1 | 212.6 | 211.8 |
| 12-5-34P1 | 195.00 | 153.00 | HW | * | 199.3 | 216.6 | 216.6 | 220.8 | 217.6 |
| 13-5-03L1 | 126.00 | 0.00 | HW | * | 211.7 | 225.8 | 226.3 | 222.8 | 225.6 |
| 13-5-04B | 0.00 | 0.00 | HW | | 207.4 | 212.6 | 212.7 | 225.1 | 226.8 |
| 13-5-10B1 | 0.00 | 0.00 | HW | * | 219.6 | 218.6 | 218.8 | 231.0 | 215.6 |
| 13-5-10L1 | 252.00 | 52.00 | HW | | 312.0 | 312.0 | 312.0 | 312.0 | |
| 13-5-11E1 | 0.00 | 0.00 | HW | | 277.9 | 282.3 | 283.5 | 286.8 | 277.3 |
| San Justo 4 (INDART) | 0.00 | 0.00 | HW | | 272.7 | | 272.4 | 271.8 | 271.4 |
| San Justo 6 (ROSE) | 0.00 | 0.00 | HW | | 231.9 | | 234.7 | 233.4 | 234.2 |
| **Pacheco** | | | | | | | | | |
| 11-5-26N2 | 232.00 | 95.00 | P | * | 173.6 | 173.2 | 173.5 | 169.2 | 168.7 |
| 11-5-26R3 | 225.00 | 65.00 | P | * | 180.4 | 181.9 | 183.9 | 179.6 | 177.5 |
| 11-5-35C1 | 180.00 | 0.00 | P | * | 176.7 | 178.3 | 178.7 | 173.1 | 169.7 |
| 11-5-35G1 | 230.00 | 0.00 | P | * | 185.1 | 183.1 | 183.8 | 181.2 | 179.3 |
| 11-5-35Q3 | 0.00 | 0.00 | P | * | 159.7 | 168.4 | 157.2 | 144.7 | 167.8 |
| 11-5-36C1 | 98.00 | 0.00 | P | * | 194.3 | 196.2 | 198.7 | 194.9 | 194.0 |
| 11-5-36M1 | 0.00 | 0.00 | P | * | 185.7 | 184.2 | 184.8 | 182.5 | 180.4 |
| 11-6-31M2 | 188.00 | 155.00 | P | * | 241.8 | 227.0 | 228.7 | 225.7 | 231.0 |
| 12-5-01G2 | 300.00 | 0.00 | P | | 186.7 | 184.0 | 185.0 | 182.2 | 180.4 |
| 12-5-02H5 | 128.00 | 42.00 | P | | 178.8 | 176.3 | 180.6 | 178.3 | 176.8 |
| 12-5-02L2 | 170.00 | 0.00 | P | | 194.6 | 194.5 | 195.6 | 193.3 | 192.4 |
| 12-5-03B1 | 128.00 | 100.00 | P | * | 182.0 | | | | 182.0 |
| 12-6-06K1 | 260.00 | 16.00 | P | | 260.0 | | | | 260.0 |
| 12-6-06L4 | 235.00 | 50.00 | P | | 221.6 | 220.9 | 222.0 | 220.1 | 218.1 |
| **San Juan** | | | | | | | | | |
| 12-4-17L20 | 0.00 | 0.00 | SJ | | 121.9 | 123.6 | 124.2 | 122.2 | 118.9 |
| 12-4-18J1 | 0.00 | 0.00 | SJ | | 121.6 | 124.2 | 122.6 | 123.1 | 122.6 |
| 12-4-20C3 | 0.00 | 0.00 | SJ | | | | 110.2 | 107.2 | 110.0 |
| 12-4-21M1 | 250.00 | 0.00 | SJ | * | 139.7 | 146.3 | 146.3 | 143.5 | 142.6 |
| 12-4-26G1 | 876.00 | 240.00 | SJ | * | 145.9 | 155.7 | 160.3 | 127.4 | 154.3 |
| 12-4-34H1 | 387.00 | 120.00 | SJ | * | 152.7 | 166.9 | 171.6 | 154.8 | 156.7 |
| 12-4-35A1 | 325.00 | 110.00 | SJ | | 165.5 | 187.5 | 192.4 | 176.3 | 174.1 |
| 12-5-30H1 | 240.00 | 0.00 | SJ | | 185.7 | 203.3 | 204.3 | 205.5 | 204.8 |
| 12-5-31H1 | 0.00 | 0.00 | SJ | | | 206.3 | 207.6 | 178.9 | 198.6 |
| 13-4-03H1 | 312.00 | 168.00 | SJ | | 146.4 | 166.1 | 170.5 | 158.2 | 156.1 |
| 13-4-4A3 | 0.00 | 0.00 | SJ | | 197.9 | 197.2 | 195.4 | 191.9 | 188.1 |
| RIDER BERRY | 0.00 | 0.00 | SJ | | 155.9 | | 171.6 | 146.5 | 146.7 |

**Table C-1. Groundwater Elevations October 2017 through October 2018**

| Well Number | Well Depth (feet) | Depth to Top of Screens (feet) | Subbasin | Key Well | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Oct-17 | Jan-18 | Apr-18 | Jul-18 | Oct-18 |
| **Tres Pinos** | | | | | | | | | |
| 13-5-12D4 | 0.00 | 0.00 | TP | | 169.0 | 249.0 | 253.0 | 231.0 | 234.5 |
| 13-5-12K1 | 0.00 | 0.00 | TP | | 316.0 | 320.0 | 322.0 | 322.8 | 321.9 |
| 13-5-12N20 | 352.00 | 301.00 | TP | * | 310.1 | 313.1 | 312.9 | 310.6 | 308.3 |
| 13-5-13F1 | 134.00 | 30.00 | TP | * | 325.7 | 326.2 | 326.7 | 325.3 | 323.6 |
| 13-5-13J2 | 180.00 | 0.00 | TP | * | 330.6 | 333.7 | 333.5 | 318.8 | 325.2 |
| 13-6-19J1 | 340.00 | 128.00 | TP | | 428.6 | 429.1 | 429.4 | 424.4 | 429.0 |
| 13-6-19K1 | 211.00 | 0.00 | TP | * | 357.6 | 361.1 | 361.6 | 365.8 | 357.5 |
| 13-6-20K1 | 0.00 | 0.00 | TP | | 427.5 | 427.8 | 428.7 | 422.1 | 426.2 |
| **Bolsa** | | | | | | | | | |
| 11-4-25H1 | 0.00 | 0.00 | B | | 114.4 | 116.5 | 118.2 | (5.2) | 23.7 |
| 11-4-26B1 | 642.00 | 149.00 | B | * | 131.9 | 136.6 | 134.8 | 115.5 | 125.0 |
| 11-4-34A1 | 100.00 | 0.00 | B | * | 127.9 | 132.0 | 132.0 | 128.6 | 127.8 |
| 11-5-20N1 | 300.00 | 0.00 | B | * | 62.5 | 109.0 | 109.6 | 48.9 | 71.3 |
| 11-5-21E2 | 220.00 | 100.00 | B | | 155.0 | | | | 155.0 |
| 11-5-27P2 | 331.00 | 67.00 | B | | 167.3 | 172.9 | 173.0 | 168.3 | 168.5 |
| 11-5-28B1 | 198.00 | 125.00 | B | | 168.0 | | | | 168.0 |
| 11-5-28P4 | 140.00 | 80.00 | B | | 165.0 | | | | 165.0 |
| 11-5-31F1 | 515.00 | 312.00 | B | * | 68.0 | 94.9 | 96.5 | 41.2 | 67.5 |
| 11-5-33B1 | 125.00 | 0.00 | B | | 169.0 | | | | 169.0 |
| 12-5-05M1 | 0.00 | 0.00 | B | | 47.7 | 82.5 | 27.1 | 35.9 | 61.4 |
| 12-5-06L1 | 0.00 | 0.00 | B | * | 141.6 | 148.2 | 150.7 | 147.4 | 145.2 |
| 12-5-07P1 | 750.00 | 360.00 | B | | 36.7 | 56.8 | 58.3 | 55.1 | 50.0 |
| 12-5-17D1 | 950.00 | 314.00 | B | | | 70.8 | 72.8 | 70.7 | 67.0 |
| **Paicines** | | | | | | | | | |
| DONATI 6 | 0.00 | 0.00 | Paicines | | 631.6 | 626.0 | 628.5 | 618.6 | 617.7 |
| RFP Vineyard 3 (FRANCHIONI) | 0.00 | 0.00 | Paicines | | 646.9 | 656.0 | 656.3 | 655.8 | 657.8 |
| RIDGEMARK 5 | 0.00 | 0.00 | Paicines | | 639.6 | 641.6 | 601.3 | 636.3 | 635.1 |
| RIDGEMARK 7 | 0.00 | 0.00 | Paicines | | 628.7 | 633.8 | 634.6 | 635.8 | 638.3 |
| SCHIELDS 2 | 0.00 | 0.00 | Paicines | | 737.0 | 737.0 | 737.0 | | |
| SCHIELDS 4 (vineyard) | 0.00 | 0.00 | Paicines | | 625.7 | 632.3 | 632.8 | 609.3 | 608.3 |
| **Pacheco Creek** | | | | | | | | | |
| 11-5-12E1 | 103.00 | 52.00 | PC | * | 243.3 | 238.6 | | | |
| 11-5-13D1 | 125.00 | 0.00 | PC | * | 229.3 | 228.4 | 230.1 | 219.5 | 190.1 |
| 11-5-24C1 | 134.00 | 0.00 | PC | * | 213.9 | | | 212.9 | 207.4 |
| 11-5-24C2 | 165.00 | 70.00 | PC | * | 225.9 | 224.7 | 226.0 | 223.0 | 216.3 |
| 11-5-24L1 | 70.00 | 0.00 | PC | * | 212.7 | 210.4 | 211.7 | 207.9 | 211.8 |
| 11-5-25G1 | 225.00 | 0.00 | PC | * | 223.0 | 206.8 | 207.9 | 211.8 | 210.7 |
| **Tres Pinos Creek Valley** | | | | | | | | | |
| 1536 | 0.00 | 0.00 | TPCV | | 276.0 | 295.0 | 297.0 | 294.5 | 293.0 |
| DONATI 2 | 0.00 | 0.00 | TPCV | | 654.6 | 651.5 | 651.1 | 649.4 | 636.4 |
| GRANITE ROCK WELL 1 | 0.00 | 0.00 | TPCV | | 299.6 | | 305.7 | 304.9 | 305.5 |
| GRANITE ROCK WELL 2 | 0.00 | 0.00 | TPCV | | 314.5 | | 319.7 | 315.4 | 315.9 |
| San Justo 5 (WINDMILL) | 0.00 | 0.00 | TPCV | | 273.9 | | 276.1 | 275.7 | 275.4 |
| WILDLIFE CENTER 5 | 0.00 | 0.00 | TPCV | | 705.6 | 709.5 | 711.7 | 713.8 | 711.5 |
| **SCVWD** | | | | | | | | | |
| 11S04E02D008 | 0.00 | 0.00 | SCVWD | | 151.4 | 163.6 | 150.4 | 126.6 | 142.7 |
| 11S04E02N001 | 0.00 | 0.00 | SCVWD | | 147.0 | 156.7 | 155.6 | 116.1 | 134.8 |
| 11S04E03J002 | 0.00 | 0.00 | SCVWD | | 152.5 | 161.4 | 149.7 | 122.4 | 140.4 |
| 11S04E08K002 | 0.00 | 0.00 | SCVWD | | 152.5 | 161.5 | 161.4 | 144.9 | 145.0 |
| 11S04E10D004 | 0.00 | 0.00 | SCVWD | | 143.8 | 159.0 | 152.1 | 127.0 | 137.9 |
| 11S04E15J002 | 0.00 | 0.00 | SCVWD | | 133.0 | | | 111.6 | 123.1 |
| 11S04E17N004 | 0.00 | 0.00 | SCVWD | | 153.7 | 161.7 | 160.4 | 145.2 | 144.9 |
| 11S04E21P003 | 0.00 | 0.00 | SCVWD | | 139.2 | 147.8 | 143.4 | 120.6 | 132.8 |
| 11S04E22N001 | 0.00 | 0.00 | SCVWD | | 134.6 | 142.3 | 139.2 | 114.4 | 128.0 |
| 11S04E32R002 | 0.00 | 0.00 | SCVWD | | 128.0 | 133.6 | 128.6 | 111.1 | 121.4 |

**Table C-2. Groundwater Change Attributes**

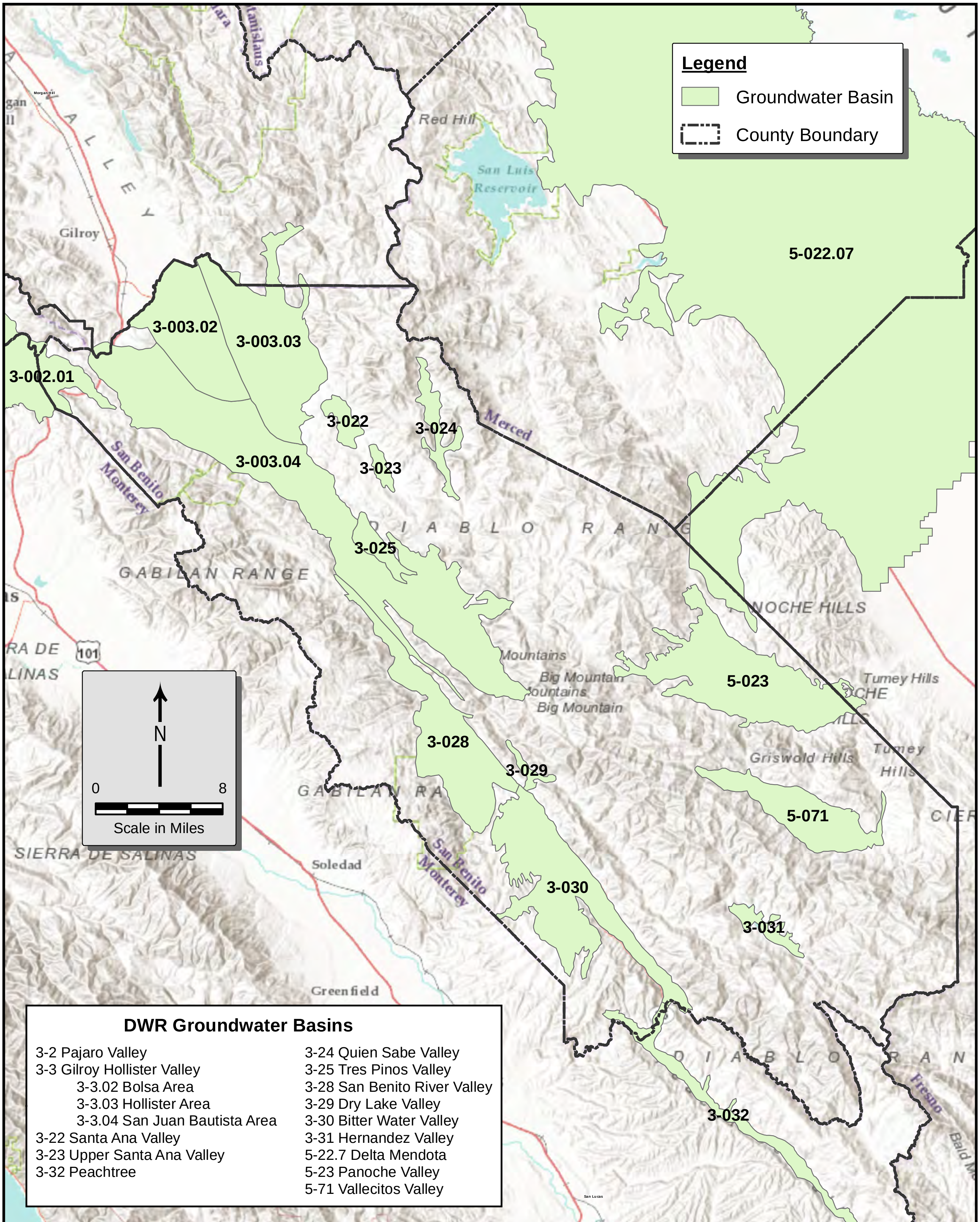
| Subbasin | Subbasin Area (Acres) | Average Storativity |
|---|---|---|
| San Juan | 11,708 | 0.05 |
| Hollister West | 6,050 | 0.05 |
| Tres Pinos | 4,725 | 0.05 |
| Pacheco | 6,743 | 0.03 |
| Northern Hollister East | 10,686 | 0.03 |
| Southern Hollister East | 5,175 | 0.03 |
| Bolsa SE | 2,691 | 0.08 |
| Bolsa | 20,003 | 0.01 |

**Table C-3. Groundwater Change in Elevation 2017-2018 (feet)**

| Subbasin | Average Change in Groundwater Elevation | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| San Juan | 0.87 | (4.49) | 0.29 | (0.75) | (1.39) | (0.89) | - | (10.66) | (7.95) | (9.45) | (3.56) | 14.57 | 3.55 |
| Hollister West | 3.13 | (1.69) | 3.31 | (1.43) | (1.58) | (0.66) | 2.12 | (5.72) | (17.41) | (3.60) | 0.93 | 6.89 | 9.51 |
| Tres Pinos | 2.47 | (2.34) | 0.72 | 8.10 | (10.52) | 0.97 | 2.54 | (2.48) | (6.66) | (6.68) | (6.04) | 4.38 | 0.91 |
| Pacheco | 1.93 | (4.41) | (1.36) | 8.10 | (6.60) | 1.92 | (4.36) | (2.95) | (7.37) | 1.92 | 2.98 | 8.58 | (2.41) |
| Northern Hollister East | 3.64 | (6.51) | (4.21) | 10.15 | (8.73) | 2.72 | (2.36) | 1.65 | (9.10) | 0.76 | (1.48) | 5.82 | 2.55 |
| Southern Hollister East | 3.26 | (1.46) | 5.45 | 9.39 | 4.93 | (1.94) | (2.18) | (1.14) | (6.87) | 1.61 | 8.13 | 0.46 | 7.23 |
| Bolsa SE | 1.55 | (6.78) | 11.51 | (24.80) | 25.29 | (11.65) | 0.25 | (4.27) | (10.68) | (3.34) | (9.94) | 8.21 | 7.17 |
| Bolsa | 6.79 | (3.30) | 8.97 | (16.86) | 23.15 | (11.19) | 10.72 | (3.37) | (25.56) | 4.57 | (2.89) | 10.62 | (2.57) |

**Table C-4. Groundwater Change in Storage 2006-2018 (acre-feet)**

| Subbasin | Average Change in Groundwater Storage (AF) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| San Juan | 510 | (2,626) | 168 | (437) | (811) | (523) | - | (6,239) | (4,653) | (5,530) | (2,086) | 8,531 | 2,077 |
| Hollister West | 947 | (510) | 1,001 | (431) | (477) | (198) | 640 | (1,730) | (5,267) | (1,090) | 282 | 2,084 | 2,878 |
| Tres Pinos | 584 | (553) | 169 | 1,913 | (2,485) | 228 | 601 | (586) | (1,574) | (1,579) | (1,427) | 1,034 | 216 |
| Pacheco | 391 | (892) | (275) | 1,639 | (1,335) | 389 | (882) | (597) | (1,490) | 388 | 604 | 1,736 | (488) |
| Northern Hollister East | 1,167 | (2,087) | (1,350) | 3,253 | (2,798) | 870 | (757) | 528 | (2,918) | 242 | (474) | 1,867 | 818 |
| Southern Hollister East | 506 | (227) | 846 | 1,457 | 766 | (301) | (339) | (177) | (1,067) | 250 | 1,263 | 72 | 1,123 |
| Bolsa SE | 333 | (1,458) | 2,478 | (5,338) | 5,443 | (2,508) | 53 | (918) | (2,300) | (719) | (2,139) | 1,767 | 1,543 |
| Bolsa | 1,358 | (659) | 1,794 | (3,372) | 4,631 | (2,239) | 2,144 | (674) | (5,112) | 915 | (578) | 2,125 | (514) |



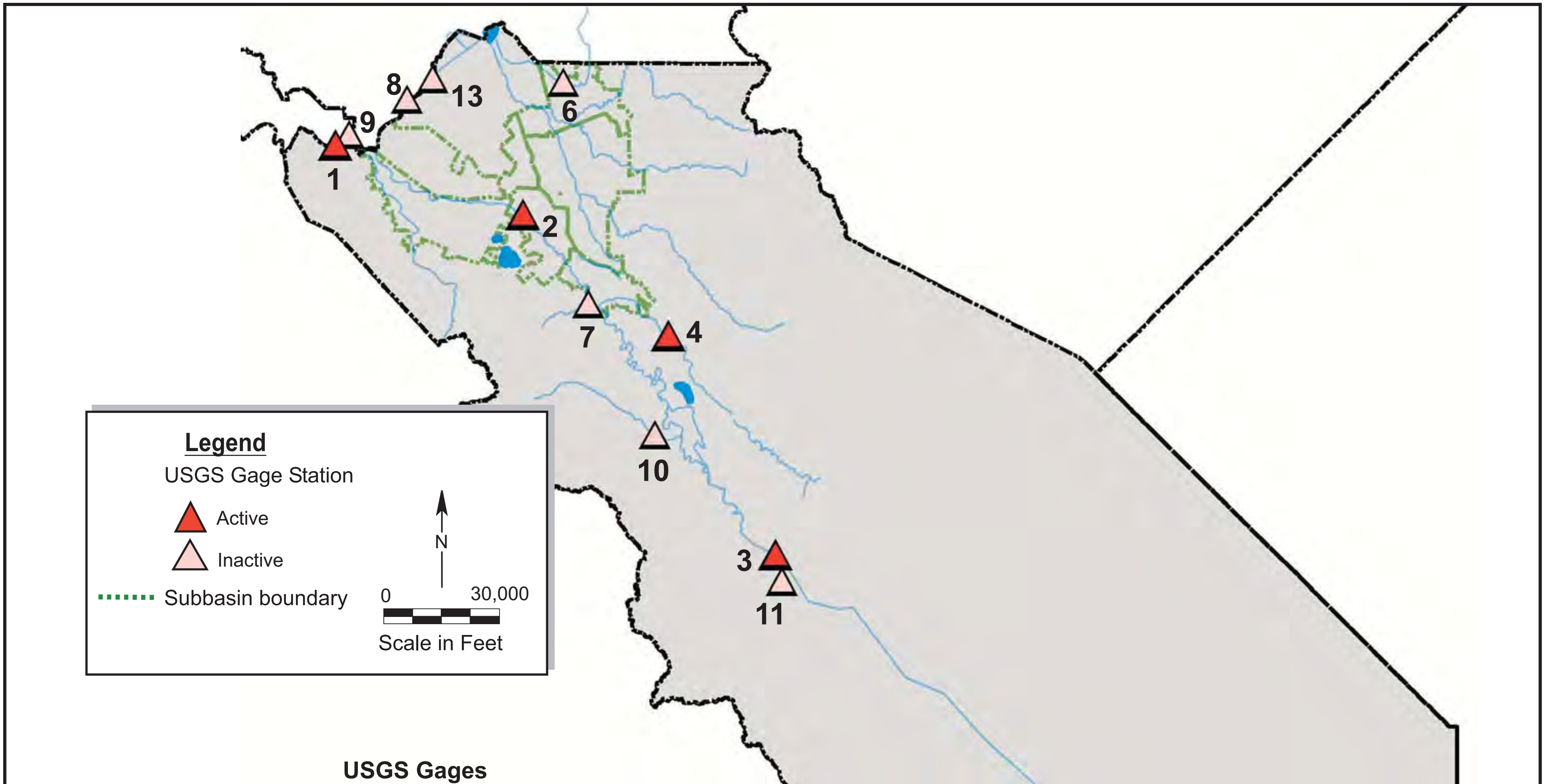

**DWR Groundwater Basins**

- 3-2 Pajaro Valley
- 3-3 Gilroy Hollister Valley
  - 3-3.02 Bolsa Area
  - 3-3.03 Hollister Area
  - 3-3.04 San Juan Bautista Area
- 3-22 Santa Ana Valley
- 3-23 Upper Santa Ana Valley
- 3-32 Peachtree
- 3-24 Quien Sabe Valley
- 3-25 Tres Pinos Valley
- 3-28 San Benito River Valley
- 3-29 Dry Lake Valley
- 3-30 Bitter Water Valley
- 3-31 Hernandez Valley
- 5-22.7 Delta Mendota
- 5-23 Panoche Valley
- 5-71 Vallecitos Valley

December 2018

TODD GROUNDWATER

**Figure C-1**
**Groundwater Basins in San Benito County**




**USGS Gages**

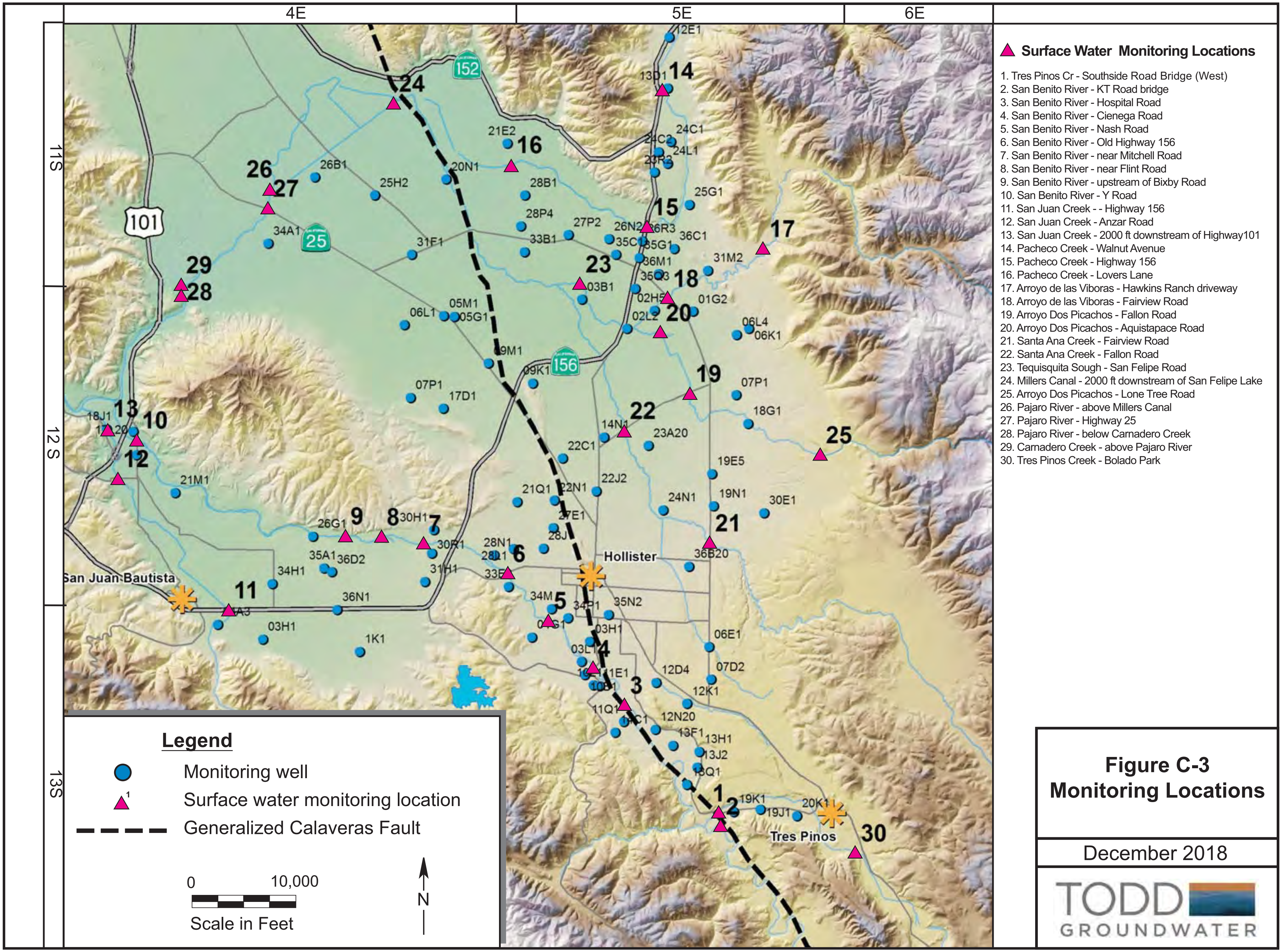
| Site ID | USGS Number | Site Name | Period of Record | |
|---|---|---|---|---|
| 1 | 11159000 | PAJARO R A CHITTENDEN CA | 10/1/1939 | Active |
| 2 | 11158600 | SAN BENITO R A HWY 156 NR HOLLISTER CA | 10/1/1970 | Active |
| 3 | 11156500 | SAN BENITO R NR WILLOW CREEK SCHOOL CA | 10/1/1939 | Active |
| 4 | 11157500 | TRES PINOS C NR TRES PINOS CA* | 12/8/1922 | Active |
| 5 | 11154700 | CLEAR C NR IDRIA CA | 10/1/1993 | Active |
| 6 | 11153040 | PACHECO C A DUNNEVILLE CA | 10/1/1981 | 9/30/1985 |
| 7 | 11158500 | SAN BENITO R NR HOLLISTER CA | 10/1/1949 | 9/30/1983 |
| 8 | 11153700 | PAJARO R NR GILROY CA | 3/1/1959 | 9/30/1982 |
| 9 | 11158900 | PESCADERO C NR CHITTENDEN CA | 9/11/1970 | 9/30/1981 |
| 10 | 11156700 | PESCADERO C NR PAICINES CA | 7/1/1959 | 10/7/1970 |
| 11 | 11156450 | WILLOW C TRIB NR SAN BENITO CA | 7/1/1964 | 9/30/1969 |
| 12 | 11156000 | SAN BENITO R BL M C NR HERNANDEZ CA | 10/1/1949 | 9/30/1963 |
| 13 | 11154500 | PAJARO R A SARGENT CA | 10/1/1940 | 9/30/1941 |

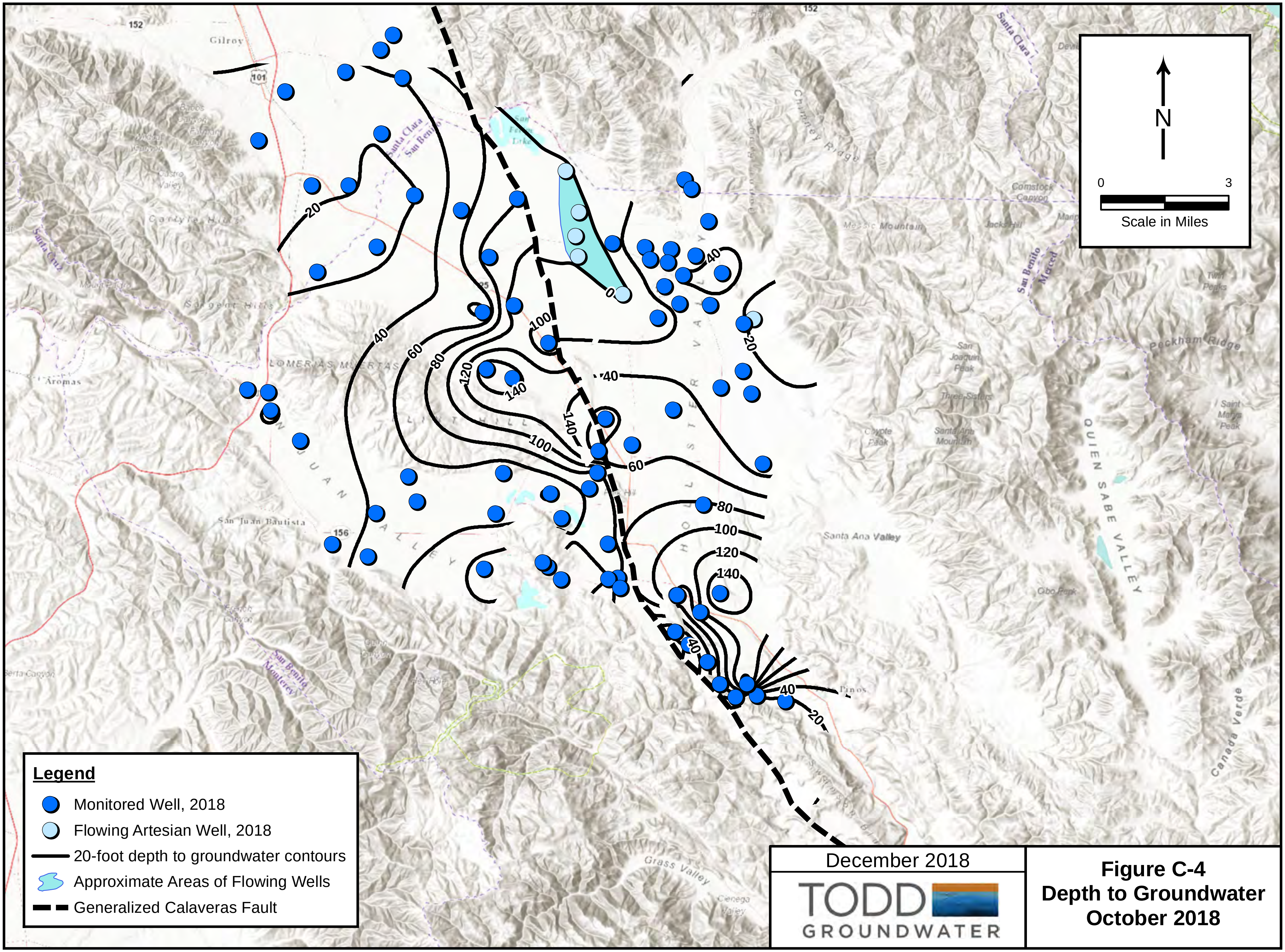
* WY 2006 data for gage height only

December 2018

TODD GROUNDWATER

**Figure C-2**
**Location of Streamflow Stations**

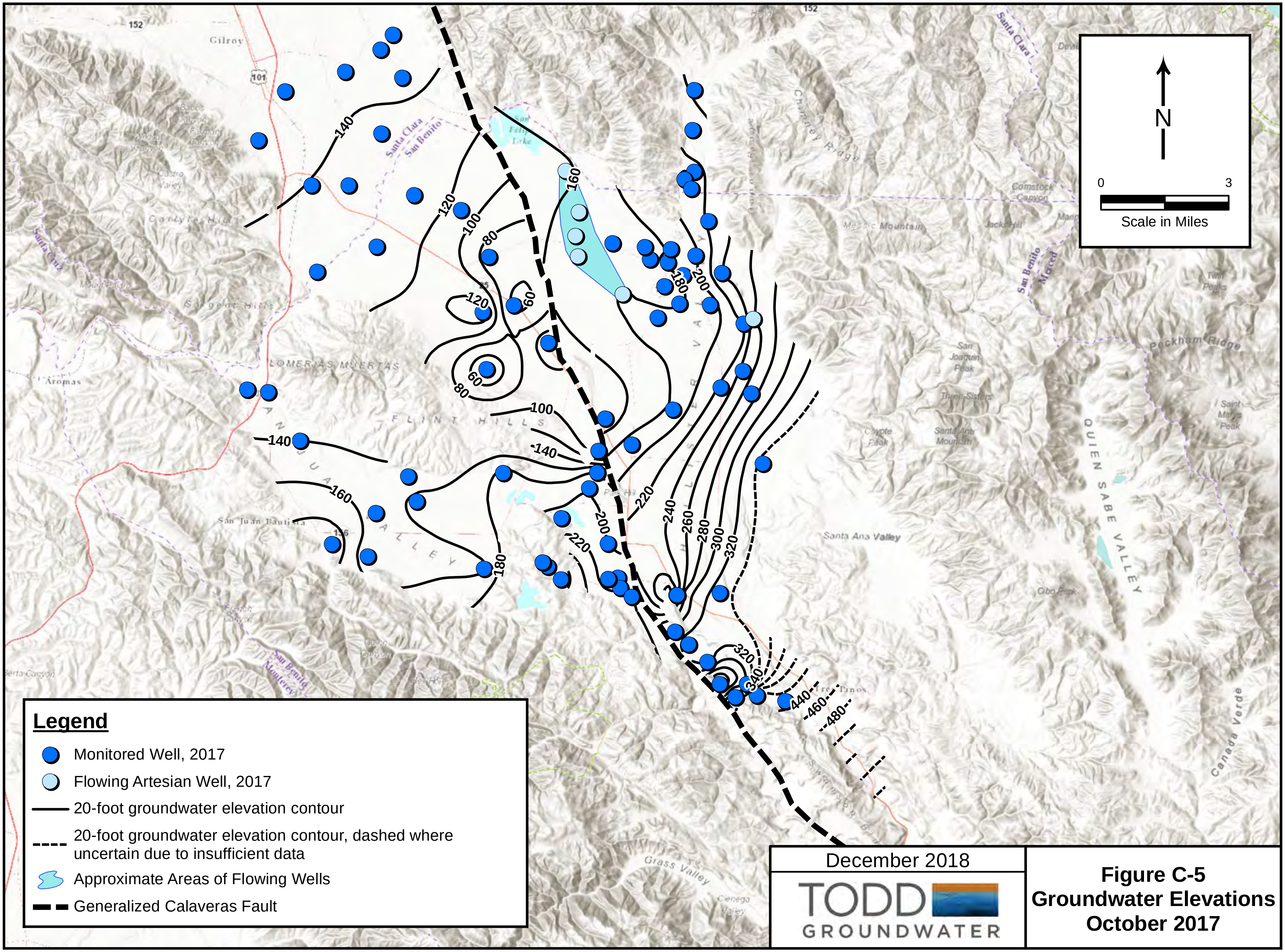

4E
5E
6E
11S
12 S
13S
Surface Water Monitoring Locations
1. Tres Pinos Cr - Southside Road Bridge (West)
2. San Benito River - KT Road bridge
3. San Benito River - Hospital Road
4. San Benito River - Cienega Road
5. San Benito River - Nash Road
6. San Benito River - Old Highway 156
7. San Benito River - near Mitchell Road
8. San Benito River - near Flint Road
9. San Benito River - upstream of Bixby Road
10. San Benito River - Y Road
11. San Juan Creek - - Highway 156
12. San Juan Creek - Anzar Road
13. San Juan Creek - 2000 ft downstream of Highway101
14. Pacheco Creek - Walnut Avenue
15. Pacheco Creek - Highway 156
16. Pacheco Creek - Lovers Lane
17. Arroyo de las Viboras - Hawkins Ranch driveway
18. Arroyo de las Viboras - Fairview Road
19. Arroyo Dos Picachos - Fallon Road
20. Arroyo Dos Picachos - Aquistapace Road
21. Santa Ana Creek - Fairview Road
22. Santa Ana Creek - Fallon Road
23. Tequisquita Sough - San Felipe Road
24. Millers Canal - 2000 ft downstream of San Felipe Lake
25. Arroyo Dos Picachos - Lone Tree Road
26. Pajaro River - above Millers Canal
27. Pajaro River - Highway 25
28. Pajaro River - below Carnadero Creek
29. Carnadero Creek - above Pajaro River
30. Tres Pinos Creek - Bolado Park
152
101
25
156
San Juan Bautista
Hollister
Tres Pinos
Legend
Monitoring well
Surface water monitoring location
Generalized Calaveras Fault
0
10,000
Scale in Feet
N
Figure C-3
Monitoring Locations
December 2018
TODD
GROUNDWATER




December 2018

TODD GROUNDWATER

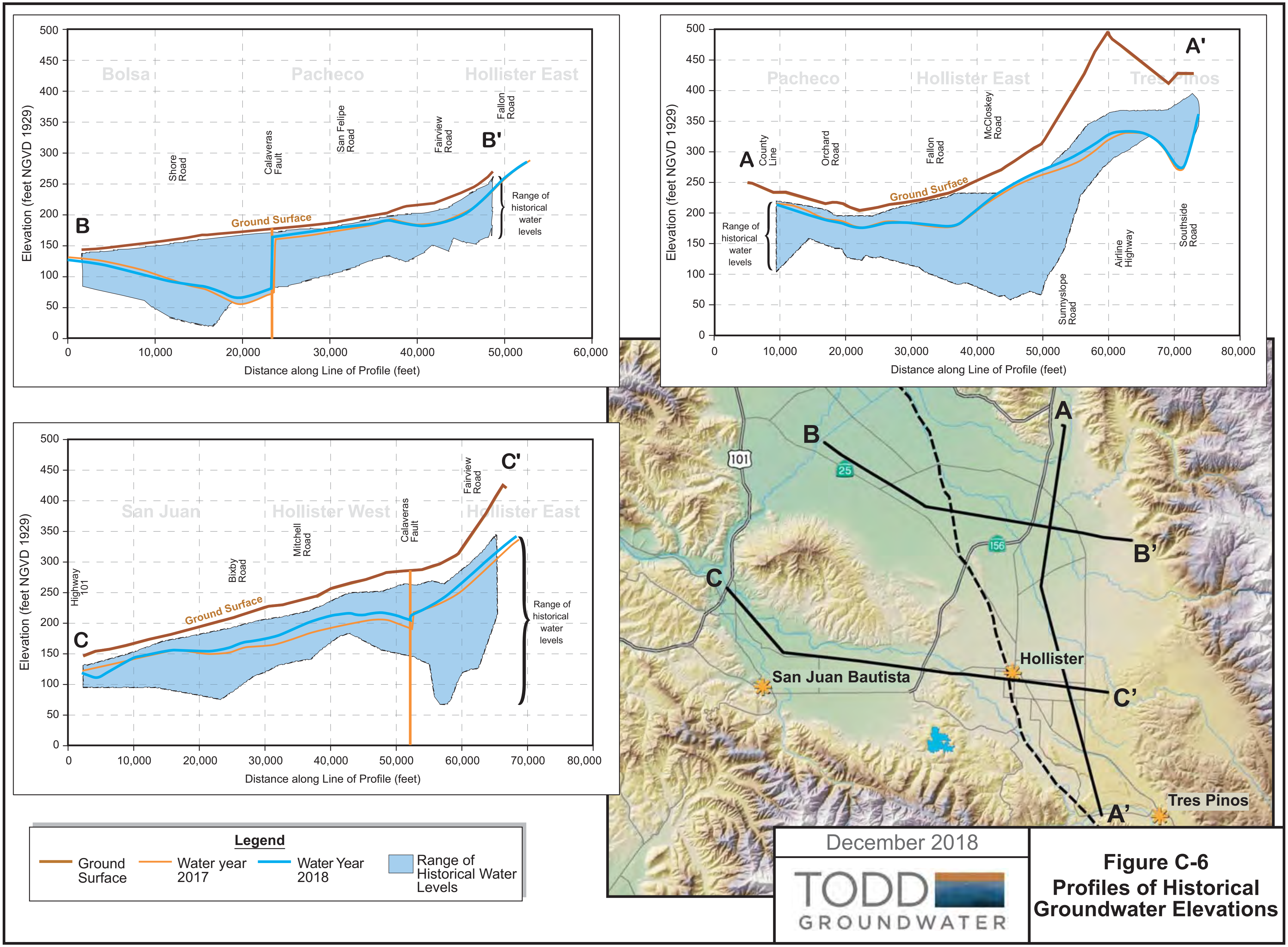
**Figure C-4**
**Depth to Groundwater**
**October 2018**




December 2018

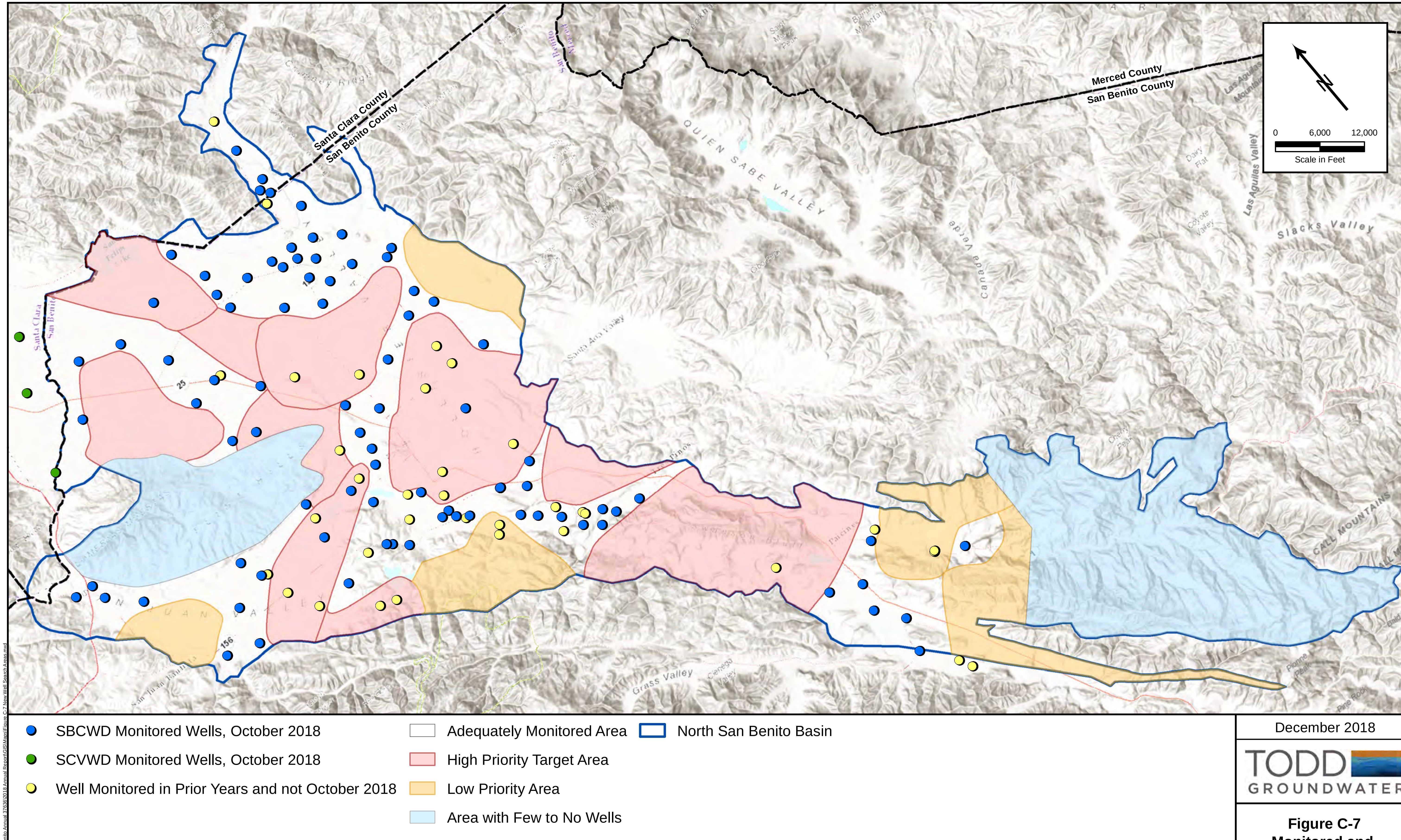
TODD GROUNDWATER

**Figure C-5**
**Groundwater Elevations**
**October 2017**




December 2018

**Figure C-6**
**Profiles of Historical Groundwater Elevations**




December 2018

TODD GROUNDWATER

**Figure C-7**
**Monitored and Unmonitored Areas**
**North San Benito Basin**

# TECHNICAL MEMORANDUM

**Subject:** Sustainable Groundwater Management Act –

Process for Establishing Well Network to Monitor Groundwater in San Benito County

**Prepared For:** Jeff Cattaneo, P.E. SBCWD General Manager

**Prepared by:** David Macdonald, Assistant Engineer

**Reviewed by:** Garrett Haertel, P.E. Deputy District Engineer

**Date:** November 21, 2018

**Organization of TM**

- Background
- Purpose
- Discussion
- Conclusions
- Recommendations

## BACKGROUND

San Benito County Water District (SBCWD) has continuously managed the groundwater in San Benito County for over 50 years. In 2017, SBCWD became the Groundwater Sustainability Agency (GSA) for San Benito County to satisfy requirements of the Sustainable Groundwater Management Act (SGMA). This designation allows SBCWD to be the lead agency in preparing a Groundwater Sustainability Plan (GSP) for a significant portion of San Benito County.

After reviewing the current network of monitored wells, it became evident that in order to fully comply with SGMA, additional wells were needed to increase monitoring coverage of the groundwater basin.

## PURPOSE

The purpose of this technical memorandum is to detail the procedure for finding and adding new wells to the monitoring network.

## DISCUSSION

Additional wells are needed in the San Juan Bautista, Tres Pinos Valley, Bolsa, and Hollister sub-basins in order to provide quality coverage. Todd Groundwater is SBCWD's consultant regarding groundwater management, and they have provided a map titled "Historically Monitored Wells" which indicates areas where data is lacking. These areas were targeted in the search for additional wells to add to the monitoring network. SBCWD utilized the following procedure to locate potential wells to add extra coverage within the groundwater subbasins.

**Finding Wells for Monitoring Groundwater Conditions**

First Method

1. Determine areas of need based on the "Historically Monitored Wells" map.
2. Use county GIS map to determine Assessor's Parcel Number (APN) of parcels within areas of need.
3. Use the APNs to locate well logs within SBCWD's files.
4. Locate the well on an aerial map to verify location/existence.

Second Method

1. Search the targeted areas on an aerial map to locate wells that may not be in SBCWD's files. This is done by looking for pipes and lone power poles in locations where a well would be advantageous.
2. Use the coordinates from Google Maps to map the location of the well on ArcGIS.
3. Use county GIS map to determine APN numbers of parcels within areas of need.
4. Confirm and verify location.

**Acquiring Rights to Use Wells for Monitoring Groundwater Conditions**

1. Use APN's to determine the owner of each well.
2. Produce and send a letter requesting permission to access the well for water level measurements and/or test water quality.
3. Once permission is granted, visit site and determine method of measurement/testing.

**Repairing/Re-activating Previous Wells for use**

1. Determine wells with access issues and follow up with owner to get keys/access.
2. Determine wells that can be altered/repaired to re-activate, and assess access.
3. If well can be reactivated, assess well condition (functioning, collapsed, etc.)

## CONCLUSIONS

More monitoring wells are necessary to cover the entire area of the groundwater basins in San Benito County. This effort will improve the quality and credibility of data that SBCWD can produce to ensure compliance with SGMA. SBCWD's groundwater management activities can be further improved by increasing the amount of data collected within the county subbasins.

## RECOMMENDATIONS

Based on this information it is recommended that the following actions be taken:

- Locate as many potential wells as possible.
- Request Owners to allow SBCWD access/permission to monitor groundwater conditions.
- Increase long term monitoring network.

# APPENDIX D PERCOLATION DATA

## List of Tables and Figures

**Table D-1. Reservoir Water Budgets for Water Year 2018 (acre-feet)**

| | Hernandez | Paicines | San Justo | |
|---|---|---|---|---|
| **Observed Storage** | | | | |
| Starting Storage (Oct 2017) | 800 | 300 | 7,942 | |
| Ending Storage (Sept 2018) | 375 | 300 | 5,131 | |
| **Inflows** | | | | |
| Rainfall | 106 | 13 | 145 | |
| San Benito River | 6,437 | 8 | n.a. | |
| Hernandez-Paicines transfer | n.a. | 516 | n.a. | |
| San Felipe Project* | n.a. | n.a. | 18,952 | * |
| **Total Inflows** | **6,543** | **537** | **19,097** | |
| **Outflows** | | | | |
| Hernandez spills | 0 | n.a. | n.a. | |
| Hernandez-Paicines transfer | 516 | n.a. | n.a. | |
| Tres Pinos Creek percolation releases | n.a. | 384 | n.a. | |
| San Benito River percolation releases | 6,054 | n.a. | n.a. | |
| CVP Deliveries* | n.a. | n.a. | 21,899 | * |
| Evaporation and seepage | 136 | 58 | 1,360 | |
| **Total Outflows** | **6,707** | **442** | **23,259** | |
| **Change in Storage** | | | | |
| **Observed storage change (Ending - Starting)** | **-425** | **0** | **-2,811** | |
| **Calculated net storage change (Inflow - Outflows)** | **-163** | **95** | **-4,162** | |
| **Unaccounted for Water (Observed - Calculated)**** | **-262** | **-95** | **1,351** | |

| | | | |
|---|---|---|---|
| **Reservoir Information** | | | |
| Reservoir capacity | 17,200 | 2,870 | 11,000 |
| Maximum storage | 4,154 | 515 | 10,349 |
| Minimum storage | 375 | 100 | 4,113 |

* Reflects imported water for beneficial use, not all stored in reservoir

** Negative value is water shortage, positive value is water surplus

**Table D-2. Historical Reservoir Releases (AFY)**

| WY | Hernandez | Paicines | TOTAL |
|---|---|---|---|
| 1996 | 13,535 | 6,139 | 19,674 |
| 1997 | 3,573 | 2,269 | 5,842 |
| 1998 | 26,302 | 450 | 26,752 |
| 1999 | 12,084 | 1,293 | 13,377 |
| 2000 | 13,246 | 2,326 | 15,572 |
| 2001 | 12,919 | 3,583 | 16,502 |
| 2002 | 9,698 | 310 | 10,008 |
| 2003 | 5,434 | 0 | 5,434 |
| 2004 | 3,336 | 0 | 3,336 |
| 2005 | 19,914 | 677 | 20,591 |
| 2006 | 14,112 | 196 | 14,308 |
| 2007 | 12,022 | 1,254 | 13,276 |
| 2008 | 7,646 | 495 | 8,141 |
| 2009 | 4,883 | 0 | 4,883 |
| 2010 | 8,484 | 4,147 | 12,631 |
| 2011 | 9,757 | 2,397 | 12,154 |
| 2012 | 6,341 | 1,321 | 7,662 |
| 2013 | 3,963 | 677 | 4,640 |
| 2014 | 0 | 0 | 0 |
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 23,191 | 2,407 | 25,597 |
| 2018 | 6,054 | 384 | 6,438 |
| AVG | **9,413** | **1,318** | **10,731** |

**Table D-3. Historical Percolation of CVP Water (AFY)**

| | | Arroyo de las Viboras | | | Arroyo Dos Picachos | | | Santa Ana Creek | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Year | Pacheco Creek | Road | Creek 1 | Creek 2 | Fallon Road | Jarvis Lane | Creek | John Smith Road | Maranatha Road | Airline Highway | Ridgemark | Tres Pinos Creek | San Benito River | Total |
| 1994 | 232 | 136 | 515 | 0 | 0 | 550 | 209 | 0 | 0 | 0 | 0 | 85 | 158 | **1,885** |
| 1995 | 444 | 238 | 770 | 2 | 0 | 654 | 622 | 73 | 0 | 0 | 0 | 809 | 2,734 | **6,345** |
| 1996 | 0 | 494 | 989 | 832 | 67 | 235 | 708 | 531 | 197 | 134 | 25 | 21 | 6,097 | **10,330** |
| 1997 | 0 | 447 | 601 | 1,981 | 77 | 0 | 200 | 17 | 353 | 286 | 29 | 1,477 | 5,619 | **11,087** |
| 1998 | 0 | 132 | 109 | 403 | 0 | 0 | 0 | 65 | 0 | 158 | 74 | 518 | 1,084 | **2,543** |
| 1999 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 256 | 48 | 141 | 10 | 452 | 413 | **1,322** |
| 2000 | 1 | 0 | 0 | 6 | 0 | 0 | 3 | 236 | 21 | 240 | 12 | 285 | 938 | **1,740** |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 161 | 17 | 186 | 1 | 703 | 1,041 | **2,110** |
| 2002 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 78 | 2 | 143 | 0 | 426 | 470 | **1,122** |
| 2003 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 119 | 9 | 172 | 0 | 163 | 605 | **1,074** |
| 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 83 | 0 | 0 | 0 | 1 | 882 | **1,018** |
| 2005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 527 | **527** |
| 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 156 | 0 | 0 | 0 | 1 | 451 | **614** |
| 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 216 | **304** |
| 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | **6** |
| 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2014 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2015 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2016 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2017* | 0 | 0 | 340 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,209 | **2,549** |
| 2018* | 0 | 0 | 199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 867 | 1,899 | **2,965** |

*2017-2018 percolation occurred only to recharge basins adjacent to the listed streams.

**Table D-4. Percolation of Municipal Wastewater during Water Year 2018**

| | Pond Area[1] (acres) | Effluent Discharge (acre-feet) | Evaporation[2] (acre-feet) | Percolation (acre-feet) |
|---|---|---|---|---|
| Hollister - domestic* | 92.9 | 1,631 | 266 | 1,365 |
| Hollister - industrial* | 39.0 | 85 | 28 | 57 |
| Ridgemark Estates I & II | 7.2 | 171 | 21 | 150 |
| Tres Pinos | 1.8 | 20 | 5 | 15 |
| **Total** | **141** | **1,907** | **320** | **1,587** |

Notes:

1. Hollister pond areas are from Dickson and Kenneth D. Schmidt and Associates (1999) and include treatment ponds in addition to percolation ponds at the domestic wastewater treatment plant. Assumes 80% of total pond area in use at any time (Rose, pers. comm.). These areas should be updated as operations change.

2. Average evaporation less precip = 43 inches (56 in/yr evaporation (DWR Bulletin 73-79) less 13 in/yr precip (CIMIS) The IWTP evaporation was adjusted to account only for when the ponds are in use.

The San Juan Bautista plant is not included because the unnamed tributary of San Juan Creek that receives its effluent usually gains flow along the affected reach and is on the southwest side of the San Andreas Fault. These conditions prevent the effluent from recharging the San Juan Subbasin.

**Table D-5. Historical Percolation of Municipal Wastewater (AFY)**

| | Hollister Reclamation Plant - Domestic | Hollister - industrial | Ridgemark Estates I & II | Tres Pinos | TOTAL |
|---|---|---|---|---|---|
| 1994 | 1,775 | 665 | 155 | 5 | 2,600 |
| 1995 | 1,935 | 610 | 180 | 10 | 2,735 |
| 1996 | 2,020 | 689 | 207 | 14 | 2,930 |
| 1997 | 1,965 | 909 | 201 | 17 | 3,092 |
| 1998 | 2,490 | 518 | 231 | 17 | 3,256 |
| 1999 | 1,693 | 1,476 | 156 | 12 | 3,337 |
| 2000 | 2,110 | 1,136 | 293 | 24 | 3,563 |
| 2001 | 1,742 | 1,078 | 303 | 24 | 3,147 |
| 2002 | 1,884 | 1,545 | 283 | 24 | 3,736 |
| 2003 | 2,009 | 1,432 | 279 | 24 | 3,744 |
| 2004 | 1,787 | 1,536 | 268 | 21 | 3,612 |
| 2005 | 1,891 | 1,323 | 227 | 26 | 3,468 |
| 2006 | 1,797 | 1,211 | 216 | 33 | 3,257 |
| 2007 | 1,740 | 1,228 | 139 | 19 | 3,126 |
| 2008 | 1,580 | 1,257 | 139 | 19 | 2,996 |
| 2009 | 1,976 | 428 | 172 | 19 | 2,594 |
| 2010 | 1,922 | 37 | 172 | 19 | 2,150 |
| 2011 | 1,807 | 466 | 183 | 19 | 2,476 |
| 2012 | 1,740 | 605 | 177 | 19 | 2,541 |
| 2013* | 889 | 332 | 188 | 21 | 1,430 |
| 2014 | 1,552 | 86 | 179 | 21 | 1,838 |
| 2015 | 1,816 | 344 | 161 | 21 | 2,342 |
| 2016 | 1,923 | 305 | 154 | 21 | 2,402 |
| 2017 | 1,945 | 57 | 154 | 20 | 2,177 |
| 2018 | 1,365 | 57 | 150 | 15 | 1,587 |

*Potential missing data

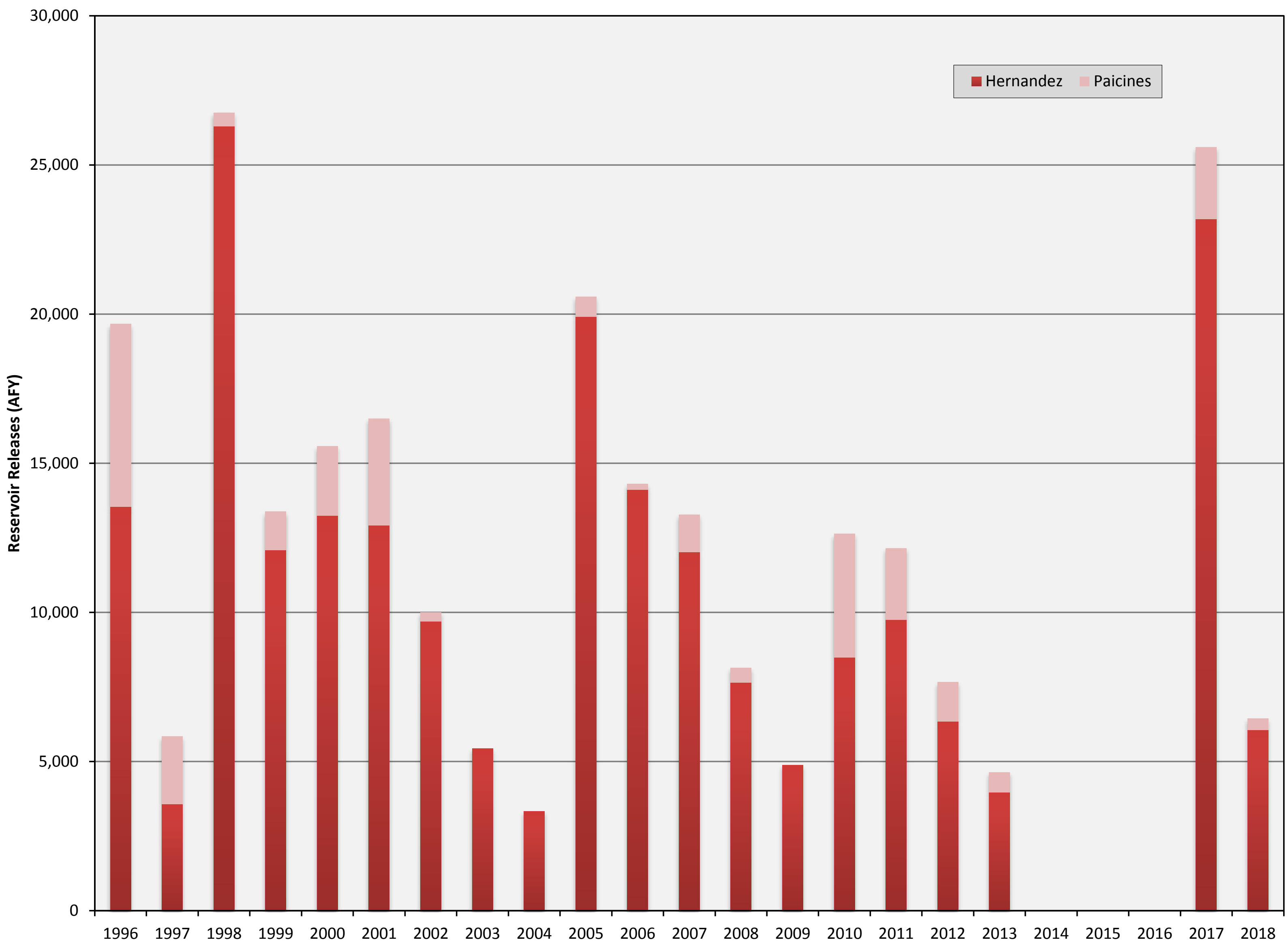



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**Figure D-1**
**Reservoir Releases for Percolation**

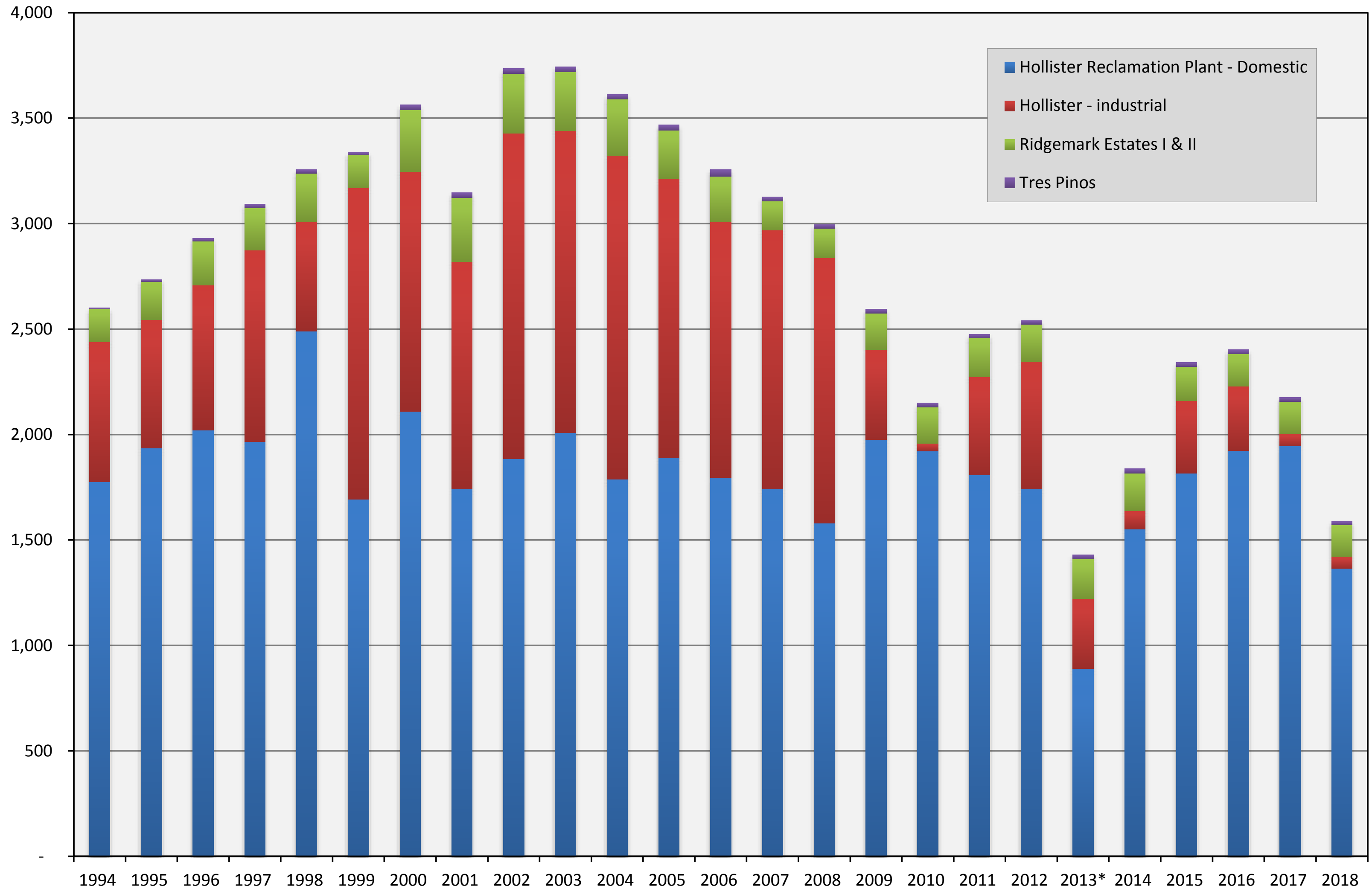


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**Figure D-2**
**Wastewater Percolation by Facility**

# APPENDIX E WATER USE DATA

## List of Tables and Figures

**Table E-1. Recent CVP Allocation and Use**

| | Municipal and Industrial (M&I) CVP | | | | Agricultural CVP | | | |
|---|---|---|---|---|---|---|---|---|
| Water Year | Percent of Contract Allocation | Percent of Historic Average | Contract Amount Used (AF) | Contract Amount Used (%) | Percent of Contract Allocation | Percent of Contract and M&I Adjustment[1] | Contract Amount Used (AF) | Contract Amount Used (%) |
| | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | |
| **2006** | 100% | | 3,152 | 38% | 100% | | 19,840 | 56% |
| **2007** | 100% | | 4,969 | 60% | 40% | | 18,865 | 53% |
| **2008** | 37% | 75% | 2,232 | 27% | 40% | 45% | 10,514 | 30% |
| **2009** | 29% | 60% | 1,978 | 24% | 10% | 11% | 6,439 | 18% |
| **2010** | 37% | 75% | 2,197 | 27% | 45% | 50% | 10,061 | 28% |
| **2011** | 100% | | 2,433 | 29% | 80% | | 16,234 | 46% |
| **2012** | 51% | 75% | 2,683 | 33% | 40% | 40% | 17,267 | 49% |
| **2013** | 47% | 70% | 2,652 | 32% | 20% | 22% | 12,914 | 36% |
| **2014** | 34% | 50% | 1,599 | 29% | 0% | 0% | 7,545 | 21% |
| **2015** | 25% | | 1,810 | 22% | 0% | | 3,697 | 10% |
| **2016** | 55% | | 1,914 | 23% | 5% | | 4,434 | 12% |
| **2017** | 100% | | 2,909 | 35% | 100% | | 13,288 | 37% |
| **2018** | 75% | | 5,679 | 69% | 50% | | 14,453 | 41% |

Notes: [1]Shortage Policy Adjustments

**Table E-2. Historical Water Use by Subbasin and Water Source (AFY)**

| Subbasin | Pacheco | | Bolsa Southeast | | | San Juan | | Hollister West | | | Hollister East | | | Tres Pinos | | Total Zone 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source | GW | CVP | GW | CVP | RW | GW | CVP | GW | CVP | RW | GW | CVP | RW | GW | CVP | GW | CVP | RW |
| 1993 | 2,251 | 3,210 | 3,474 | 533 | | 9,278 | 4,300 | 7,213 | 90 | | 3,744 | 7,275 | | 5,658 | 224 | 31,618 | 15,633 | - |
| 1994 | 3,748 | 3,394 | 3,467 | 602 | | 10,859 | 3,836 | 7,327 | 87 | | 5,475 | 6,808 | | 5,294 | 263 | 36,169 | 14,990 | - |
| 1995 | 2,756 | 3,474 | 2,855 | 720 | | 9,328 | 4,554 | 7,092 | 460 | | 3,428 | 6,647 | | 4,475 | 275 | 29,935 | 16,130 | - |
| 1996 | 2,533 | 3,500 | 2,682 | 782 | | 8,726 | 5,187 | 5,717 | 679 | | 3,396 | 8,267 | | 3,695 | 408 | 26,748 | 18,823 | - |
| 1997 | 2,209 | 4,205 | 2,755 | 997 | | 9,587 | 6,191 | 7,602 | 907 | | 3,534 | 8,284 | | 4,620 | 466 | 30,307 | 21,048 | - |
| 1998 | 2,035 | 2,165 | 1,561 | 361 | | 6,963 | 4,099 | 4,991 | 591 | | 4,037 | 5,291 | | 3,751 | 289 | 23,338 | 12,796 | - |
| 1999 | 2,553 | 3,219 | 2,453 | 433 | | 9,312 | 5,990 | 7,013 | 726 | | 3,701 | 7,279 | | 4,199 | 391 | 29,231 | 18,038 | - |
| 2000 | 2,270 | 3,256 | 2,418 | 355 | | 8,681 | 6,372 | 7,590 | 869 | | 3,108 | 7,279 | | 4,006 | 542 | 28,073 | 18,673 | - |
| 2001 | 1,848 | 3,443 | 2,126 | 411 | | 7,977 | 7,232 | 7,377 | 685 | | 2,213 | 7,010 | | 3,599 | 621 | 25,140 | 19,402 | - |
| 2002 | 2,322 | 3,840 | 2,193 | 497 | | 7,571 | 7,242 | 6,577 | 706 | | 2,588 | 7,390 | | 3,994 | 737 | 25,244 | 20,411 | - |
| 2003 | 2,425 | 3,277 | 2,175 | 493 | | 7,434 | 7,127 | 6,222 | 720 | | 1,897 | 9,329 | | 2,805 | 788 | 22,958 | 21,734 | - |
| 2004 | 2,461 | 3,607 | 2,405 | 740 | | 8,121 | 7,357 | 4,971 | 614 | | 2,321 | 10,726 | | 3,204 | 966 | 23,484 | 24,010 | - |
| 2005 | 1,320 | 3,106 | 1,849 | 514 | | 6,608 | 6,245 | 5,084 | 680 | | 2,586 | 9,198 | | 2,378 | 642 | 19,825 | 20,384 | - |
| 2006 | 1,208 | 3,495 | 1,864 | 661 | | 6,741 | 7,200 | 4,633 | 579 | | 2,555 | 10,253 | | 2,537 | 803 | 19,538 | 22,992 | - |
| 2007 | 1,034 | 3,832 | 2,005 | 572 | | 7,658 | 6,160 | 5,118 | 553 | | 3,867 | 10,194 | | 2,908 | 804 | 22,590 | 22,115 | - |
| 2008 | 1,900 | 1,568 | 2,014 | 333 | | 7,796 | 3,160 | 4,375 | 399 | | 3,962 | 6,792 | | 2,743 | 493 | 22,789 | 12,745 | - |
| 2009 | 3,370 | 1,257 | 2,082 | 179 | | 11,956 | 1,605 | 4,186 | 19 | | 4,733 | 4,697 | | 2,871 | 447 | 29,199 | 8,204 | - |
| 2010 | 2,553 | 1,771 | 1,897 | 207 | | 9,561 | 3,452 | 4,081 | 10 | 151 | 4,460 | 6,056 | | 1,686 | 488 | 24,238 | 11,984 | 151 |
| 2011 | 1,992 | 2,420 | 2,781 | 229 | | 4,987 | 5,623 | 3,940 | 394 | 183 | 1,947 | 9,575 | | 2,454 | 427 | 18,102 | 18,667 | 183 |
| 2012 | 3,723 | 2,652 | 1,556 | 288 | | 5,782 | 5,976 | 4,298 | 549 | 230 | 2,004 | 9,917 | | 2,492 | 568 | 19,855 | 19,949 | 230 |
| 2013 | 4,157 | 1,976 | 2,348 | 292 | | 11,044 | 4,134 | 5,656 | 374 | 357 | 5,430 | 8,224 | | 2,452 | 565 | 31,087 | 15,566 | 357 |
| 2014 | 3,303 | 1,020 | 2,157 | 32 | | 10,018 | 1,984 | 7,227 | 233 | 262 | 4,872 | 5,490 | | 3,014 | 384 | 30,592 | 9,144 | 262 |
| 2015 | 4,279 | 555 | 2,401 | 20 | | 12,739 | 975 | 4,730 | 148 | 101 | 7,230 | 3,568 | | 2,948 | 241 | 34,327 | 5,507 | 101 |
| 2016 | 4,386 | 420 | 2,558 | 30 | 38 | 13,581 | 819 | 4,031 | 162 | 253 | 6,383 | 4,810 | 207 | 2,223 | 106 | 33,162 | 6,347 | 499 |
| 2017 | 2,949 | 2,097 | 1,414 | 365 | 66 | 7,542 | 5,853 | 3,255 | 217 | 108 | 2,209 | 7,488 | 192 | 2,447 | 177 | 19,815 | 16,197 | 366 |
| 2018 | 4,375 | 1,529 | 3,063 | 291 | 3 | 8,932 | 6,383 | 3,922 | 2,054 | 468 | 3,699 | 9,686 | - | 1,865 | 188 | 25,856 | 20,131 | 471 |
| AVG 03-18 | **2,840** | **2,161** | **2,161** | **328** | **36** | **8,781** | **4,628** | **4,733** | **482** | **235** | **3,760** | **7,875** | **133** | **2,564** | **505** | **24,839** | **15,980** | **164** |

GW = groundwater, CVP = Central Valley Project, RW = recycled water

**Table E-3. Recent Water Use by Subbasin and User Type, Includes Recycled Water (AFY)**

| SUBBASIN | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Agriculture** | | | | | | | | | | | | | | |
| Bolsa SE | 2,352 | 2,517 | 2,570 | 2,334 | 2,252 | 2,103 | 3,004 | 1,837 | 2,635 | 2,180 | 2,417 | 2,601 | 1,831 | 3,315 |
| Hollister East | 8,543 | 9,526 | 10,685 | 8,012 | 6,860 | 8,315 | 9,067 | 9,453 | 10,832 | 8,151 | 8,464 | 8,784 | 7,756 | 9,594 |
| Hollister West | 2,128 | 1,936 | 2,145 | 1,509 | 1,708 | 1,888 | 2,190 | 2,228 | 3,324 | 2,584 | 2,750 | 2,192 | 1,338 | 2,337 |
| Pacheco | 4,190 | 4,469 | 4,573 | 3,220 | 4,304 | 4,242 | 4,279 | 6,148 | 5,990 | 4,121 | 4,658 | 4,616 | 4,964 | 5,663 |
| San Juan | 11,496 | 12,622 | 12,185 | 9,581 | 12,397 | 11,960 | 10,009 | 10,964 | 14,376 | 11,183 | 13,123 | 13,826 | 11,916 | 14,568 |
| Tres Pinos | 800 | 1,004 | 954 | 655 | 670 | 640 | 471 | 641 | 652 | 514 | 1,513 | 572 | 468 | 448 |
| **TOTAL** | **29,509** | **32,074** | **33,112** | **25,310** | **28,192** | **29,148** | **29,020** | **30,980** | **37,810** | **28,734** | **32,926** | **32,591** | **28,273** | **35,925** |
| **M&I** | | | | | | | | | | | | | | |
| Bolsa SE | 12 | 8 | 7 | 13 | 9 | 0 | 6 | 6 | 4 | 9 | 5 | 25 | 14 | 43 |
| Hollister East | 3,241 | 3,280 | 3,203 | 2,742 | 2,570 | 2,307 | 2,594 | 2,608 | 2,961 | 2,277 | 2,334 | 2,617 | 2,132 | 3,790 |
| Hollister West | 3,636 | 3,168 | 3,361 | 3,265 | 2,710 | 2,555 | 2,235 | 2,710 | 2,796 | 5,072 | 2,229 | 2,254 | 2,242 | 4,106 |
| Pacheco | 235 | 234 | 293 | 248 | 323 | 83 | 133 | 227 | 144 | 203 | 176 | 191 | 81 | 241 |
| San Juan | 1,356 | 1,320 | 1,640 | 1,375 | 1,164 | 1,053 | 601 | 793 | 803 | 820 | 590 | 574 | 1,479 | 747 |
| Tres Pinos | 2,220 | 2,336 | 2,748 | 2,581 | 2,648 | 1,534 | 2,410 | 2,710 | 2,365 | 2,884 | 1,676 | 1,757 | 2,156 | 1,606 |
| **TOTAL** | **10,700** | **10,345** | **11,252** | **10,225** | **9,424** | **7,532** | **7,979** | **9,055** | **9,073** | **11,263** | **7,010** | **7,417** | **8,105** | **10,533** |

**Table E-4. Historical Water Use by User Type in Zone 6 - Includes Recycled Water (AFY)**

| WY | Agricultural | Municipal, and Industrial | Total | % Ag |
|---|---|---|---|---|
| 1988 | 46,366 | 5,152 | 51,518 | 90% |
| 1989 | 32,387 | 6,047 | 38,434 | 84% |
| 1990 | 49,663 | 5,725 | 55,388 | 90% |
| 1991 | 46,640 | 7,631 | 54,271 | 86% |
| 1992 | 32,210 | 6,912 | 39,122 | 82% |
| 1993 | 38,878 | 5,066 | 43,944 | 88% |
| 1994 | 41,854 | 7,186 | 49,040 | 85% |
| 1995 | 36,399 | 8,272 | 44,671 | 81% |
| 1996 | 39,845 | 8,131 | 47,976 | 83% |
| 1997 | 41,482 | 11,068 | 52,550 | 79% |
| 1998 | 27,526 | 8,605 | 36,131 | 76% |
| 1999 | 37,203 | 10,066 | 47,269 | 79% |
| 2000 | 36,062 | 10,764 | 46,826 | 77% |
| 2001 | 34,035 | 10,640 | 44,675 | 76% |
| 2002 | 34,354 | 11,300 | 45,654 | 75% |
| 2003 | 33,533 | 11,159 | 44,692 | 75% |
| 2004 | 35,597 | 11,898 | 47,495 | 75% |
| 2005 | 29,510 | 10,699 | 40,209 | 73% |
| 2006 | 32,074 | 10,456 | 42,530 | 75% |
| 2007 | 33,112 | 13,311 | 46,424 | 71% |
| 2008 | 25,310 | 10,225 | 35,535 | 71% |
| 2009 | 28,192 | 9,424 | 37,616 | 75% |
| 2010 | 29,148 | 7,531 | 36,679 | 79% |
| 2011 | 29,020 | 7,932 | 36,952 | 79% |
| 2012 | 30,980 | 9,055 | 40,095 | 77% |
| 2013 | 37,810 | 9,073 | 46,653 | 81% |
| 2014 | 28,734 | 11,226 | 39,960 | 72% |
| 2015 | 32,926 | 7,161 | 39,935 | 82% |
| 2016 | 32,591 | 7,417 | 40,008 | 81% |
| 2017 | 28,273 | 8,105 | 36,012 | 79% |
| 2018 | 35,925 | 10,533 | 46,458 | 77% |
| AVERAGE | **34,763** | **8,960** | **43,701** | **79%** |

Todd Groundwater 12/13/2018

**Table E-5. Municipal Water Use by Major Purveyor for Water Year 2018 (AF)**

| | WY 2018 | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Groundwater** | | | | | | | | | | | | | |
| Sunnyslope CWD | **978** | 136 | 141 | 65 | 66 | 31 | 24 | 26 | 47 | 79 | 118 | 138 | 108 |
| City of Hollister | **1,217** | 83 | 36 | 25 | 108 | 97 | 98 | 139 | 137 | 144 | 162 | 113 | 74 |
| City of Hollister - Cienega Wells | **121** | 10 | 10 | 10 | 10 | 10 | 12 | 11 | 10 | 10 | 11 | 8 | 10 |
| San Juan Bautista | **184** | 24 | 19 | 19 | 17 | - | 17 | 19 | 22 | 12 | 18 | 10 | 7 |
| Tres Pinos CWD | **34** | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 3 |
| **Groundwater Subtotal** | **2,533** | **256** | **208** | **120** | **203** | **141** | **152** | **196** | **220** | **249** | **312** | **274** | **202** |
| **CVP Imported Water** | | | | | | | | | | | | | |
| Lessalt Treatment Plant | **1,596** | 178 | 86 | 92 | 102 | 107 | 102 | 124 | 144 | 169 | 162 | 149 | 181 |
| West Hills Treatment Plant | **1,990** | 140 | 124 | 127 | 124 | 113 | 124 | 142 | 202 | 207 | 230 | 277 | 179 |
| **Imported Water Subtotal** | **3,586** | **318** | **210** | **220** | **226** | **220** | **226** | **266** | **346** | **376** | **391** | **425** | **360** |
| **Municipal Total** | | | | | | | | | | | | | |
| **Municipal Water Supply Total** | **6,119** | **574** | **418** | **340** | **429** | **361** | **378** | **462** | **566** | **624** | **704** | **699** | **562** |

**Table E-6. Historical Municipal Water Use by Major Purveyor (AFY)**

| WY | Sunnyslope CWD - GW | City of Hollister - GW | City of Hollister - Cienega Wells[1] | San Juan Bautista | Tres Pinos CWD | Lessalt Treatment Plant | West Hills Treatment Plant | Undivided Total | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 1988 | | | | | | 0 | | 5,152 | **5,152** |
| 1989 | | | | | | 0 | | 6,047 | **6,047** |
| 1990 | | | | | | 0 | | 5,725 | **5,725** |
| 1991 | | | | | | 0 | | 7,631 | **7,631** |
| 1992 | | | | | | 0 | | 6,912 | **6,912** |
| 1993 | | | | | | 0 | | 5,066 | **5,066** |
| 1994 | | | | | | 0 | | 7,186 | **7,186** |
| 1995 | 2,167 | 2,446 | | | | 0 | | | **4,613** |
| 1996 | 2,139 | 3,386 | | | | 0 | | | **5,525** |
| 1997 | 2,638 | 3,848 | | | | 0 | | | **6,486** |
| 1998 | 2,357 | 3,441 | | | | 0 | | | **5,798** |
| 1999 | 2,820 | 3,558 | | | | 0 | | | **6,378** |
| 2000 | 3,214 | 4,021 | | | | 0 | | | **7,235** |
| 2001 | 3,290 | 3,851 | | | | 0 | | | **7,141** |
| 2002 | 3,256 | 4,120 | | | | 21 | | | **7,398** |
| 2003 | 2,053 | 2,754 | | | | 2,494 | | | **7,302** |
| 2004 | 2,426 | 2,828 | | | | 2,101 | | | **7,356** |
| 2005 | 1,959 | 3,147 | 123 | 247 | 49 | 1,843 | | | **7,368** |
| 2006 | 1,907 | 2,801 | 123 | 150 | 49 | 1,900 | | | **6,930** |
| 2007 | 2,413 | 2,758 | 123 | 47 | 49 | 1,719 | | | **7,108** |
| 2008 | 2,294 | 2,746 | 123 | 417 | 47 | 1,323 | | | **6,949** |
| 2009 | 2,251 | 2,503 | 123 | 373 | 47 | 1,212 | | | **6,509** |
| 2010 | 1,861 | 2,194 | 108 | 308 | 47 | 1,344 | | | **5,861** |
| 2011 | 2,225 | 1,651 | 80 | 292 | 47 | 1,593 | | | **5,887** |
| 2012 | 2,360 | 1,761 | 130 | 267 | 45 | 1,657 | | | **6,219** |
| 2013 | 1,655 | 2,655 | 120 | 281 | 46 | 1,648 | | | **6,405** |
| 2014 | 2,134 | 2,646 | 114 | 285 | 49 | 979 | | | **6,207** |
| 2015 | 1,348 | 1,960 | 114 | 225 | 49 | 1,364 | | | **5,060** |
| 2016 | 1,331 | 1,615 | 105 | 232 | 49 | 1,682 | | | **5,014** |
| 2017 | 1,449 | 1,543 | 79 | 249 | 32 | 1,940 | 51 | | **5,344** |
| 2018 | 978 | 1,217 | 121 | 184 | 34 | 1,596 | 1,990 | | **6,119** |

1. Data from Hollister Cienega Wells for 2005-2008 was estimated to be the same as WY 2009
Cells with no data indicate that the information is unavailable, while years with no use are shown explicitly as 0's.

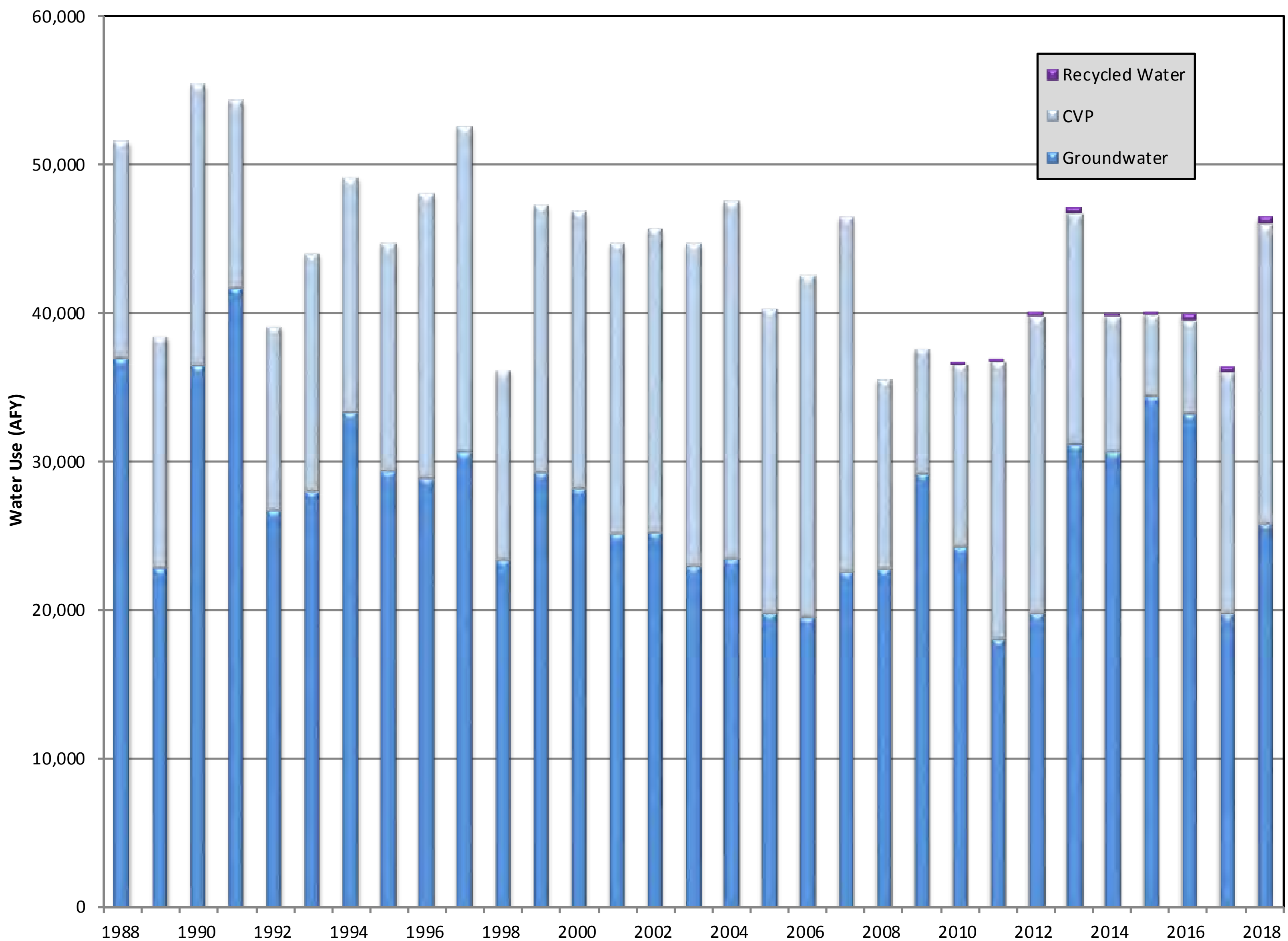


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**Figure E-1**
**Total Water Use**
**by Water Source**
**Zone 6**

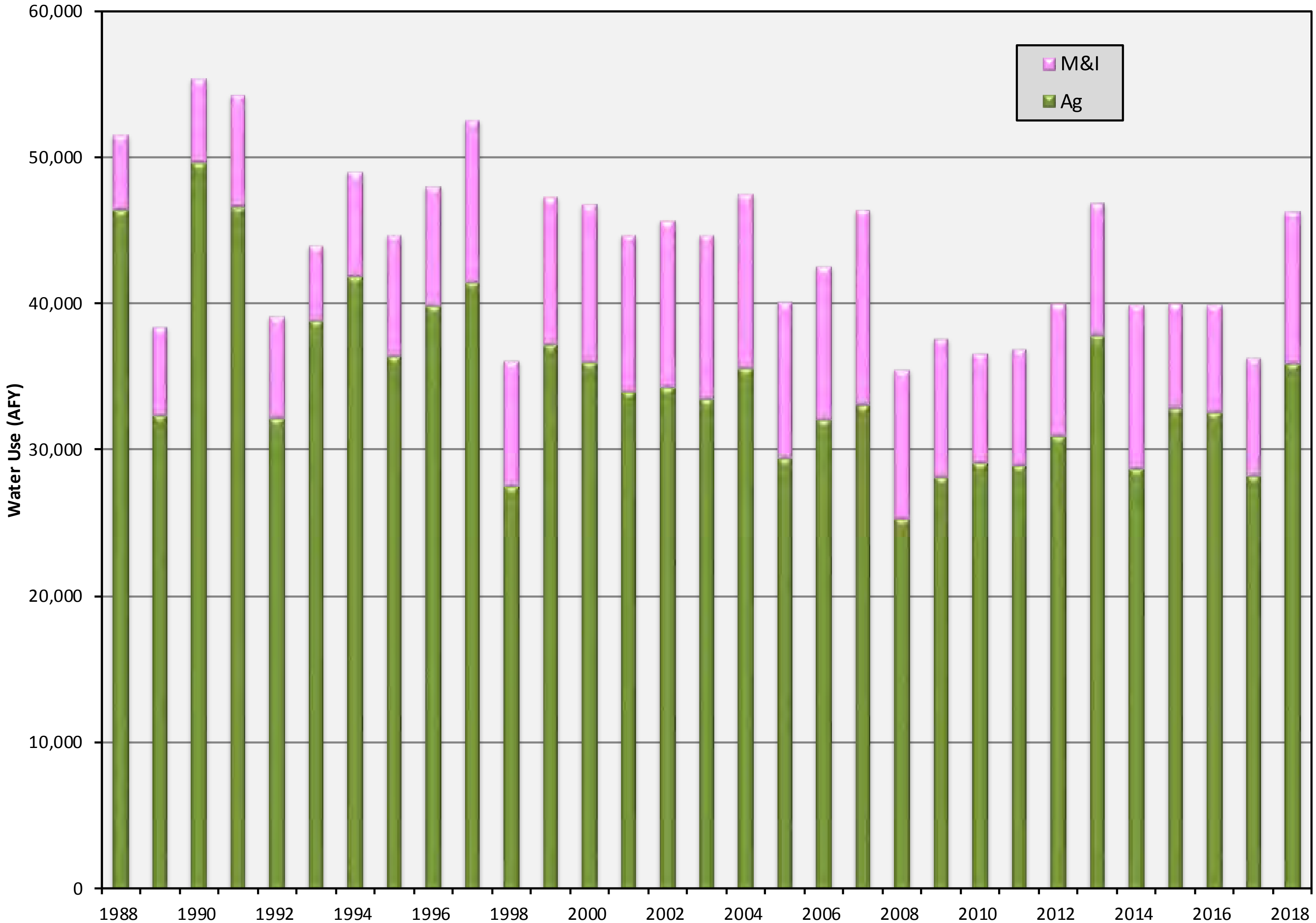


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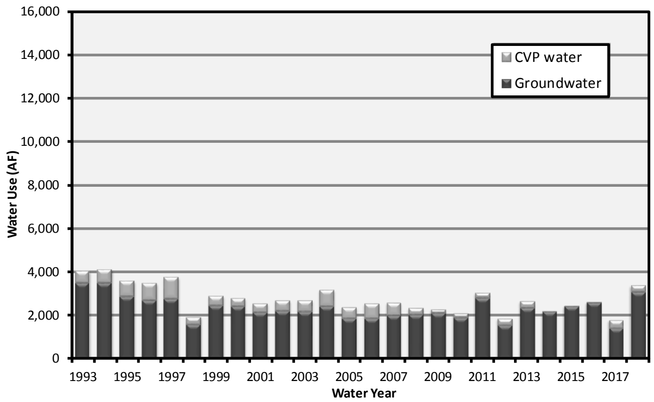
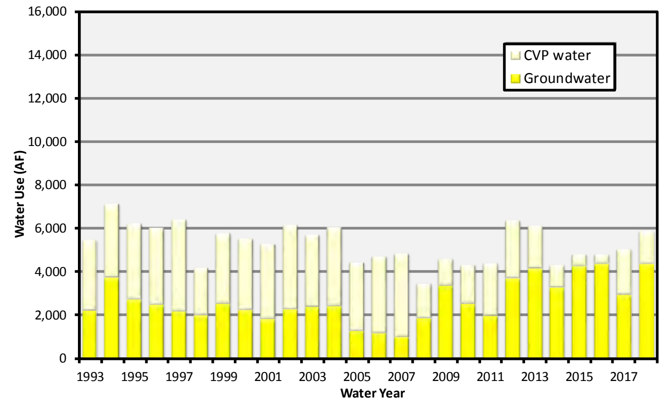
**Figure E-2**
**Water Use in Zone 6 by User Category**

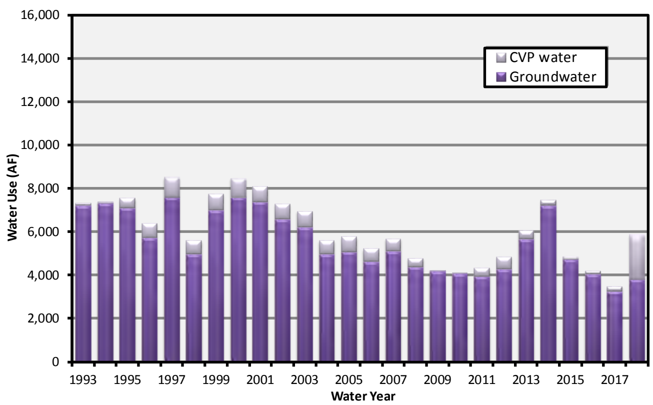
## Bolsa SE



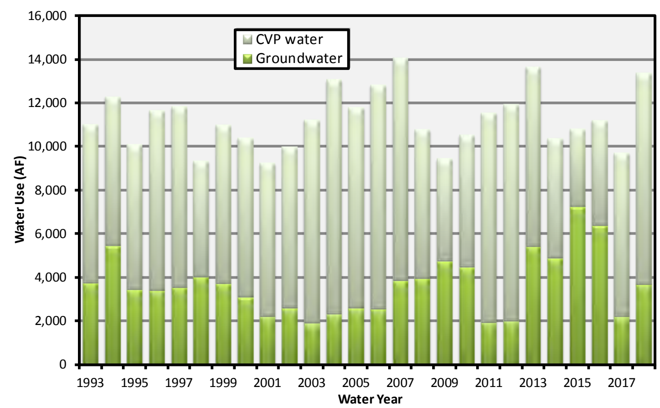

## Pacheco



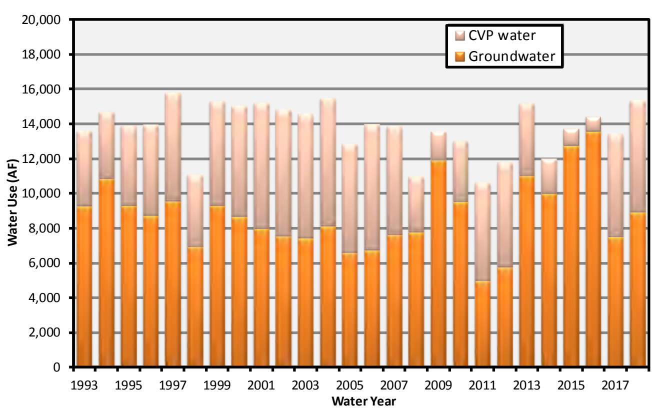

## Hollister West



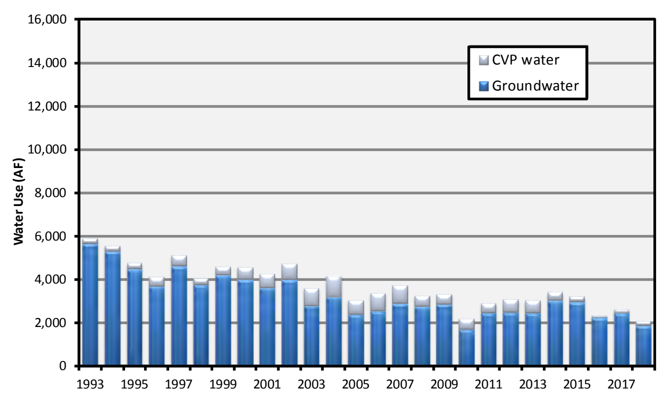

## Hollister East




## San Juan Valley



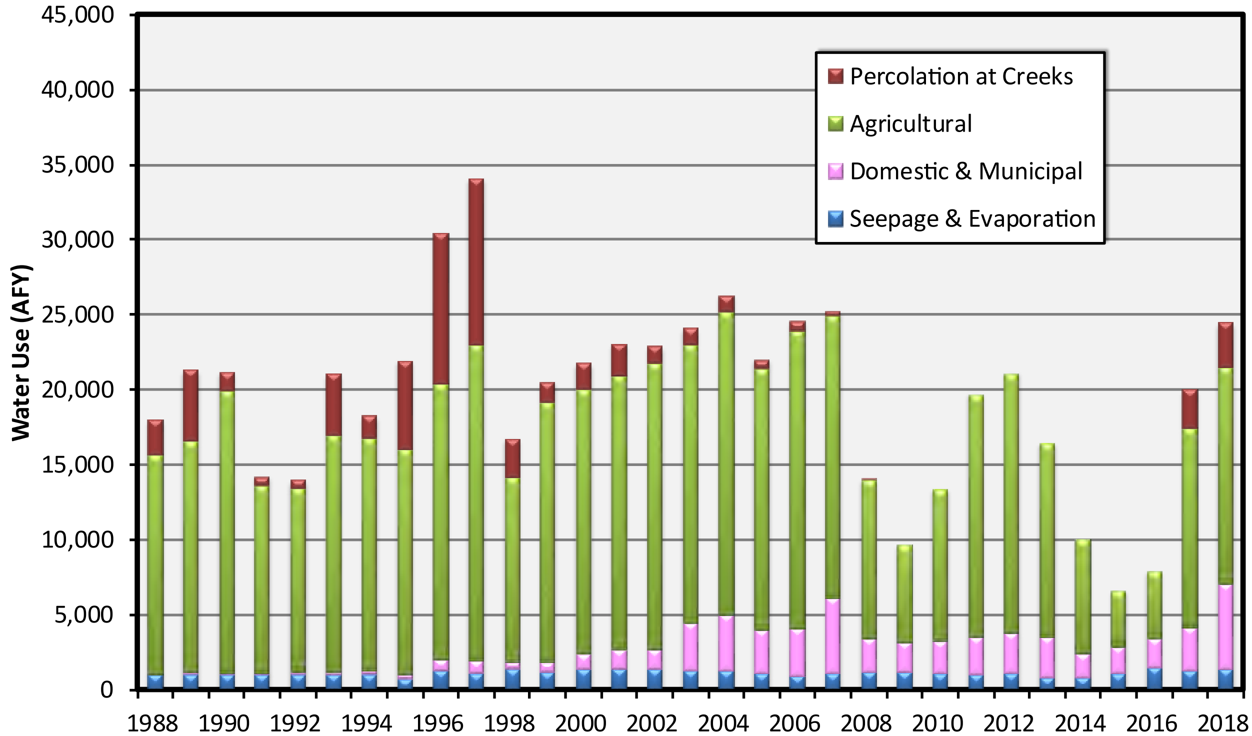

## Tres Pinos

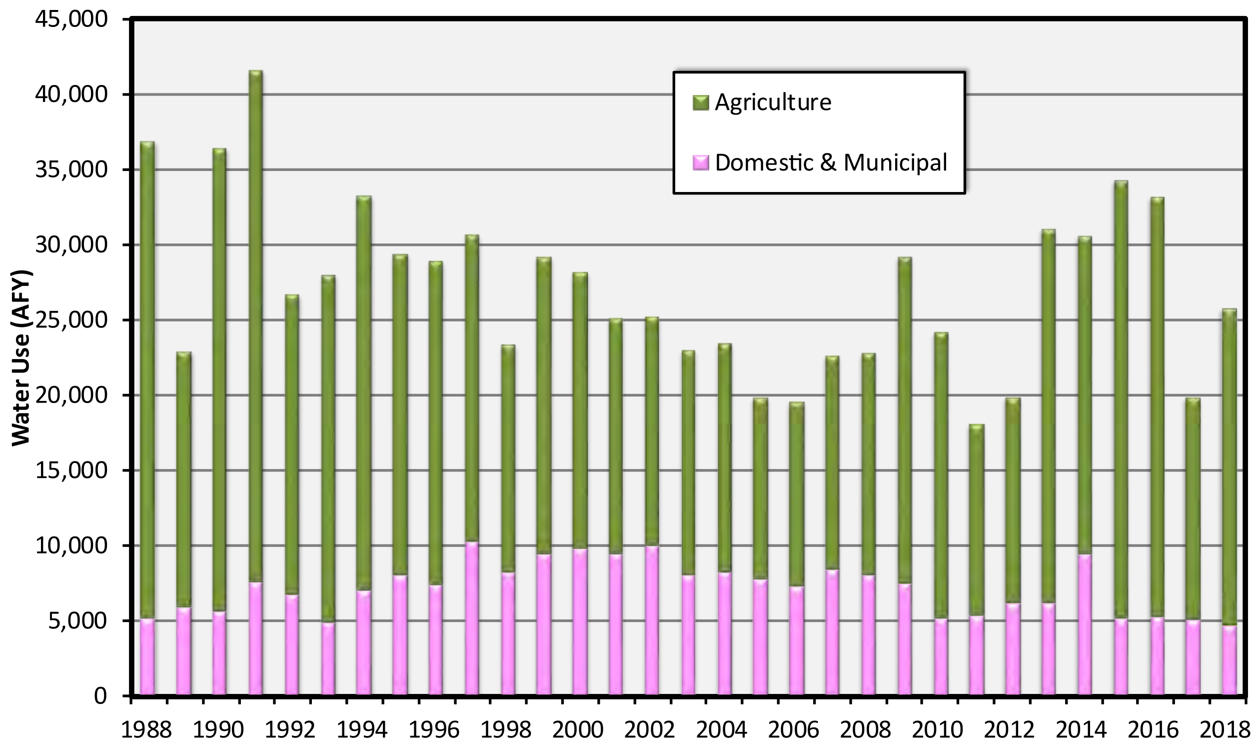



December 2018

TODD GROUNDWATER

**Figure E-3**
**Total Subbasin Water Use by Water Type**

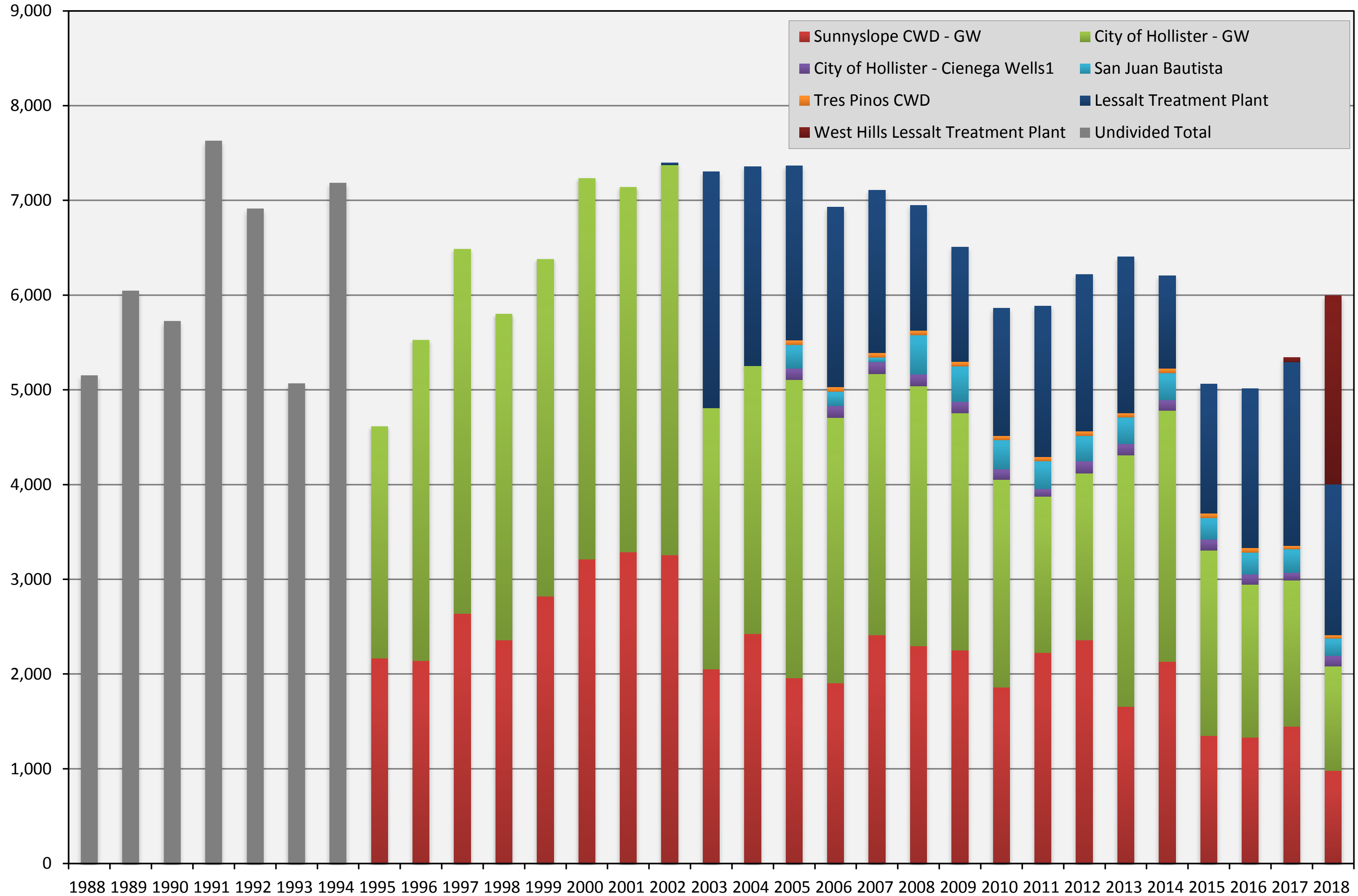



December 2018

TODD GROUNDWATER

**Figure E-4**
**Annual Total of CVP and Groundwater by Use**




December 2018

TODD GROUNDWATER

**Figure E-5**
**Municipal Water Use By Purveyor**

# APPENDIX F RATES AND CHARGES

## List of Tables and Figures

## Table F-1. 2018 Recommended Groundwater Revenue Requirement/Charges

**San Benito County Water District**
**Groundwater Rates**
**Water Year**
**2019-2020, 2020-2021, 2021-2022**
**Zone 6**

| REVENUE REQUIREMENTS | | | | Rates[2] | |
|---|---|---|---|---|---|
| **Component** | **Rate ($/AF)** | **Quantity (A/F)[1]** | **Amount** | **Ag** (per A/F) | **M & I** (per A/F) |
| **SOURCE OF SUPPLY O&M** | | | | | |
| AG | $ 18.68 | 23,974 | $ 447,851 | $ 18.68 | |
| M&I | $ 18.68 | 4,877 | $ 91,110 | | $ 18.68 |
| **PERCOLATION COSTS** | | | | | |
| **Cost of Water** | | | | | |
| AG Cost of Water[3] | $ 53.51 | 2,105 | $ 112,612 | $ 4.70 | |
| M&I Cost of Water[3] | $ 163.58 | 428 | $ 70,036 | | $ 14.36 |
| **Power Costs** | | | | | |
| AG Power Charge for percolation | $ 58.83 | 2,105 | 123,812 | $ 5.16 | |
| M&I Power Charge for percolation | $ 58.83 | 428 | 25,188 | | $ 5.16 |
| **TOTAL** | | | | $ 28.54 | $ 38.21 |
| Current Groundwater Charge[4] (per acre foot) | | | | $ 7.95 | $ 24.25 |
| **RECOMMENDED Rate Basis (per acre foot)** | | | | | |
| Water Year 2019-2020 | | | | **$ 12.74** | **$ 38.21** |
| Water Year 2020-2021 | | | | **$ 13.12** | **$ 39.36** |
| Water Year 2021-2022 | | | | **$ 13.51** | 40.54 |
| **RECOMMENDED CHARGES (per acre foot)** | | | | | |
| Water Year 2019-2020 | | | | **$ 12.75** | 38.25 |
| Water Year 2020-2021 | | | | **$ 13.15** | 39.40 |
| Water Year 2021-2022 | | | | **$ 13.55** | 40.55 |

Notes:

1 Assumed Volumes

Groundwater usage (based on average of past 4 years)

| | |
|---|---|
| Ag usage | 23,974 |
| M&I usage | 4,877 |
| Total | 28,851 |

2 Rates=Revenue Requirements/projected groundwater usage

3 Cost of Water:
AG: USBR and SLDMWA O&M
M&I: USBR and SLDMWA O&M, USBR Out-of-Basin Interest

4 Groundwater charge adopted by San Benito County Water District Board of Directors in January 2017 (Ag) and January 2016 (M&I)

5 Assumed volumes for percolation (based on 3 year average)

| | | |
|---|---|---|
| Ag | 83% | 2105 |
| M&I | 17% | 428 |
| Total | 100% | 2533 |

6 Annual escalation rate 3%

7 Rates charged will be rounded up to nearest $.05

Note: Section 70-7.8 (a) of the District Act states that the agricultural rate shall not exceed one-third of the rates for all water other than agricultural water.

Rate Worksheets for 1920 (Groundwater Revenue)

**Table F-2. Historical and Current San Benito County Water District CVP (Blue Valve) Water Rates (dollars/af)**

| USBR Water Year | Standby & Availability Charge (dollars/acre) | Water Charge | | Power Charge | | | | | Groundwater Charge (dollars/af) | | | Recycled Water (per AF) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agricultural | Municipal & Industrial | Distribution Subsystem | | | | | Agricultural | Municipal & Industrial | | Agricultural | Power Charge |
| | | | | 2 | 6H | 9L | 9H | Others | | | | | |
| 1987 | $8.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | | | |
| 1988 | $2.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | | | |
| 1991 | $4.00 | $38.00 | $110.00 | | | | | | $6.25 | $22.00 | | | |
| 1992 | $4.00 | $45.00 | $120.00 | | | | | | $2.00 | $10.00 | | | |
| 1994 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $5.00 | | | |
| 1995 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $15.75 | First 100 af | | |
| | | | | | | | | | | $36.70 | Next 500 af | | |
| | | | | | | | | | | $54.60 | Over 600 af | | |
| 1996 | $6.00 | $75.00 | $150.00 | | | | | | $1.50 | $33.00 | | | |
| 1997 | $6.00 | $75.00 | $157.00 | | | | | | $1.50 | $33.00 | | | |
| 1998 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $33.00 | | | |
| 2000 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $11.50 | | | |
| 2001 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $25.00 | | | |
| 2004 | $6.00 | $75.00 | $150.00 | $24.30 | $46.75 | $25.05 | $53.70 | $15.25 | $1.50 | $10.00 | | | |
| 2005 | $6.00 | $80.00 | $150.00 | $26.15 | $49.40 | $35.00 | $66.90 | $17.10 | $1.50 | $21.50 | | | |
| 2006 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | | | |
| 2007 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | | | |
| 2008 | $6.00 | $100.00 | $170.00 | $17.25 | $19.40 | $32.60 | $62.75 | $14.85 | $1.50 | $21.50 | | | |
| 2009 | $6.00 | $115.00 | $180.00 | $17.50 | $20.25 | $42.55 | $74.85 | $16.30 | $2.50 | $22.50 | | | |
| 2010 | $6.00 | $135.00 | $200.00 | $22.00 | $27.30 | $49.75 | $84.35 | $21.75 | $2.50 | $22.50 | | | |
| 2011 | $6.00 | $155.00 | $220.00 | $22.70 | $28.15 | $51.25 | $86.90 | $22.40 | $2.50 | $22.50 | | | |
| 2012 | $6.00 | $170.00 | $235.00 | $23.35 | $29.00 | $52.80 | $89.50 | $23.10 | $2.50 | $22.50 | | | |
| 2013 | $6.00 | $170.00 | $235.00 | $40.30 | $29.25 | $43.05 | $91.55 | $22.40 | $3.25 | $23.25 | | | |
| 2014 | $6.00 | $170.00 | $238.00 | $41.55 | $30.15 | $44.35 | $94.30 | $23.10 | $3.60 | $23.25 | | | |
| 2015 | $6.00 | $179.00 | $247.00 | $42.75 | $31.05 | $45.70 | $97.15 | $23.80 | $3.95 | $23.25 | | | |
| 2016 | $6.00 | $272.00 | $363.00 | $123.10 | $75.65 | $109.95 | $162.55 | $66.05 | $4.95 | $24.25 | | $182.55 | $57.70 |
| 2017 | $6.00 | $191.00 | $363.00 | $126.80 | $77.90 | $113.25 | $167.45 | $68.05 | $6.45 | $24.25 | | $183.45 | $59.45 |
| 2018 | $6.00 | $209.00 | $363.00 | $130.60 | $80.25 | $116.25 | $172.45 | $70.10 | $7.95 | $24.25 | | $183.45 | $59.45 |

Notes:

af = acre-feet.
n.c. = no classification.
n.i. = not implemented
All rates effective March 1 through following February.

**Table F-3. Recent US Bureau of Reclamation Charges per Acre-Foot for CVP Water**

| User Category and Cost Item | Irrigation[1] | | | | | | Municipal & Industrial | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cost of service (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] | Cost of service[2] (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] |
| 1994 | $71.68 | $6.20 | n.a. | | $77.88 | $17.21 | $165.67 | $12.40 | n.a. | | $178.07 | $85.86 |
| 1995 | $66.47 | $6.35 | n.a. | | $72.82 | $17.21 | $132.90 | $12.69 | n.a. | | $145.59 | $85.86 |
| 1996 | $65.63 | $6.53 | n.a. | | $72.16 | $27.46 | $127.40 | $13.06 | n.a. | | $140.46 | $85.86 |
| 1997 | $69.57 | $6.70 | n.a. | | $76.27 | $27.46 | $143.27 | $13.39 | n.a. | | $156.66 | $85.86 |
| 1998 | $61.58 | $6.88 | $5.00 | | $73.46 | $27.46 | $130.88 | $13.76 | $5.00 | | $149.64 | $85.86 |
| 1999 | $60.30 | $6.98 | $2.73 | | $70.01 | $27.46 | $127.91 | $13.96 | $2.73 | | $144.60 | $85.86 |
| 2000 | $64.24 | $7.10 | $6.43 | | $77.77 | $27.46 | $129.59 | $14.20 | $6.43 | | $150.22 | $85.86 |
| 2001 | $69.50 | $7.28 | $2.65 | | $79.43 | $27.46 | $129.40 | $14.56 | $4.15 | | $148.11 | $85.86 |
| 2002 | $68.71 | $7.54 | $6.61 | | $82.86 | $24.30 | $130.32 | $15.08 | $6.61 | | $152.01 | $79.13 |
| 2003 | $72.20 | $7.69 | $5.46 | | $85.35 | $24.30 | $129.07 | $15.38 | $5.46 | | $149.91 | $79.13 |
| 2004 | $74.52 | $7.82 | $6.61 | | $88.95 | $24.30 | $134.86 | $15.64 | $6.61 | | $157.11 | $79.13 |
| 2005 | $77.10 | $7.93 | $7.99 | | $93.02 | $24.30 | $132.01 | $15.87 | $7.99 | | $155.87 | $79.13 |
| 2006 | $91.13 | $8.24 | $9.31 | | $108.68 | $30.93 | $214.41 | $16.49 | $9.31 | | $240.21 | $77.12 |
| 2007 | $93.53 | $8.58 | $9.99 | $0.11 | $112.21 | $30.93 | $215.32 | $17.15 | $9.99 | $0.11 | $242.46 | $80.08 |
| 2008[6] | $28.12 | $8.79 | $10.95 | $0.07 | $47.93 | $30.93 | $33.34 | $17.57 | $10.95 | $0.07 | $61.68 | $33.34 |
| 2009 | $30.20 | $9.06 | $11.49 | $0.07 | $50.82 | $30.20 | $32.77 | $18.12 | $11.49 | $0.07 | $62.45 | $32.77 |
| 2010 | $33.27 | $9.11 | $11.91 | $0.11 | $54.40 | $33.27 | $36.11 | $18.23 | $11.91 | $0.11 | $66.36 | $36.11 |
| 2011 | $38.92 | $9.29 | $9.51 | $0.05 | $57.77 | $38.92 | $42.58 | $18.59 | $9.51 | $0.05 | $70.73 | $42.58 |
| 2012 | $39.71 | $9.39 | $15.20 | $0.05 | $64.35 | $39.71 | $37.95 | $18.78 | $15.20 | $0.05 | $71.98 | $37.95 |
| 2013 | $40.39 | $9.79 | $17.29 | $0.05 | $67.52 | $39.91 | $38.71 | $19.58 | $17.29 | $0.05 | $75.63 | $40.92 |
| 2014 | $46.87 | $9.99 | $28.81 | $0.23 | $85.90 | $46.87 | $29.70 | $19.98 | $28.81 | $0.23 | $78.72 | $29.70 |
| 2015 | $53.82 | $10.07 | $30.66 | $0.23 | $94.78 | $53.82 | $34.74 | $20.14 | $30.66 | $0.23 | $85.77 | $34.74 |
| 2016 | $85.12 | $10.07 | $30.66 | $0.23 | $126.08 | $53.82 | $61.24 | $20.14 | $30.66 | $0.23 | $112.27 | $34.74 |
| 2017 | $91.57 | $10.23 | $14.15 | $0.30 | $90.85 | $39.90 | $49.50 | $20.45 | $14.15 | $0.30 | $84.40 | $22.85 |
| 2018 | $85.13 | $10.47 | $20.39 | $0.30 | $107.87 | $48.35 | $21.42 | $20.94 | $20.39 | $0.30 | $63.05 | $17.45 |

Notes:

(1) Total USBR rate given for non-full cost users only, as they represent the majority of water users.

(2) Cost-of-service for agricultural and municipal and industrial users includes a capital repayment rate and an operation and maintenance (O&M) rate. For municipal and industrial customers, cost-of-service also includes a deficit charge, which includes interest on unpaid O&M and interest on capital and on unpaid deficit.

(3) Restoration fund charges apply October 1 through September 30.

(4) Beginning in 1998, the San Luis-Delta Mendota Water Authority instituted this charge to "self-fund" costs associated with maintaining the Delta-Mendota Canal and certain other facilities, which were formerly funded directly by the Bureau of Reclamation. SLDMWA issues preliminary rates in December for the upcoming contract year (March-February). These rates are used for rate-setting purposes; actual rates may vary.

(5) The contract rate is the minimum rate CVP contractors are allowed to pay. To the extent that the contract rate does not cover interest plus actual operation and maintenance costs, a contractor deficit is accumulated that is charged interest at the current-year treasury borrowing rate.

(6) Per the amendatory contract with the USBR "out of basin" capital costs that were previously included in the cost of service are now under a separate repayment contract.

(7) Cost of service rates are inclusive of USBR direct pumping and Project Use Energy costs.

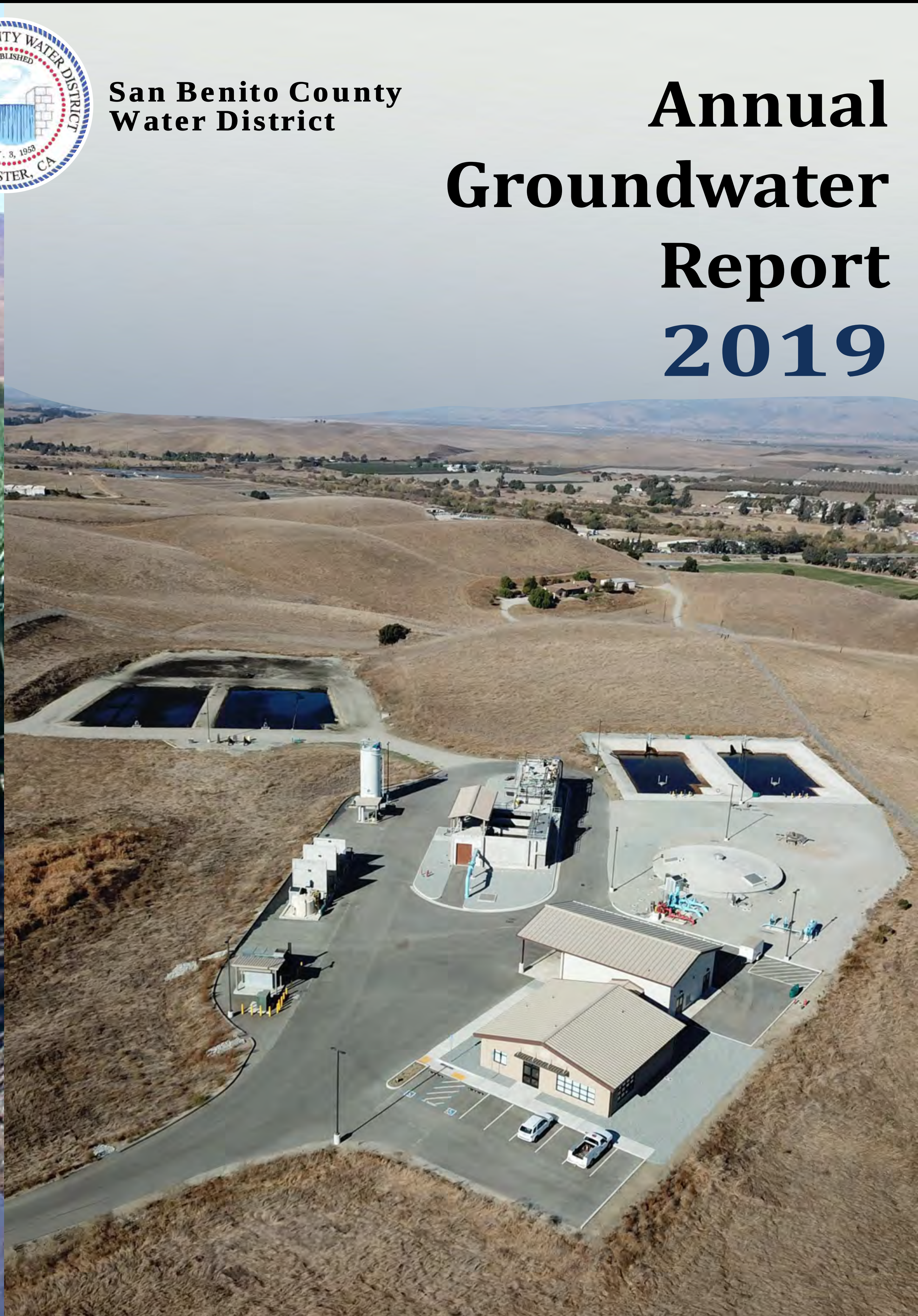
# APPENDIX G LIST OF ACRONYMS

## List of Acronyms

| | |
|---|---|
| AF or A/F | acre-foot |
| AFY | acre-foot per year |
| AG | agriculture |
| BMP | Best Management Practices |
| CASGEM | California Statewide Groundwater Elevation Monitoring |
| CEQA | California Environmental Quality Act |
| cfs | cubic feet per second |
| CIMIS | California Irrigation Management Information System |
| COC | Constituent of Concern |
| CVP | Central Valley Project |
| District or SBCWD | San Benito County Water District |
| DWR | California Department of Water Resources |
| DWTP | Domestic Wastewater Treatment Plant |
| ET | evapotranspiration |
| ft | feet |
| gpd | gallons per day |
| GSA | Groundwater Sustainability Agency |
| GSP | Groundwater Sustainability Plan |
| GW | groundwater |
| IRWMP | Integrated Regional Water Management Plan |
| ITRC | Irrigation Training and Research Center, California Polytechnic State University |
| IWTP | Industrial Wastewater Treatment Plant |
| M&I | Municipal and Industrial |
| MGD | million gallons per day |
| msl | mean sea level |
| NGVD | National Geodetic Vertical Datum |
| pdf | Adobe Acrobat Portable Document Format |
| PPWD | Pacheco Pass Water District |
| PVWMA | Pajaro Valley Water Management Agency |
| RW | recycled water |
| RWQCB | Regional Water Quality Control Board |
| SCVWD | Santa Clara Valley Water District |
| SEIR | Supplemental Environmental Impact Report |
| SGMA | Sustainable Groundwater Management Act |
| SLDMWA | San Luis & Delta-Mendota Water Authority |
| SSCWD | Sunnyslope County Water District |
| USBR | U.S. Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| WRA | Water Resources Association of San Benito County |
| WTP | Water Treatment Plant |
| WWTP | Wastewater Treatment Plant |
| WY | water year |

San Benito County
Water District

# Annual Groundwater Report 2019



TODD GROUNDWATER

# ANNUAL GROUNDWATER REPORT

**December 2019**

TODD GROUNDWATER

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# SIGNATURE PAGE

Iris Priestaf, PhD

President



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Appendix F	Rates and Charges
Appendix G	List of Acronyms

# EXECUTIVE SUMMARY

This Annual Groundwater Report for San Benito County Water District (District) describes groundwater conditions in the San Benito County portions of the North San Benito Subbasin of the Gilroy-Hollister Basin. Consistent with past reports, this Annual Report focuses on the District's Zone 6, the zone of benefit for importation of Central Valley Project (CVP) water supply. The Report is prepared at the request of the District Board of Directors and is consistent with the special act of the State that established the District. It documents water sources and uses, groundwater elevations and storage, and management activities for Water Year 2019 and it provides recommendations. Water Year 2019 was characterized by higher than average rainfall, above average CVP allocations, and stable to slightly increased groundwater storage in parts of the basin and stable groundwater storage in the other areas.

This Water Year, the District successfully requested that the Department of Water Resources (DWR) combine three separate subbasins of the Gilroy-Hollister Basin (Bolsa, Hollister, and San Juan) with the Tres Pinos Valley basin to form the new North San Benito Groundwater Subbasin. Portions of the new Subbasin extend into Santa Clara County; the entire Llagas Subbasin of the Gilroy-Hollister Basin is in Santa Clara County. The District is the exclusive Groundwater Sustainability Agency (GSA) for the San Benito portion of North San Benito Subbasin and Santa Clara Valley Water District (SCVWD) is GSA for Santa Clara portions. The District is leading preparation of the Groundwater Sustainability Plan (GSP) in cooperation with SCVWD and in compliance with the Sustainable Groundwater Management Act (SGMA). Upon adoption by the District and SCVWD boards, the GSP will provide the information and tools for continued groundwater management. After completion of the GSP, the District will be required to submit Annual GSP Reports to DWR. This 2019 Annual Groundwater Report begins a transition to an annual groundwater report that meets the requirements of the District Act and satisfies SGMA requirements. This includes expanding the report coverage to address the entire North San Benito Subbasin.

The Annual Groundwater Report for Water Year 2019 includes a triennial update of the water quality database and assessment of water quality; this is the fifth triennial update as planned originally in 2006. Water quality did not change significantly during 2017-2019, although some areas of the basin continue to have elevated levels of TDS and nitrate. Water quality monitoring will continue consistent with existing District management objectives and will be transitioned over the next two years to conform with the District Act and with SGMA.

The District has effectively managed water resources in San Benito County for decades. Working collaboratively with other agencies, the District has eliminated historical overdraft, developed and managed multiple sources of supply, established an effective water conservation program, protected water quality, and provided annual reporting. Water Year 2019 witnessed a continuation of these collaborative efforts. The continued partnership of the Hollister Urban Area (including the District, City of Hollister, and Sunnyslope County Water District (SSCWD)) resulted in increased water treatment capacity that significantly enhances opportunities for conjunctive use of CVP and groundwater and improves delivered water quality for municipal costumers. The District has also worked directly with well owners to supplement the groundwater elevation monitoring network and fill data gaps identified in the GSP process. The District's continued public outreach—including preparation of Annual Groundwater Reports—has been an asset to the GSP process and is a foundation for future groundwater management.

# 1-INTRODUCTION

The San Benito County Water District (District or SBCWD) was formed in 1953 by a special act (District Act) of the State with responsibility and authority to manage groundwater. The District Act authorizes the Board of Directors to require an annual investigation and report on groundwater conditions of the District and its zones of benefit, such as Zone 6, the area for distribution of Central Valley Project (CVP) water. As documented in **Appendix A,** the District Act specifies the minimum content of the report should the District choose to prepare one. Annual Reports have been prepared historically to analyze the status of the groundwater basin, to evaluate conditions in the next year, and to provide management recommendations.

With passage of the Sustainable Groundwater Management Act (SGMA) in 2014, the State has created a new framework for groundwater basin management, monitoring, and reporting by local agencies. The District has responded proactively. The District is the exclusive Groundwater Sustainability Agency (GSA) for the North San Benito Groundwater Basin in San Benito County shown on **Figure 1-1**. This basin was formerly defined as three separate subbasins of the Gilroy-Hollister basin and the Tres Pinos Valley basin. The District is currently preparing a Groundwater Sustainability Plan (GSP) for the North San Benito Basin in cooperation with Santa Clara Valley Water District (SCVWD), which is the GSA for the small portions of the basin within Santa Clara County. As proposed in the GSP, the North San Benito Groundwater Basin can be divided into four management areas, shown in **Figure 1-2**. These management areas are designed to facilitate implementation of the GSP. In Water Year 2019, the District and Todd Groundwater have completed several sections of the plan, participated in two public workshops, and four Technical Advisory Committee meetings.

Consistent with the District Act and prepared at the request of the District, this Annual Report documents water supply sources and use, groundwater elevations and storage, and District management activities from October 2018 through September 2019. It fulfills the minimum content for a District Annual Report and presents an overview of the state of the groundwater basin with recommendations for management. It conveys considerable information, including tables and figures, which are provided largely in **Appendices B through E**. **Appendix F** provides information on water rates and charges and **Appendix G** contains a list of acronyms.

The 2019 Annual Groundwater Report strives to maintain consistency with past Annual Reports while also providing a path to fulfill future requirements for SGMA Annual Reports. As development of the GSP proceeds over the next two years (with completion before January 31, 2022), the SBCWD Annual Reports may be modified further to ensure compliance with SGMA. While complying with GSP regulations, Annual Reports will also adhere to requirements for SBCWD annual reporting, as described in the District Act.

## Acknowledgments

This report was prepared by Iris Priestaf, PhD, Maureen Reilly, PE, Arden Wells, and Chad Taylor, PG, CHG of Todd Groundwater. We appreciate the assistance of San Benito County Water District staff, particularly Jeff Cattaneo, Sara Singleton, Garrett Haertel, and David Macdonald.

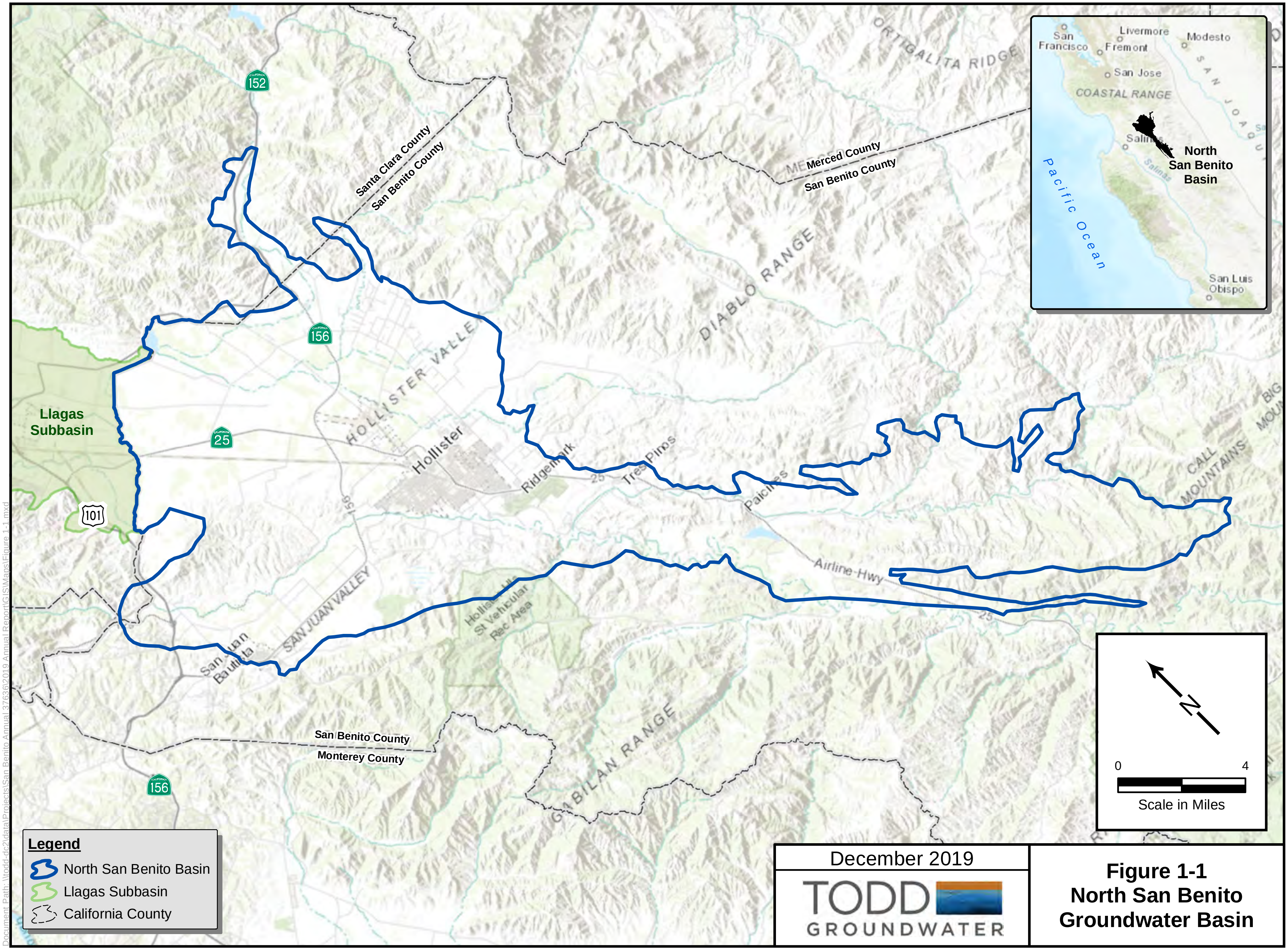


**Figure 1-1**
**North San Benito Groundwater Basin**

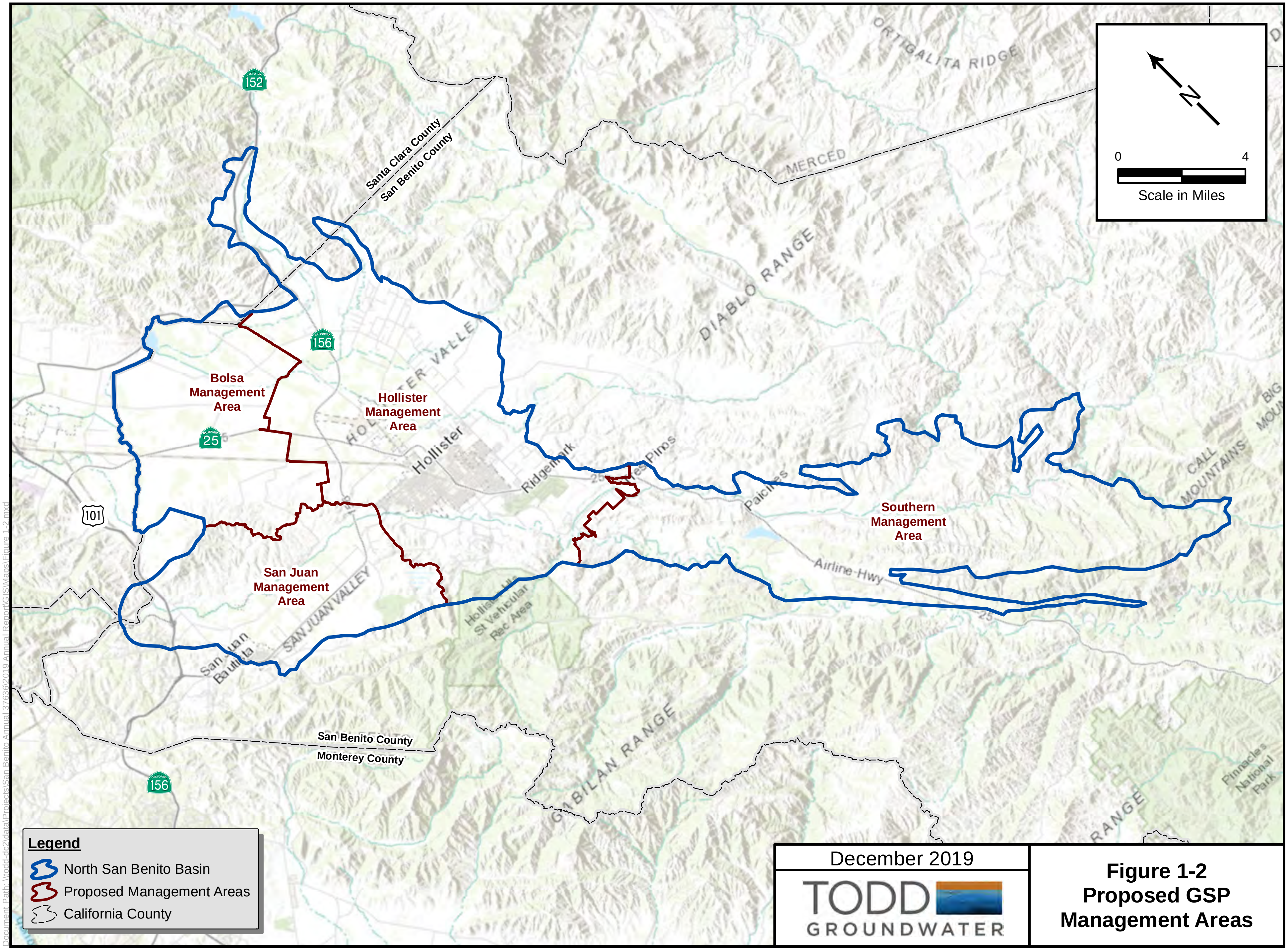


**Figure 1-2**
**Proposed GSP Management Areas**

# 2 – GEOGRAPHIC AREA

The geographic area and boundaries of local groundwater basins have been defined differently by the District and by the California Department of Water Resources (DWR) for their specific purposes. Like previous annual reports, this Annual Report focuses on the San Benito County portions of the Gilroy-Hollister Groundwater Basin, including the previously-defined Bolsa, Hollister, and northern San Juan Bautista subbasins. Nonetheless, it is recognized that the North San Benito Basin (Basin)[1] includes portions in Santa Clara County and that it extends farther to the south; the entire basin is the subject of the GSP. To support a transition to SGMA, the monitoring program is being improved and expanded.

## District-Defined Subbasins

For the past 24 years, the Annual Reports have focused on subbasins delineated in 1996 and based on hydrogeologic and other local factors (e.g., Zone 6 boundaries). These subbasins are shown in **Figure 2-1** in light blue. Six of these subbasins are defined within Zone 6, including Bolsa Southeast (SE), Pacheco, Hollister East (North and South), Tres Pinos, Hollister West, and San Juan subbasins. The seventh is the Bolsa subbasin; of the subbasins shown on the map, only the Bolsa subbasin receives no direct CVP deliveries and relies on local groundwater.

## DWR-Defined Basins

As the District proceeds with SGMA planning and implementation, its area of focus is changing from the 1996-defined subbasins and Zone 6 to the North San Benito Basin and GSP area outlined in **Figure 1-1**, in dark blue. All groundwater basins defined by DWR as wholly or partially in San Benito County are shown in **Figure C-1** in **Appendix C.**

Over the next few years, the annual report will transition from analyses on the basis of subbasins to management areas, shown in red on **Figure 1-2**. The four proposed Management Areas (MAs) have been defined as part of the GSP process to facilitate implementation. A major factor in defining MAs is availability of water sources (e.g., CVP) and Zone 6. While recognizing that water supply availability (in terms of sources, infrastructure, and institutional arrangements) can change in the future, current availability is a reasonable starting point. SBCWD provides local surface water from Hernandez and Paicines reservoirs that is provided to a local zone of benefit, Zone 3, and imported Central Valley Project (CVP) water that is provided to Zone 6. The District-defined subbasins also relied on Zone 6 as a boundary and thus the District-defined subbasins generally fall within the boundaries of the MAs.

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[1] The official nomenclature is North San Benito Subbasin of the Gilroy Hollister Basin; it has been assigned DWR Basin Number 3-003.05. For the purposes of this report, it is referred to as North San Benito Basin to clearly differentiate it from previous DWR-defined subbasins and from previous SBCWD-defined subbasins.

The four Management Areas (MAs) are listed below with District-defined subbasins that they generally encompass:

- Southern MA
- Hollister MA (includes Tres Pinos, Hollister East and West, Bolsa SE, Pacheco subbasins)
- San Juan MA (includes almost all District-defined San Juan subbasin)
- Bolsa MA (includes almost all previously-defined Bolsa subbasin)

Hollister and San Juan MAs include portions of Zone 6; Southern and Bolsa MAs do not.

## Ongoing District Monitoring Programs

Data from monitoring programs undertaken by local, state, and federal agencies are summarized below as currently incorporated in the Annual Report. The District data compilation and monitoring programs are likely to be expanded and revised in the future as data needs are identified in the GSP, for example to address topics such as potential subsidence, and to represent the entire North San Benito Basin.

**Climate.** Climate data are regularly compiled from DWR's California Irrigation Management Information System (CIMIS) and include: total solar radiation, soil temperature, air temperature/relative humidity, wind direction, wind speed, and precipitation. Additional precipitation data are available from the WRCC station at Hollister from 1934-2019 (WRCC 2019). For the Annual Groundwater Reports, historical annual precipitation has been compiled and reported using the Hollister rain gage for the long-term precipitation and the CIMIS San Benito station for recent monthly precipitation. Monthly precipitation and evapotranspiration for the Hollister #126 CIMIS station are tabulated in **Appendix B**.

**Groundwater levels.** SBCWD has had a semi-annual groundwater level monitoring program since Water Year (WY) 1977; groundwater level data gathered by USGS and other agencies are available as early as 1913 (Clark, 1924). The Annual Groundwater Reports provide quarterly groundwater level data in **Appendix C** for each year. The data are the basis for groundwater level contour maps, change maps, hydrographs, groundwater level profiles, and storage change computations presented in the Annual Reports. The SBCWD monitoring program includes wells in the Pacheco Valley in Santa Clara County. SCVWD's monitoring program provides data for the southern Llagas Subbasin; these shared data are used in the SBCWD annual groundwater level maps.

SBCWD is the designated CASGEM monitoring agency for the GSP Area; CASGEM data are available from DWR's online Groundwater Information Center Interactive Map (GICIMA).

**Water quality**. In 1997, SBCWD initiated a program for monitoring nitrate and electrical conductivity (EC) in wells. In 2004, SBCWD established a comprehensive water quality database that records from all water systems and regulated facilities. The database has been updated this year as part of the triennial Annual Report update. Monitoring for the Salt and Nutrient Management Plan is closely coordinated. State-wide sources of groundwater quality data include the Water Data Library (WDL), Geotracker/GAMA program, and the State Water Resources Control Board's Division of Drinking Water.

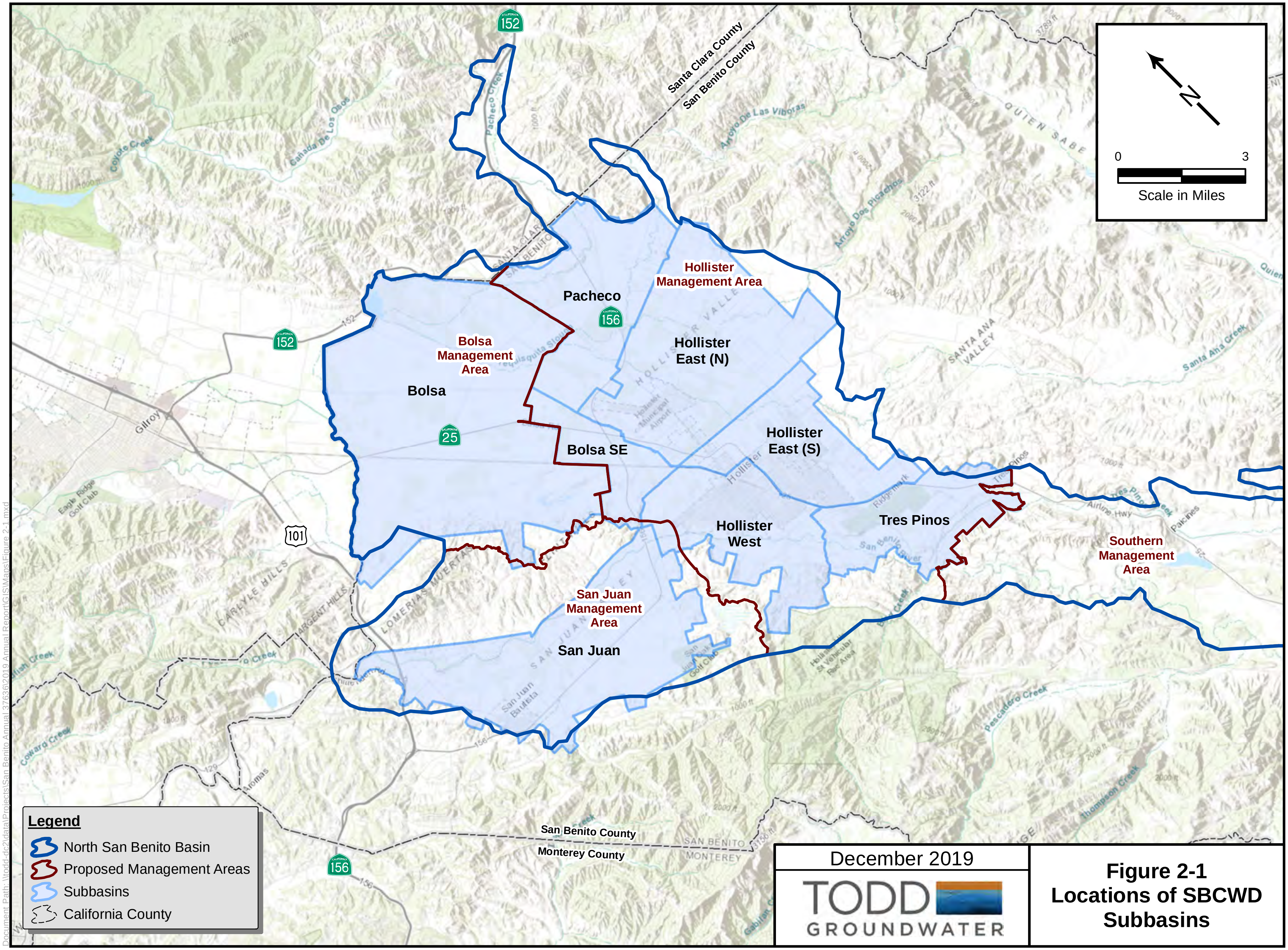
These are accessed for the triennial update of the SBCWD Water Quality Database; available data are shown in **Appendix C**, and water quality conditions are presented in Section 3.

**Reservoirs.** The Annual Report summarizes reservoir water budget information for Hernandez, Paicines, and San Justo reservoirs and provides annual total releases from Hernandez and Paicines reservoirs from Water Year 1996 to present. Reservoir storage and release data are available in **Appendix D**.

**Surface water flows and percolation.** Surface water monitoring and percolation are summarized in **Appendix D** of the Annual Groundwater Reports. For Water Year 1994 to present, percolation of imported CVP water is documented in **Table D-3** and percolation of wastewater is shown in **Tables D-4 and D-5**. The District temporally suspended its surface water monitoring network but plans to relaunch the monitoring in Water Year 2020.

**Wells and groundwater pumping.** SBCWD monitors groundwater pumping in Zone 6. Pumping amounts are calculated semiannually by metering the number of hours of pump operation and multiplying by the average discharge rate. This monitoring program began in about 1990 (soon after CVP imports started) and was based on recognition that CVP imports resulted in reduced pumping, increased recharge, and sustainable groundwater storage with regional benefits to groundwater users. Irrigation pumping beyond Zone 6 is not monitored but has been estimated for regular water budget updates based on land use information and water use factors. Groundwater pumping estimates for Zone 6 are summarized by major use category and subbasin in **Appendix E**, which also provides information on CVP use in Zone 6.

**Units and accuracy**. Throughout this report, water volumes and changes in storage are shown to the nearest acre-foot (AF). These values are accurate to one to three significant digits (depending on the measurement). All digits are retained in the text to maintain as much accuracy as possible during subsequent calculations, but results should be rounded appropriately.

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TODD GROUNDWATER

**Figure 2-1**
**Locations of SBCWD Subbasins**

# 3-GROUNDWATER CONDITIONS

The Annual Report summarizes basin conditions including climate, groundwater elevations, groundwater storage, and groundwater level trends. Overall, Water Year 2019 was an above average hydrologic year, and CVP allocations remained above average.

## Climate

Assessment of climatic conditions begins with collection of climate data (rainfall and evapotranspiration), which are summarized in **Appendix B**. Local rainfall amounts are compiled on a monthly basis and reviewed as an increasingly variable factor that affects basin inflows (e.g., deep percolation) and outflows (groundwater pumping). Recognizing that drought often is extensive across California, local dry years also may be indicative of regional drought and reduced CVP allocations. Dry years often are characterized by increased groundwater pumping for agricultural irrigation to offset lack of rainfall and reduced CVP allocations.

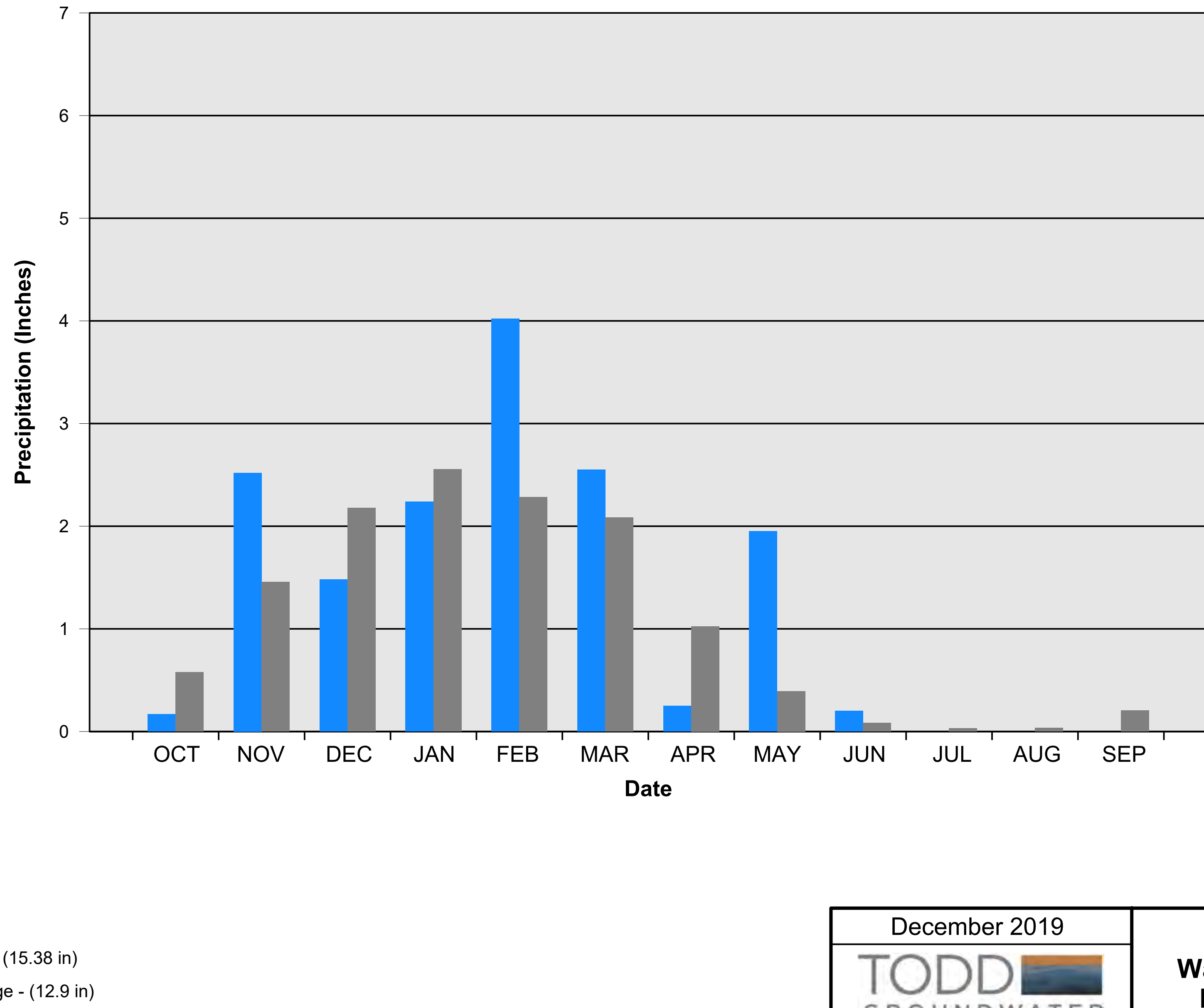
In 2019, overall precipitation was 15.38 inches as shown in **Figure 3-1**; November and early spring received higher than normal precipitation. Monthly rainfall and evapotranspiration data can be found in **Appendix B**. Water year 2019 was 116 percent of normal, reflecting an above-normal year. **Figure 3-2** shows annual precipitation and water year type from 1976 through 2019. The basin is still recovering from the extreme drought of 2013, 2014, and 2015 and from low CVP allocations for 2013 through 2016; additional inflow from this above-normal year will help replenish groundwater reserves. NOAA's weather forecast for the winter 2019-2020 predicts a 25 to 50 percent chance of less than average rainfall for the central coast region (NOAA 2019).

The Annual Report has relied on CIMIS station #126 since Water Year 1995. The station, located in Hollister, is hosted by the District and maintained by DWR. In recent years, precipitation data have been affected by periodic irrigation overspray that has been recorded on the sensors, including October and November 2018. The District has resolved this problem.

## Groundwater Elevations

In October 2019, the District collected groundwater elevations in 103 wells from their existing network and 20 additional wells. The newly selected wells will be added to the network after the reference points have been surveyed. **Figure 3-3** shows the well locations in the current monitoring network and the groundwater elevation contours for October 2019.

Groundwater elevations have generally risen throughout the basin over 2019, except for northern portions of Bolsa and San Juan. Overall, the basin is still recovering from the most recent drought (2013-2016) but at a slower rate than in the wet year of 2017. More information is in **Appendix C.**

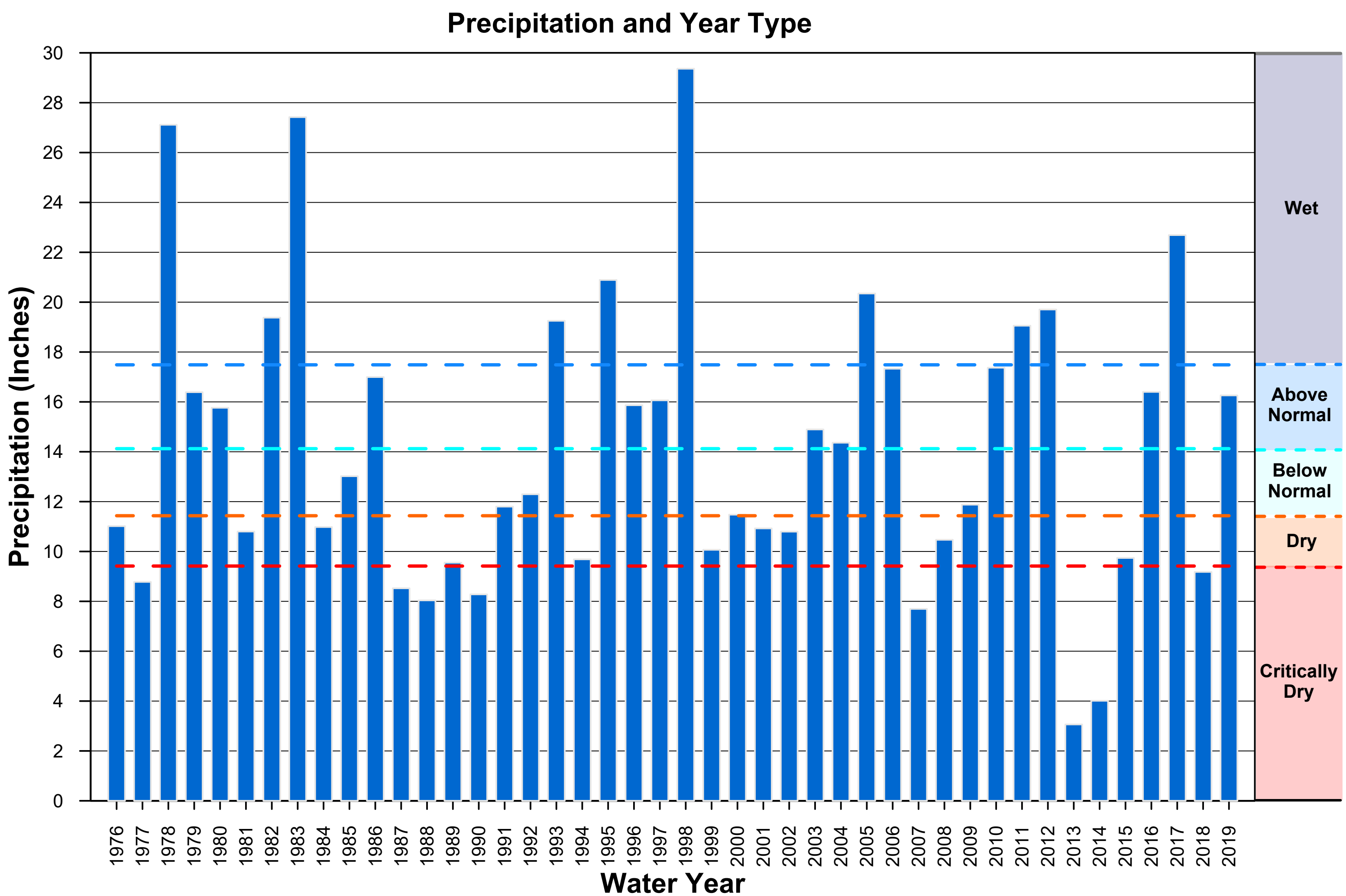





December 2019

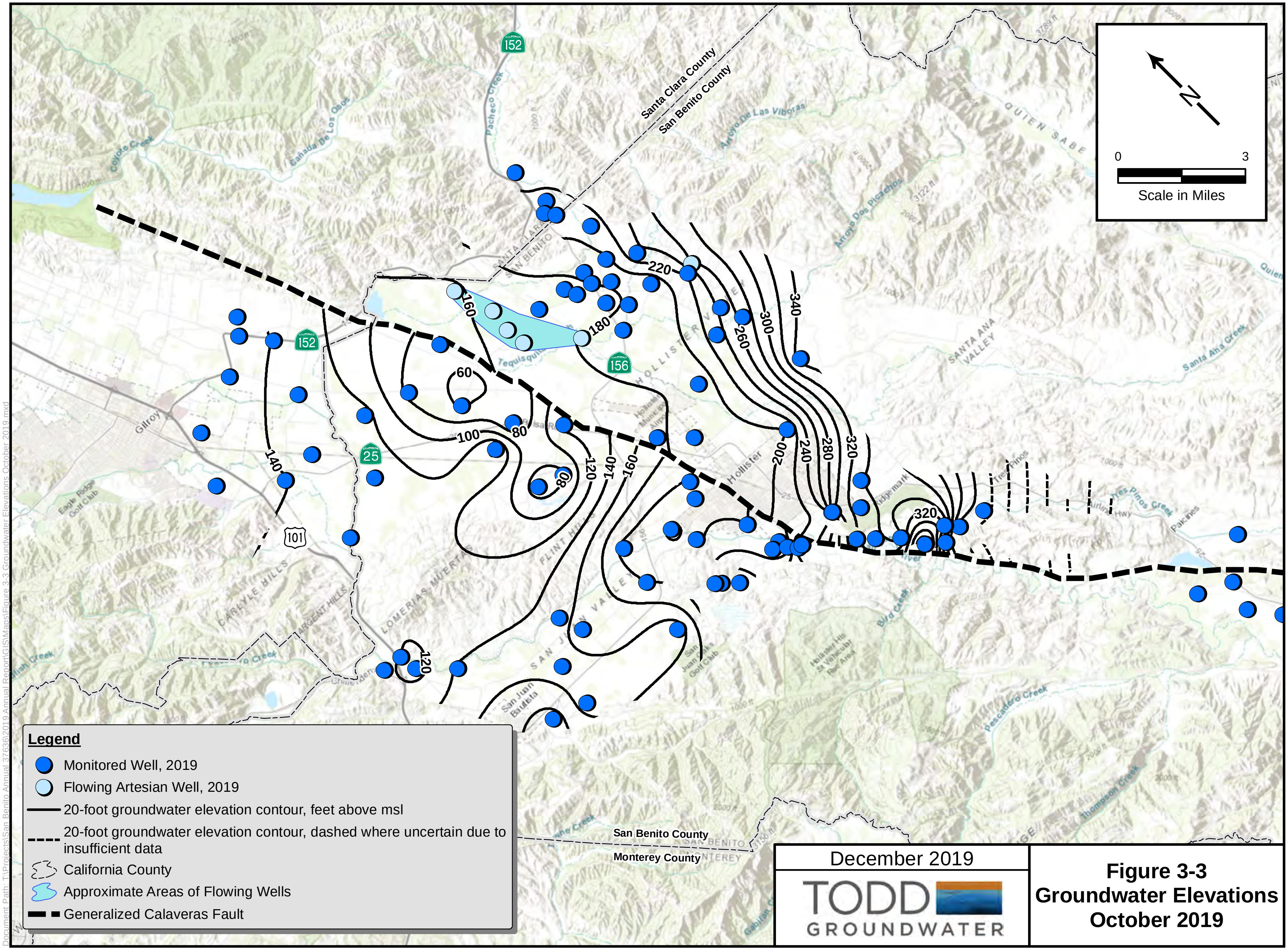
TODD GROUNDWATER

**Figure 3-1**
**Water Year 2019**
**Precipitation**






| December 2019 | **Figure 3-2**<br>**Annual Precipitation**<br>**1976-2019** |
| --- | --- |
| TODD GROUNDWATER | |



Legend
Monitored Well, 2019
Flowing Artesian Well, 2019
20-foot groundwater elevation contour, feet above msl
20-foot groundwater elevation contour, dashed where uncertain due to insufficient data
California County
Approximate Areas of Flowing Wells
Generalized Calaveras Fault
N
0
3
Scale in Miles
December 2019
TODD GROUNDWATER
Figure 3-3
Groundwater Elevations
October 2019
Santa Clara County
San Benito County
Monterey County
Gilroy
Hollister
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
152
156
25
101
Document Path: T:\Projects\San Benito Annual 37636\2019 Annual Report\GIS\Maps\Figure 3-3 Groundwater Elevations October 2019.mxd

## Change in Storage

Groundwater elevation changes from October 2018 to October 2019 were used to evaluate the change in storage. **Figure 3-4** displays change data spatially with a color ramp (see legend), ranging from red that would indicate as much as a 50-foot decline in groundwater levels to blue that indicates a 50-foot or more increase in storage. Groundwater levels and storage continue to recover across the basin. Most areas have shown slight increases (less than 20 feet) from 2018, except portions of Bolsa and San Juan.

Change in storage is the net volume of water added to or removed from the basin over the water year. The change in storage was calculated using the change in groundwater elevations (feet) and multiplying by the total area (acres) to determine the total bulk change in volume. This bulk volume of change was then multiplied by the average storativity of the subbasin to represent the amount of water that a given volume of aquifer will produce. The storativity values for each subbasin were derived from previous numerical models of the basin and continue to be used for consistency with previous Annual Reports. However, the new numerical model developed for the GSP can calculate storage change volumetrically (inflow-outflow) and its estimate may vary from these results. **Table 3-1** documents the change in groundwater storage; as in previous Annual Reports, change in storage is reported on the basis of the 1996 District-defined subbasins, Zone 6, and the total of these subbasins.

**Table 3-1. 2019 Change in Groundwater Storage**

| Subbasin | Subbasin Area (Acres) | Average Change in Groundwater Level (feet) | Change in Volume (Acre-Feet) | Average Storativity | Change in Storage (Acre-Feet) |
|---|---|---|---|---|---|
| San Juan | 11,708 | -1.74 | -20,329 | 0.05 | -1,016 |
| Hollister West | 6,050 | 6.49 | 39,248 | 0.05 | 1,962 |
| Tres Pinos | 4,725 | 15.03 | 71,044 | 0.05 | 3,552 |
| Pacheco | 6,743 | 1.79 | 12,074 | 0.03 | 362 |
| Northern Hollister East | 10,686 | 0.63 | 6,772 | 0.03 | 203 |
| Southern Hollister East | 5,175 | 2.35 | 12,178 | 0.03 | 365 |
| Bolsa SE | 2,691 | 3.23 | 8,694 | 0.08 | 695 |
| **TOTAL ZONE 6** | | | **129,680** | | **6,124** |
| Bolsa | 20,003 | -0.56 | -11,201 | 0.01 | -112 |
| **TOTAL SUBBASINS** | | | **118,479** | | **6,012** |

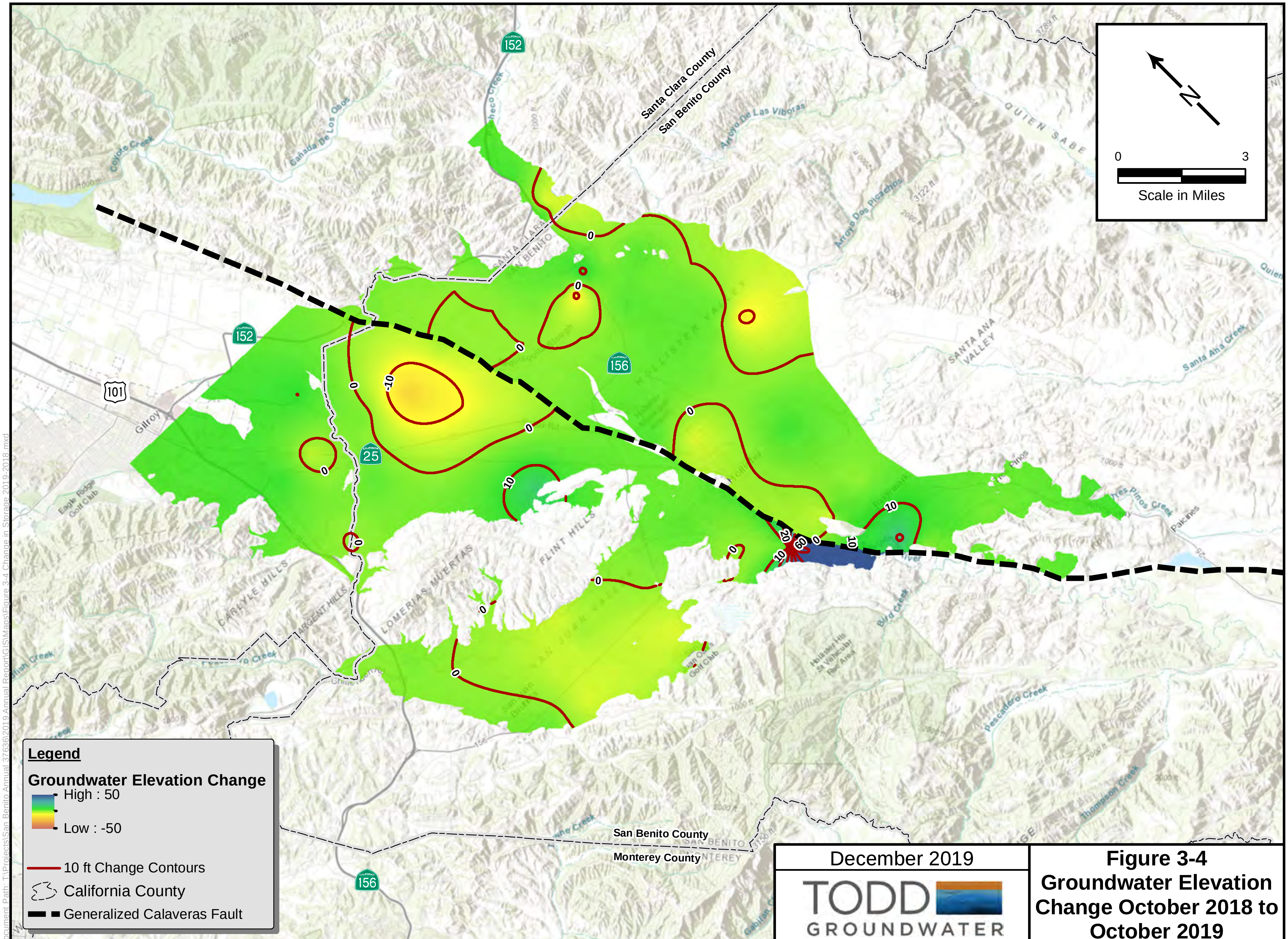



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Figure 3-4
Groundwater Elevation Change October 2018 to October 2019

## Groundwater Trends

Long term changes in groundwater elevations are illustrated in hydrographs of key wells, shown on **Figure 3-5**. These wells and other representative wells were selected based on length of monitoring record, recent monitoring, and trends similar to regional observed patterns.

**Southern Management Area.** While the District began monitoring selected wells in 2001, groundwater elevation data are limited in the Southern MA. Available data in Southern Well 14-7-20K shows trends similar to other MAs; groundwater elevations reached a local maximum in the wet year 2006, decreased during the most recent drought (2013-2015), and continued to recover in 2019. Groundwater elevations are about 400 feet higher than elevations in the Hollister MA about nine miles away, reflecting the topography and northward groundwater flow direction.

**San Juan Management Area.** While some wells in the San Juan MA show variation, especially with declines during the drought, well 12-4-17L20 located near the outflow of the basin has held a consistent elevation. The most recent drought and the dry year of 2007 resulted in relative decreases in elevation. In Water Year 2019, water levels are slightly higher than the long-term average reflecting the slightly higher than average rainfall over the past three years. Well 12-4-26G1 located in the north central part of the basin shows long-term stability although groundwater elevations decreased slightly during the most recent drought (2013-2015).

**Hollister Management Area**. The general pattern for the Hollister MA is exemplified in the hydrograph 12-5-23A20. Groundwater elevations were relatively low in the 1970s (before CVP) and have steadily risen to local high elevations in 2006. Water elevations have remained somewhat consistent since that time with a small decrease during the most recent drought (2013-2015). Water year 2019 elevations are average for the post recovery period. Well 13-6-19K1 shows a similar but more muted pattern of recovery. Groundwater elevations have remained fairly consistent in this year – increasing and decreasing with respective wet and dry years. The location of this well is more influenced by inflow from upgradient groundwater and less controlled by local pumping than 12-5-23A20.

**Bolsa Management Area.** The Bolsa MA includes artesian wells like 12-5-03B1. Groundwater elevations steadily increased from 1992 until the wet year of 1998 and have remained at a constant level since suggesting artesian conditions with groundwater levels pressurized to above ground surface. These artesian conditions are likely caused by local clay layers that create local confined conditions in the northern Bolsa and Hollister MAs.

The District Act (see **Appendix A**) requires presentation of estimates of annual overdraft for the current water year and ensuing water year. Consistent with previous Annual Reports, this would be represented by long-term groundwater level declines with accounting for rainfall conditions and CVP imports. As of 2019, groundwater elevation trends do not indicate overdraft. Recovery following the drought indicates that overdraft is not anticipated for 2020.

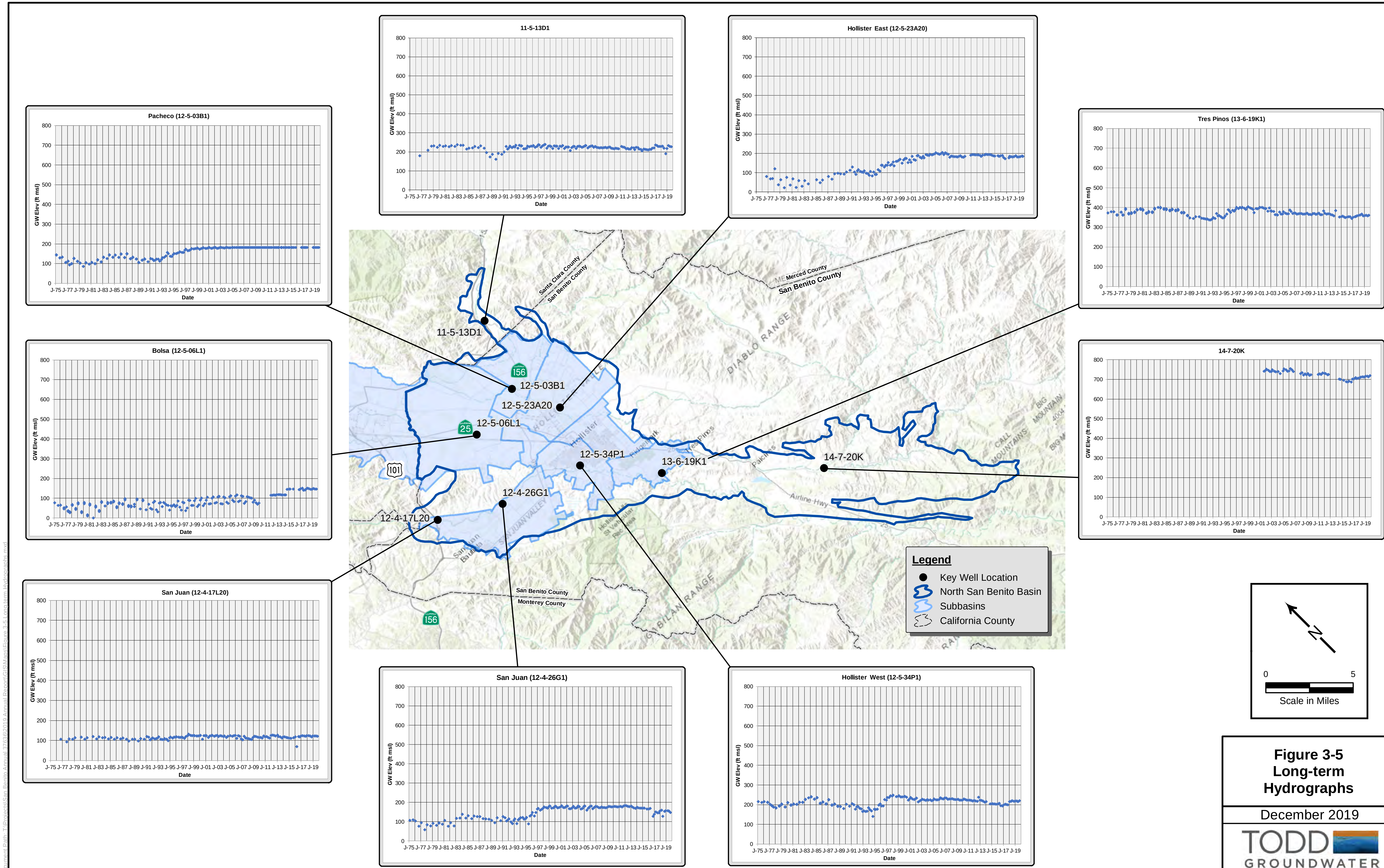


**Figure 3-5**
**Long-term Hydrographs**

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## Groundwater Quality

The San Benito County Water District water quality database contains data from monitored wells, regulated facilities, and public water systems. This database was created in 2004 with a State Local Groundwater Assistance Grant and updated every three years. Water quality data for 2017-2019 were added to the database from the District, the Regional Water Quality Control Board (regulated facilities and the Ag Lands program), California State Water Resources Control Board Division of Drinking Water, City of San Juan Bautista, Tres Pinos County Water District, City of Hollister, and SSCWD. The 2019 District Water Quality Database currently contains over 520,000 records from over 1,800 monitored locations and 175 water systems or regulated facilities.

To understand how water quality has changed over time, the District has regularly monitored a distributed network of wells including the Nested Well in Hollister MA, a dedicated monitoring well that samples from five depth zones. **Figure 3-6** shows the locations of the monitored wells and Nested Well sampled by the District. As shown SBCWD has monitored 23 wells; six wells sampled by other agencies also are shown, which provide geographic coverage.

## Key Constituents

An important document addressing groundwater quality has been the Salt and Nutrient Management Plan (SNMP) for Northern San Benito County, which was developed in 2014. The SNMP identified key constituents of concern (COCs) including total dissolved solids (TDS) and nitrate. These are used as indicators of overall groundwater quality in the basin. Both TDS and nitrate concentration data are available for basin inflow and outflows. Total dissolved solids and nitrate concentrations vary with depth, temporally, and spatially, and they are indicators of the overall changes in groundwater quality throughout the basin.

Total dissolved solids, a measurement of groundwater salinity, can indicate anthropogenic impacts, including the infiltration of urban runoff, agricultural return flows, and wastewater disposal. The North San Benito Basin naturally has an elevated TDS concentration in groundwater, with high concentrations reported since the 1930s. These salinity concentrations are likely due to marine sediments in the basin.

Nitrate ($NO_3$) is the most common form of nitrogen detected in groundwater. Natural nitrate concentrations are typically low, and elevated nitrate concentrations are often due to agricultural activities, septic systems, confined animal facilities, landscape fertilization, and wastewater treatment facility discharges. Locally elevated nitrate concentrations are recognized as a long-term concern in the basin.

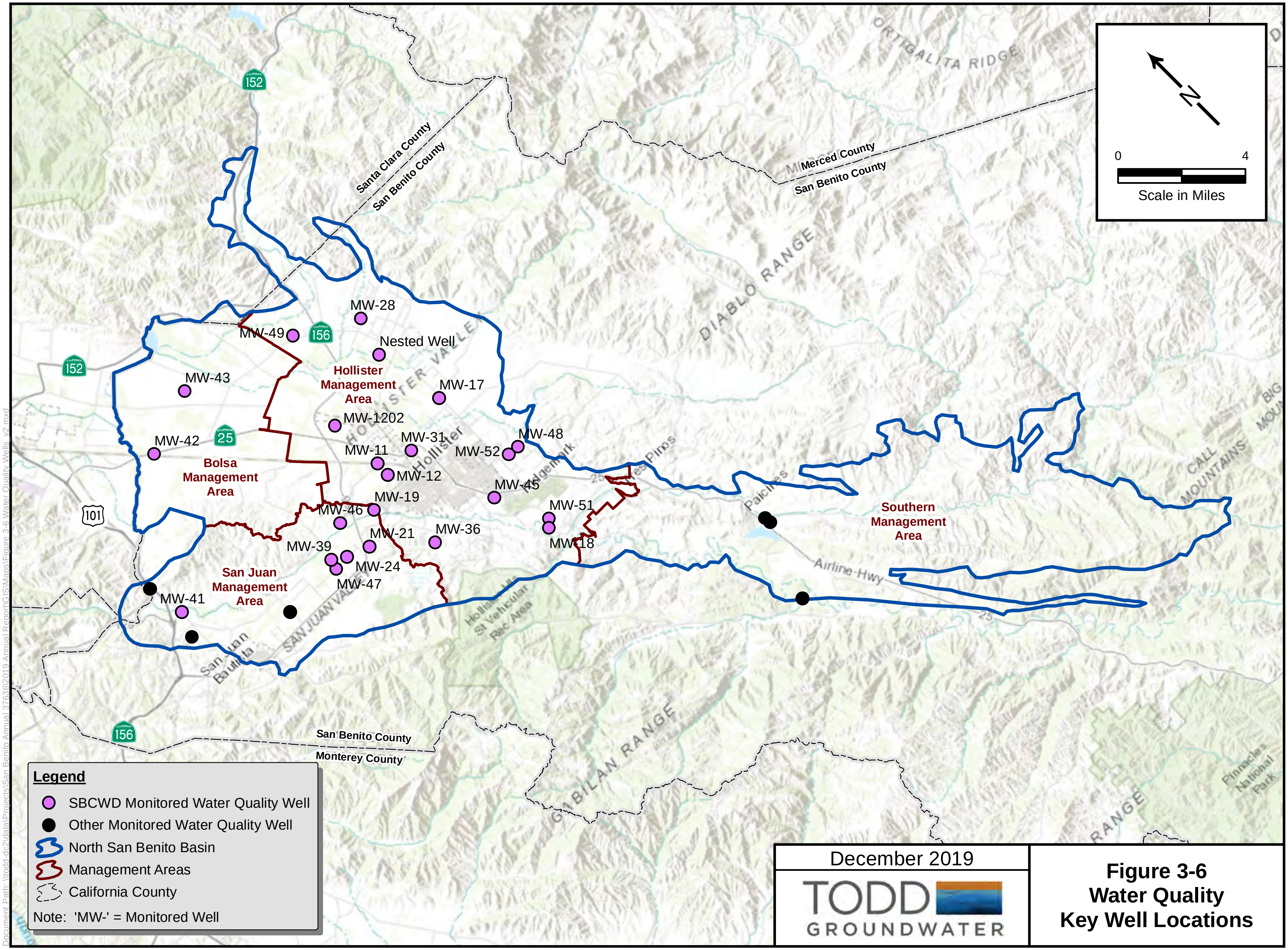


**Figure 3-6**
**Water Quality**
**Key Well Locations**

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Previous studies in the region have identified high concentrations of boron, chloride, hardness, metals, sulfide, and potassium and have considered these constituents of concern. Hexavalent chromium is no longer considered a constituent of concern because its maximum contaminant level (MCL) was raised in 2017, but chromium concentrations should continue to be monitored; these are further discussed in this section. High TDS concentrations are often indicative of high boron, chloride, sulfide, potassium, and hardness concentrations. High metal concentrations from anthropogenic sources are site-specific, and metals from geologic sources, like arsenic and chromium, can depend on local aquifer sediments, oxygen levels in groundwater, or groundwater pH. The water quality standards and number of samples in exceedance are listed in **Appendix C.**

## Water Quality Goals

Water quality goals, or General Basin Plan Objectives (GBPOs), for TDS and nitrate concentrations were developed in the SNMP. GBPOs for the Central Coast are shown in **Table 3-2.**

Three GBPO goals exist for TDS, adopted from the Division of Drinking Water's three secondary maximum contaminant levels (SMCLs). SMCLs are concentration levels where water may develop a bad taste, color, or odor but is still safe to drink. The lower SMCL for TDS is 500 mg/L, and the upper limit of 1,000 mg/L. TDS has a short-term limit of 1,500 mg/L. High concentrations of TDS in irrigation water can be detrimental to sensitive crops or livestock health, and TDS has an agricultural GBPO of 450 mg/L.

Nitrate has a primarily MCL of 45 mg/L when expressed as nitrate (as NO3). Nitrate is also reported as nitrate (as N), with an MCL of 10 mg/L. For this report, all nitrate measurements are expressed as nitrate (as NO3). Nitrate concentrations above the MCLs can cause methemoglobinemia, or "blue baby syndrome," in humans and livestock. High nitrate concentrations may also be hazardous to pregnant women (SWRCB, 2016).

Basin-specific plan objectives were also developed in the SNMP for the Hollister area and for Tres Pinos Valley, now part of the Southern Management Area. The TDS objective for the Hollister Basin was used for the Bolsa and San Juan Subbasins because these regions have similar water quality. **Table 3-3** shows the Plan Objectives for the management areas.

**Table 3-2. General Basin Plan Objectives**

| Parameter | Units | Municipal[1] | Ag[2] |
|---|---|---|---|
| TDS | mg/L | 500/1,000/1,500 | 450 |
| Nitrate (as NO3) | mg/L | 45 | 100 |

1. The municipal levels specified for TDS are the "recommended" levels for constituents with secondary maximum contaminant levels
2. The Agricultural objectives for nitrate are recommended for livestock watering

**Table 3-3. Basin-Specific Basin Plan Objectives**

| Parameter | Units | Hollister (Bolsa and San Juan) | Tres Pinos (now Southern MA) |
|---|---|---|---|
| TDS | mg/L | 1,200 | 1,000 |
| Nitrogen (as N) | mg/L | 5 | 5 |
| Nitrate (as $NO_3$) | mg/L | 22.5 | 22.5 |

## Key Constituents Results

Average constituent concentrations can provide a snapshot of groundwater quality in each management area. The average TDS and nitrate concentrations were calculated for each management area for the past three years (**Table 3-4**). The average constituent concentration is the average of all drinking water and ambient monitoring measurements from 2017-2019 for a given management area. Water quality samples from regulated facilities were excluded from the analyses as these are generally from shallow wells that do not represent the regional trend. Time concentration plots in **Figure 3-7** and **3-8** show TDS and nitrate concentrations in monitored wells over the past 17 years. The monitored wells plotted were selected to represent the general water quality of different subbasins and management areas; all water quality data collected by the District can be reviewed in **Tables C-5 and C-6** in **Appendix C**.

**Table 3-4. Average Constituent Values in Management Areas**

| Management Area | Total Dissolved Solids mg/L | Nitrate (As NO3) mg/L |
|---|---|---|
| Southern | 340 | 6 |
| San Juan | 1,417 | 25 |
| Bolsa | 1,280 | 37 |
| Hollister | 955 | 35 |

**Total Dissolved Solids.** As shown in Table 3-4, average TDS concentrations exceeded the 500 mg/L SMCL in every management area except for Southern MA during 2017-2019. The highest TDS concentrations occur in the northwestern portion of the Hollister MA and the eastern portion of the San Juan MA. For public supply wells and monitored wells, 50 percent of wells in San Juan and 25 percent of wells in Hollister management areas had median TDS concentrations greater than 1,000 mg/L measured from 2017-2019.

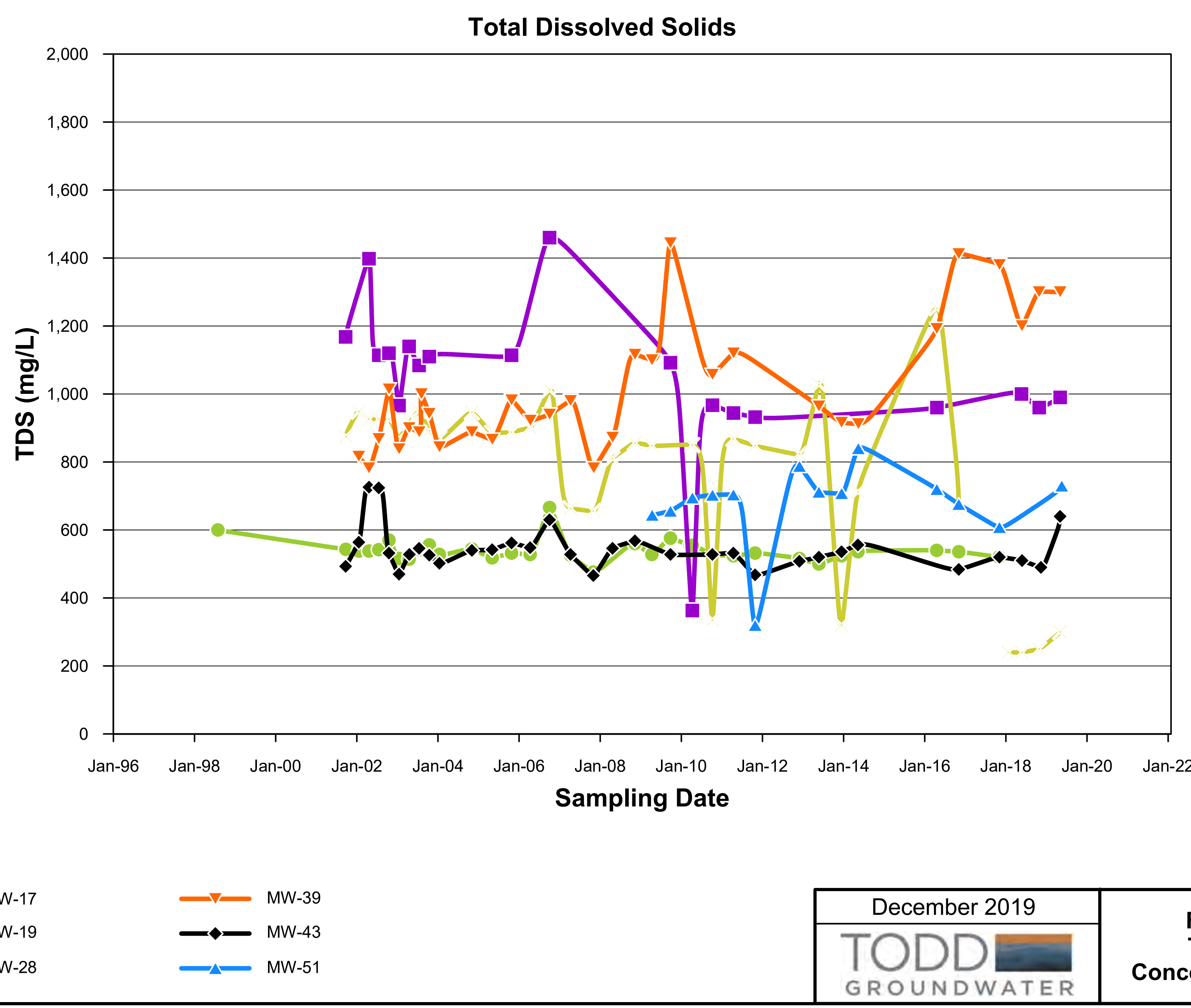


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**Figure 3-7**
**TDS Time Concentration Plots**

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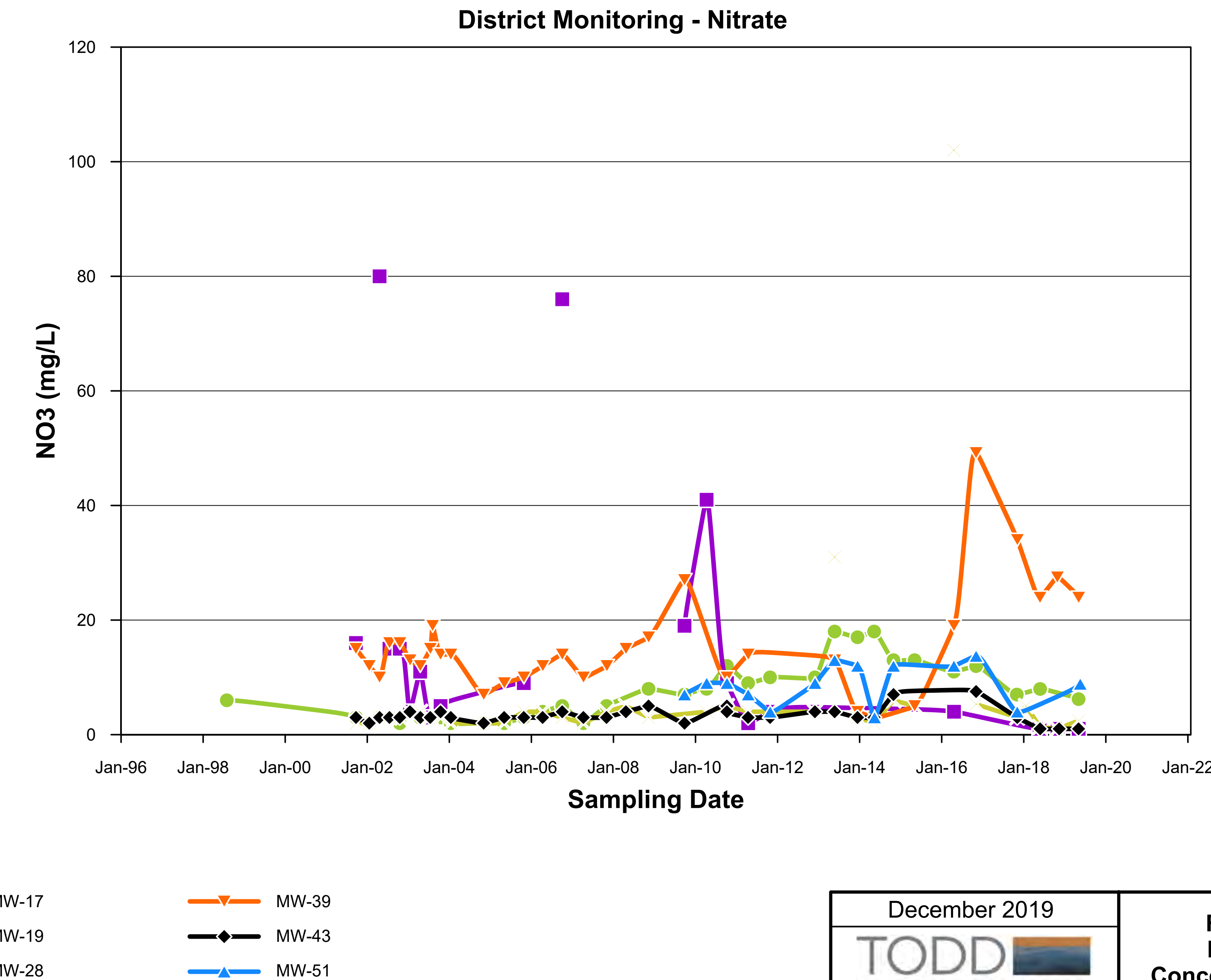


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**Figure 3-8**
**NO3 Time Concentration Plots**

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**Figure 3-7** depicts TDS concentrations over time. In general, TDS concentrations have remained within a range 500 to 1,500 mg/L; wells with relatively good quality generally show less variability and wells with relatively poor quality show a wider range of concentrations. TDS concentrations in a well can vary for a number of reasons, including the presence nearby of a variable source, changing groundwater flow directions, and varying vertical influences as groundwater levels change and as a well is pumped (With the exception of the Nested Well, the sampled wells are active private production wells). Possible error in sampling and/or analysis contributes to apparent variability.

While **Figure 3-7** indicates general variation with a range, evaluation of trends is difficult and would likely be improved with a rigorous program including specifically sited, designed, and dedicated monitoring wells. Nonetheless, water quality problems can be detected; a case in point is provided by well MW-42 (in Bolsa). As documented in **Table C-5**, groundwater from this well historically has been characterized by low TDS concentrations (<500 mg/L) that became variably elevated after 2014 with concentrations apparently exceeding 5,000 mg/L in 2019. The District is inquiring into the situation; additional sampling is being arranged to determine if the latest measurement is a data outlier reflecting procedural problems or is indicative of a local TDS source.

**Figure 3-9** shows the maximum concentrations of TDS spatially across the basin from 2017-2019. In general, TDS concentrations are below 1,000 mg/L (and within the basin objective of 1,200 mg/L) along Pacheco Creek and the San Benito River. Relatively high TDS concentrations are mainly in the central portion of the basin, some reflecting legacy municipal wastewater discharge.

Some TDS measurements were removed from the database due to believed procedural errors. The process to determine their removal is outlined in **Appendix C.**

**Nitrate (as NO3). Table 3-4** shows that relatively high nitrate concentrations occur in every management area but the Southern MA. The average nitrate concentrations do not exceed the 45 mg/L drinking water standard, but average nitrate concentrations in Hollister, Bolsa, and San Juan management areas are higher than the 22.5 mg/L basin-specific plan objectives. The distribution of wells where high nitrate concentrations were measured is similar to that of TDS measurements. In all, thirteen wells had a maximum nitrate concentration greater than the 45 mg/L MCL during 2017-2019. Of these, only five had a median measurement above this drinking water limit.

Elevated nitrate in groundwater is often due to fertilizer application and wastewater disposal, so shallow wells typically have higher nitrate concentrations than deeper wells. Many of the high nitrate concentrations in the San Juan MA (MW 31, for example), are down-gradient of wastewater disposal.

Nitrate levels in monitored wells vary over time, as shown in **Figure 3-8**. Natural nitrate levels are generally below 10 mg/L, so most of these wells are deriving nitrate from anthropogenic sources. However, most wells do have nitrate concentrations below 45 mg/L. Wells with higher nitrate concentrations generally indicate greater variability, likely reflecting the same factors that affect TDS in terms of local sources and changing groundwater levels and flow directions.

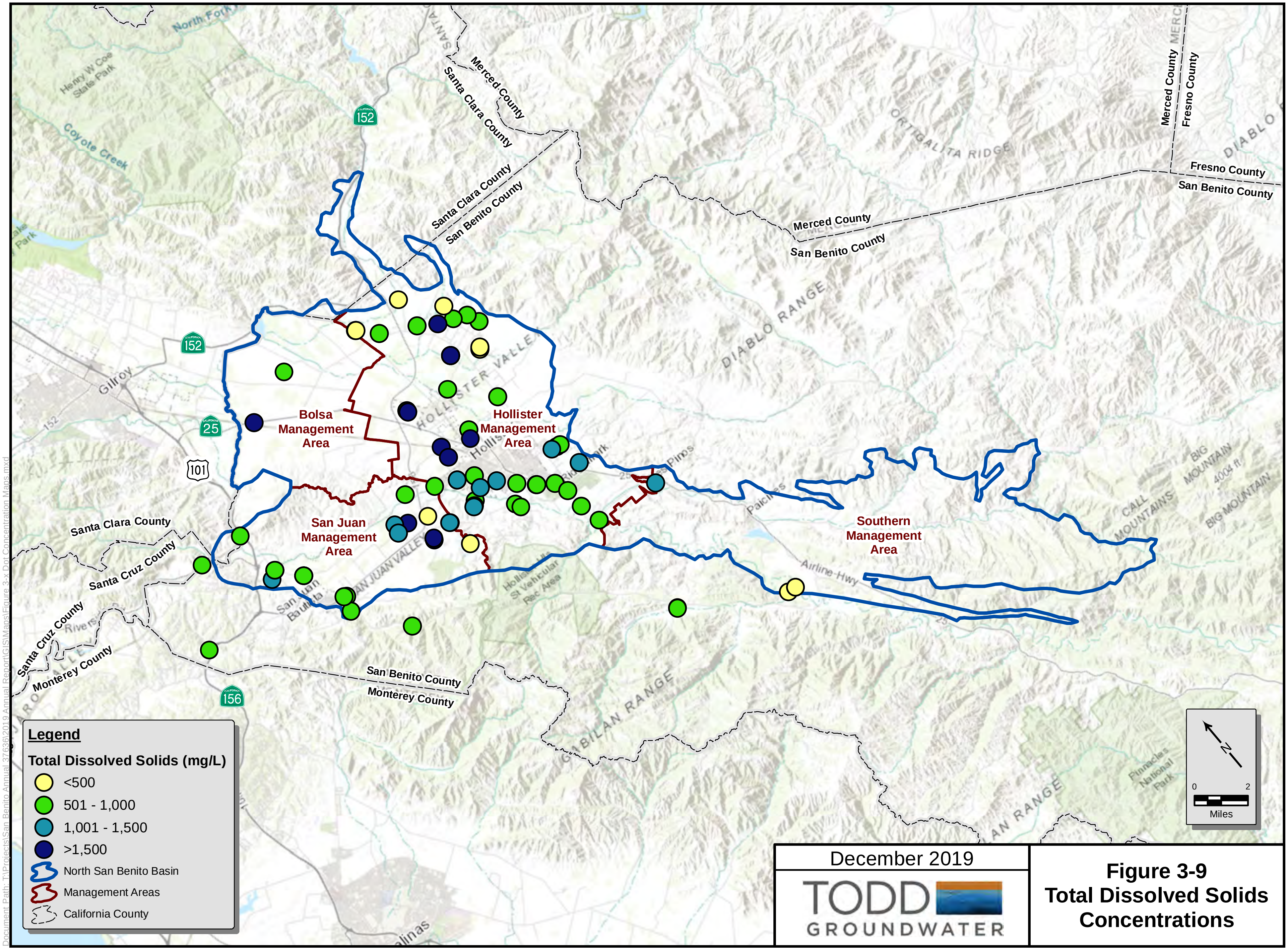


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**Figure 3-9**
**Total Dissolved Solids Concentrations**

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**Figure 3-10** shows the recent maximum concentrations of nitrate since 2017. Similar to TDS, wells along Pacheco Creek and the San Benito River show relatively low concentrations. However, areas with a long history of agricultural use and wastewater disposal (municipal and domestic) include hot spots of high nitrate that exceed the basin objective and MCL of 45 mg/L.

**Metals in Groundwater.** Hexavalent chromium (also known as CrVI or chromium VI) was considered a constituent of concern in the 2016 annual groundwater report. In 2017, the maximum contaminant level (MCL) for hexavalent chromium was increased from 10 ug/L to 20 ug/L. Because of this change, hexavalent chromium is no longer a designated constituent of concern in this basin. While chromium can originate from anthropogenic waste, much of the chromium in western California is derived from serpentinite rocks in the Coastal Range (Izbicki, 2016). Every chromium measurement from 2017-2019 for non-regulated facilities in the basin measured total chromium instead of hexavalent chromium. The MCL for total chromium is 50 ug/L, but hexavalent chromium is often the dominant form of chromium in oxygen-rich groundwater.

Ten wells in non-regulated facilities measured at least one total chromium concentration greater than 20 ug/L, and two of these wells measured total chromium levels over 50 mg/L. Groundwater from four wells in Hollister MA and one well in the San Juan MA had median total chromium concentrations over 20 mg/L. In general, groundwater with elevated chromium should be analyzed for both total chromium and hexavalent chromium. High chromium concentrations occur in the central portion of the Hollister MA, in the region with high nitrate and TDS in groundwater; a map of maximum concentrations is shown as **Figure C-5** in the Appendix.

Arsenic can enter groundwater from aquifer sediments when groundwater has low oxygen levels or a high pH. Arsenic concentrations over the 10 ug/L MCL were measured in 13 wells, most of which are in the western Hollister MA. Groundwater in this region frequently has high manganese concentrations, which suggests that it has low oxygen levels, or reducing conditions. The arsenic is likely derived from iron oxide on sediments, which dissolves in low-oxygen environments.

## Vertical Variations

A Nested Well was completed in 2006 funded in part by a State Local Groundwater Assistance Act grant. Located in Hollister MA (see **Figure 3-6**), the Nested Well has ports at five different depths: A through E, in order from shallowest to deepest. Most recently, the wells were sampled in December 2018 and again in May/June 2019 (**Table 3-5**). All wells reported TDS concentrations greater than 500 mg/L and nitrate (as NO3) concentrations less than 5 mg/L.

The lowest salinity levels were reported in wells B and C, middle-depth wells. Salinity from the shallowest well, Well A, may be influenced by anthropogenic sources, like agricultural drainage. The highest salinity levels were reported in the two deepest wells. In deeper wells, high TDS levels may be from natural groundwater salinity. Throughout the basin, shallow groundwater is more vulnerable to high TDS from human activity, while deeper groundwater has high natural salinity levels.

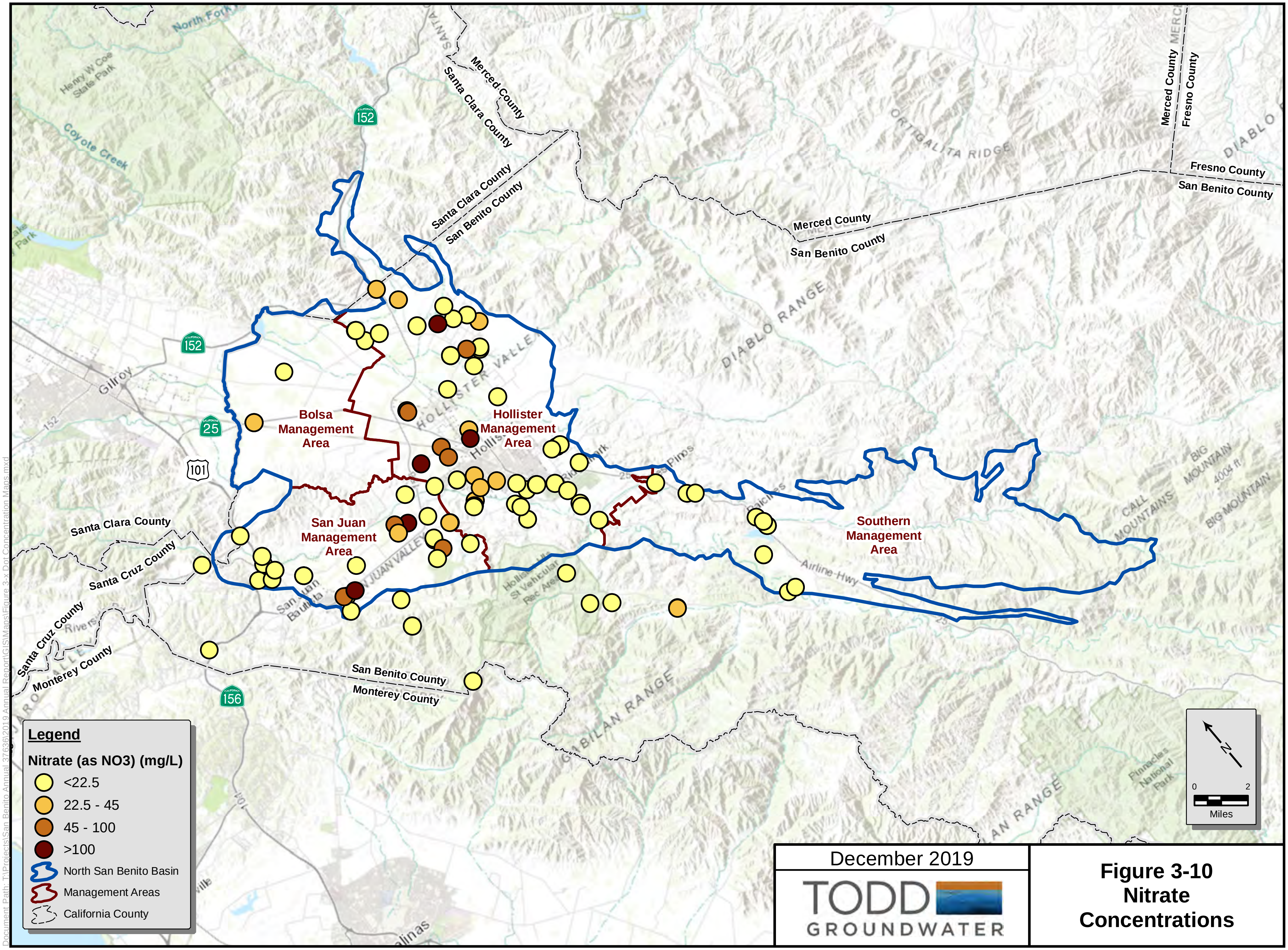


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**Figure 3-10**
**Nitrate Concentrations**

**Table 3-5. TDS and Nitrate Concentrations in Nested Wells**

| Depth | Well | COC | Dec-18 | May-19 | Jun-19 |
|---|---|---|---|---|---|
| | A | TDS | 850 | | 920 |
| | | NO3 | 3.0 | | 1.0 |
| | B | TDS | 540 | | 540 |
| | | NO3 | 1.0 | | 1.0 |
| | C | TDS | 660 | | 630 |
| | | NO3 | 1.0 | | 1.0 |
| | D | TDS | 1,300 | 1,200 | |
| | | NO3 | 1.0 | 1.0 | |
| | E | TDS | 2,700 | | 1,700 |
| | | NO3 | 1.0 | | 1.0 |

## Salt and Nutrient Management Plan

The San Benito SNMP was developed in 2014 to comply with the 2013 State Water Resources Control Board Recycled Water Policy. The SNMP identifies sources of salts and nutrients currently in the basin and addresses future sources and loading. The plan outlines salt and nutrient management actions to ensure that groundwater quality is appropriate for drinking and other beneficial uses.

Analyses conducted in 2014 for the San Benito County SNMP concluded that recycled water irrigation projects satisfied the Recycled Water Policy guidelines and that recycled water use can be increased without degrading groundwater quality for beneficial uses. While the SNMP concluded that no additional implementation measures were necessary beyond existing management plans, water quality monitoring in the San Benito County Water District is ongoing. Monitoring for the SNMP is intended to determine the effectiveness of implementation measures, with a focus on basin water quality near large recycled water projects, recharge projects, and water supply wells.

Through its Annual Groundwater Reporting process and consistent with its SNMP, the District collects and compiles groundwater quality data on a semi-annual basis. These data have been analyzed and reported to the RWQCB in the District’s triennial Groundwater Report and thus fulfills the SNMP-required discussion of TDS and nitrate concentrations in groundwater using the following analytical techniques:

- Time-Concentration Plots
- Evaluation of Vertical Variations in Groundwater
- Water Quality Concentration Maps
- Comparison to detections with basin-specific basin plan objectives (BSPOs)

The SNMP also requires analyses and a discussion of the status of recycled water use, stormwater capture projects, and stormwater capture implementation measures. Recycled water and stormwater are discussed in the next section.

Water quality did not change significantly during the period 2017 to 2019. This supports the conclusion in the SNMP that recycled water use would not adversely affect water quality. Nitrate and TDS concentrations have not increased in most wells in the basin. Groundwater quality monitoring will be continued, transitioning from the triennial quality update in the Annual Groundwater Reports to SGMA Annual Reporting (which focuses on groundwater quantity issues but includes progress reporting and new information) and Five-Year Updates.

# 4-WATER SUPPLY AND USE IN ZONE 6

## Water Supply Sources

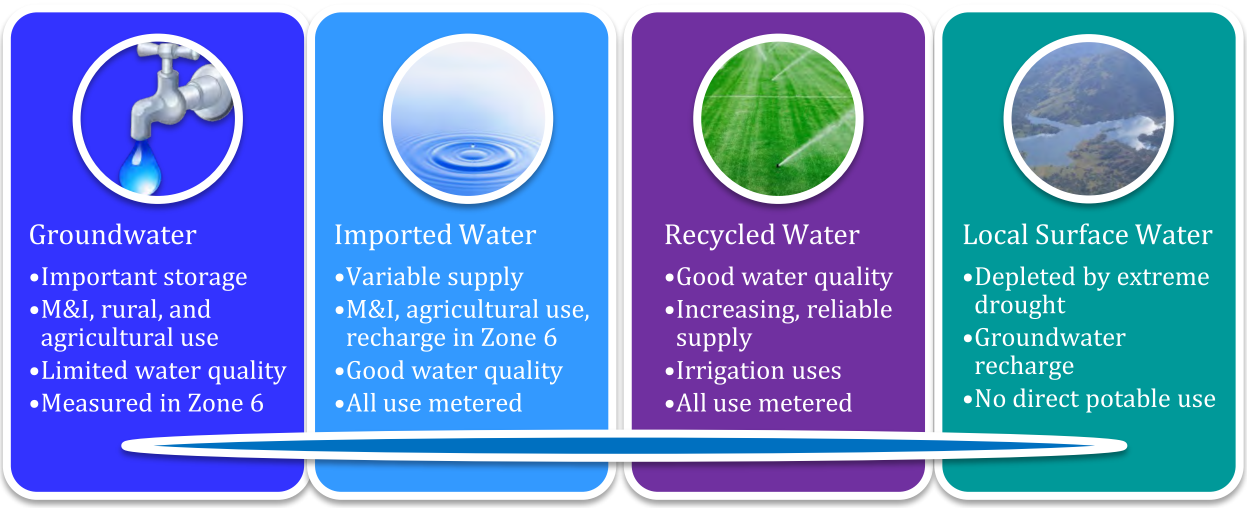
Four major sources of water supply are available for municipal, rural, and agricultural water demands in Zone 6. These are summarized below; for more data and graphs, see **Appendix E.**

**Local Groundwater.** Groundwater is pumped by private irrigation and domestic wells and by public water supply retailers. The District does not directly produce or sell groundwater but has the responsibility and authority to manage groundwater throughout San Benito County.

**Imported Water.** The District purchases Central Valley Project (CVP) water from the U.S. Bureau of Reclamation (USBR) and distributes to customers in Zone 6. Some CVP water has also been released for groundwater recharge. The District has a 40-year contract (extending to 2027 and renewable thereafter) for a maximum of 8,250 AFY of municipal and industrial (M&I) water and 35,550 AFY of agricultural water.

**Recycled Water.** Water recycling began in 2010 with landscape irrigation at Riverside Park. Recycled water currently is provided to selected landscape irrigation and agricultural users. This source is reliable during drought and helps secure a sustainable water supply.

**Local Surface Water.** Surface water is not used directly for potable or irrigation use in the basin, but creek percolation is a significant source of groundwater recharge. Releases from the District's Hernandez and Paicines reservoirs were above average in 2019, significantly contributing to recharge of the groundwater basin. Stormwater capture currently is limited to some diversion by the City of Hollister to the Hollister Industrial WWTP (via a combined sewer system) with subsequent treatment and discharge to percolation and evaporation ponds.



# 4-WATER SUPPLY AND USE IN ZONE 6

## Available Imported Water

The District distributes CVP water to agricultural and M&I customers in Zone 6. The allocation of the contract for each year is variable and contingent on total available supply of the CVP system. In dry years, the allocation may be zero and in wet years, it may be 100 percent of the contract amount. The USBR contract years are March through February, so Water Year 2019 (Oct 2018-Sept 2019) overlapped two contract years. The above average rainfall of this current year resulted in increased allocations for the March 2019-February 2020 contract year. **Table 4-1** shows the contract entitlements and recent allocations for both USBR contract years that overlap Water Year 2019 (SLDMWA 2019).

As shown in **Table 4-1**, USBR contract year 2018 (March 2018 - February 2019) allocations were 50 percent and 75 percent for agricultural users and M&I users respectively. For USBR contract year 2019 (March 2019 - February 2020) allocations were 75 percent and 100 percent for agricultural users and M&I users respectively. Both years were above the average allocations over the past 10 years; from 2010-2019 the average allocations were 42 percent and 62 percent for agricultural users and M&I users respectively.

**Table 4-1. Allocation for USBR Water Years 2018-2019**

| | Contract | % Allocation | Allocation Volume (AF) |
|---|---|---|---|
| Agriculture | 35,550 | 50% | 17,775 |
| M&I | 8,250 | 75% | 6,188 |
| TOTAL | 43,800 | | 23,963 |

March 2019 - February 2020

| | Contract | % Allocation | Allocation Volume (AF) |
|---|---|---|---|
| Agriculture | 35,550 | 75% | 26,663 |
| M&I | 8,250 | 100% | 8,250 |
| TOTAL | 43,800 | | 32,723 |

# 4-WATER SUPPLY AND USE IN ZONE 6

## Reported Water Use

**Table 4-2** shows the total reported water use in Zone 6 by source and user type for Water Years 2018 and 2019. Municipal use is metered. Agricultural CVP water use is recorded and agricultural groundwater use in Zone 6 is estimated using power meters. Independent estimates of total groundwater pumping based on crop type and irrigation rates generally indicate more groundwater use than is reported by the meters. At this time, the Annual Groundwater Report continues to use the reported water use to allow for consistency of analysis from year to year. Actual groundwater pumping in North San Benito Groundwater Basin is considered a data gap and the GSP will identify potential methods to improve assessment of pumping in Zone 6 and throughout the basin.

In Water Year 2019, total water use decreased 25 percent from 2018, returning to volumes similar to 2017. Reported water use decreased for agricultural and M&I customers using CVP and/or groundwater. However, recycled water use increased 21 percent reflecting the District's plan to continue to increase recycled water delivery. **Figure 4-1** shows Zone 6 reported water use by source since 1988. Overall, the graph indicates that water use has a general declining trend since 2013, except for the significant increase in 2018 (attributable in part to increased M&I use of CVP and increased groundwater pumping for agriculture; see 2018 Annual Report). Water conservation that began during the 2013-2015 drought continues to moderate water use in the basin. The graph also shows the general balance between CVP and groundwater use; groundwater represented a large portion of the supply during the drought and following year when CVP water was curtailed. In Water Year 2019, groundwater was 52 percent of the total reported water use, CVP represented 46 percent of supply, and recycled water was 2 percent.

**Figure 4-2** illustrates the use of groundwater and CVP supply in Zone 6 from 1988 to 2019. The top graph shows groundwater reported use in Zone 6, including the increase of groundwater use during the most recent drought and following year (i.e., 2013-2016) when CVP allocations were reduced and a marked decrease in the past three years when CVP allocations were restored. Groundwater use for M&I has decreased as the treatment plant capacity for Hollister and SSCWD has allowed more CVP water to be delivered to M&I customers in the Hollister Urban Area. The bottom graph shows CVP use in Zone 6. Corresponding to the decreased groundwater use, CVP for M&I has increased steadily from 1996 through 2019. In addition, the District has resumed percolation of CVP water in recent years. The graph illustrates the variability of CVP supply due to drought/wet year cycles and other restrictions, notably the decrease after the 2007 Federal Court decision on Delta smelt. In brief, when CVP supply has been reduced, groundwater supply has been available, representing conjunctive management.

**Table 4-2. Total Water Use in Zone 6 by User and Water Source 2018-2019**

| | CVP | | Groundwater | | Recycled Water | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 2018 | 2019 | 2018 | 2019 | 2018 | 2019 | 2018 | 2019 |
| Agriculture | 14,453 | 11,731 | 21,108 | 15,423 | 364 | 461 | 35,925 | 27,616 |
| M&I | 5,679 | 4,457 | 4,748 | 2,660 | 107 | 108 | 10,533 | 7,225 |
| **TOTAL** | **20,131** | **16,188** | **25,856** | **18,083** | **471** | **569** | **46,458** | **34,841** |

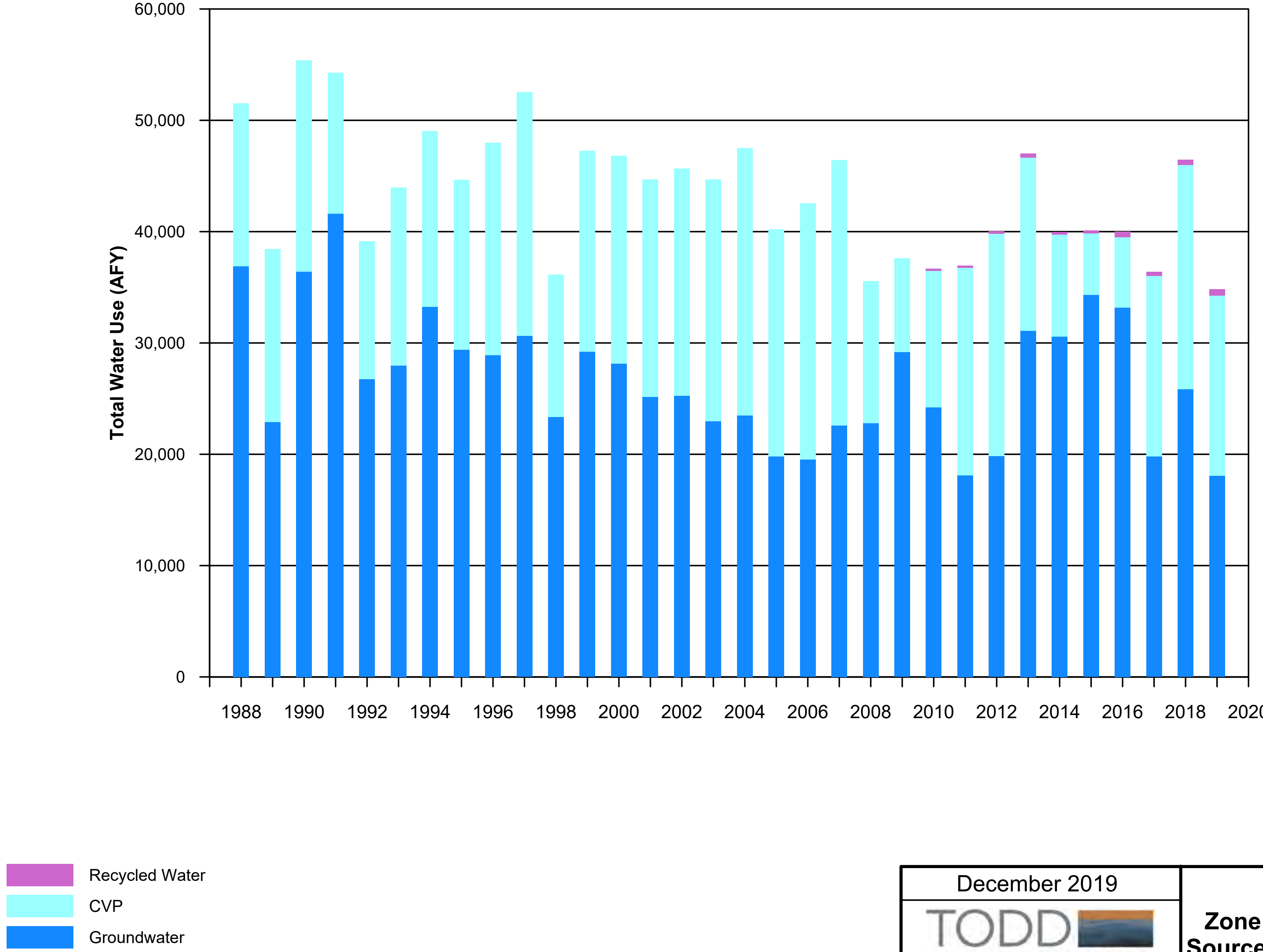



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**Figure 4-1**
**Zone 6 Water Use by Source 1988-2019 (AFY)**

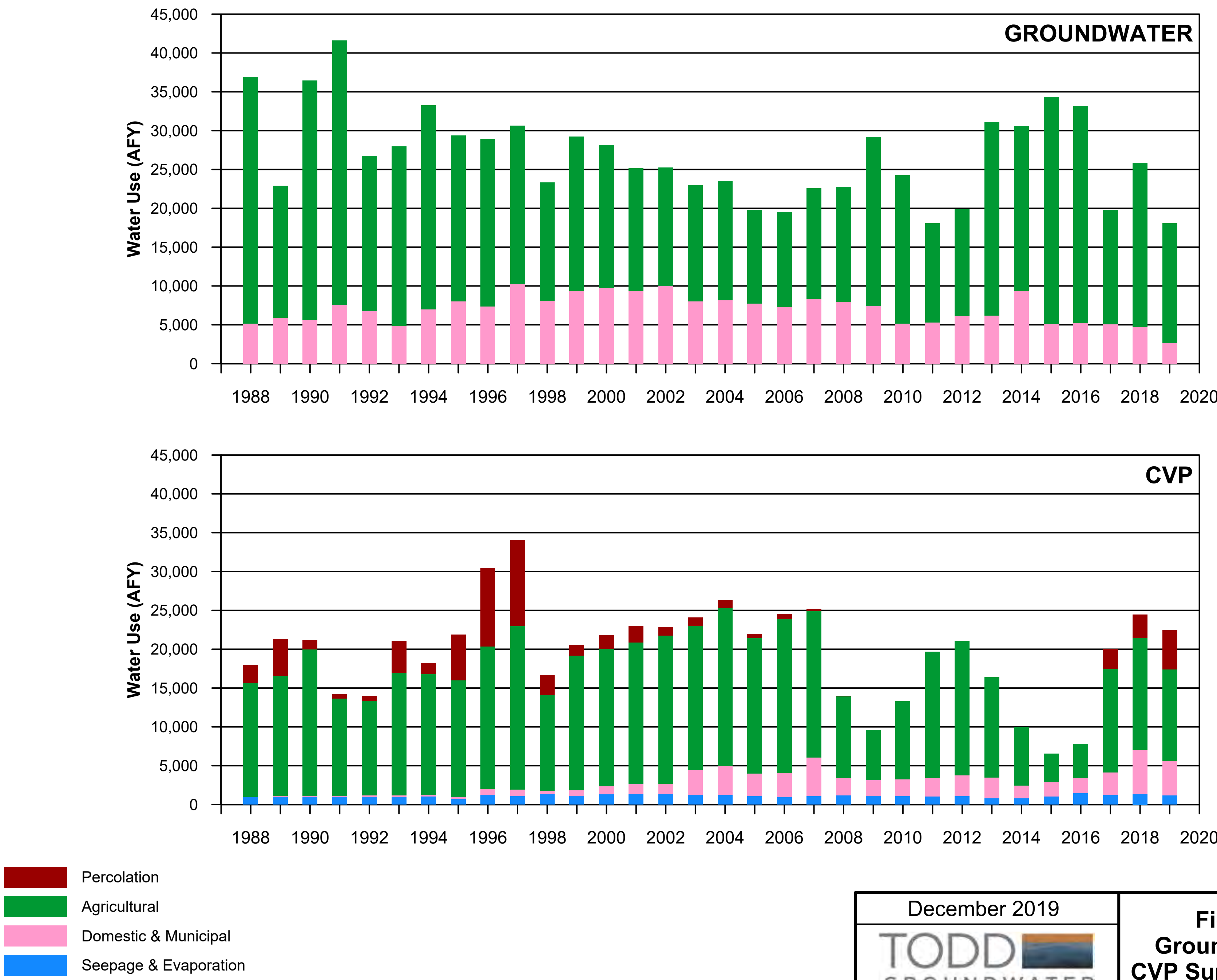




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**Figure 4-2**
**Groundwater and CVP Supply in Zone 6**

**Table 4-3** shows the breakdown of total water use by each subbasin (and management area) in Zone 6. Consistent with past patterns, San Juan is the largest producer of groundwater and the second largest user of CVP supplies, mainly for agricultural irrigation. Hollister East is the largest user of CVP for both agricultural users and municipal uses, reflecting extensive agriculture and the expanded municipal water treatment capacity.

**Table 4-3. Zone 6 Water Use by User and Water Source 2018-2019**

| Management Area | Subbasin | CVP Water | | Groundwater | | Recycled Water | |
|---|---|---|---|---|---|---|---|
| | | Agriculture | Domestic & Municipal[1] | Agriculture | Domestic & Municipal | Agriculture | Domestic & Municipal |
| Hollister | Bolsa South East | 318 | 0 | 2,568 | 0 | 2 | 0 |
| | Hollister East | 5,076 | 4,184 | 2,597 | 205 | 0 | 0 |
| | Hollister West | 252 | 21 | 1,095 | 998 | 459 | 108 |
| | Tres Pinos | 96 | 88 | 180 | 1,013 | 0 | 0 |
| | Pacheco | 2,121 | 41 | 2,717 | 63 | 0 | 0 |
| San Juan | San Juan | 3,867 | 123 | 6,266 | 381 | 0 | 0 |
| TOTAL | | 11,731 | 4,457 | 15,423 | 2,660 | 461 | 108 |

1. Hollister East includes 2,524 AF of CVP water delivered to the West Hills Treatment Plant in San Juan but supplied to Hollister East customers.

**Figure 4-3** shows the municipal water supply for the City of Hollister, SSCWD, San Juan Bautista, and Tres Pinos County Water District. Prior to 2003, the municipal demand was satisfied entirely by groundwater. The completion of Lessalt Water Treatment Plant (WTP) in 2003, the expansion of Lessalt in 2016, and the completion of West Hills WTP in 2018 have significantly increased the use of CVP water for the Hollister and SSCWD municipal systems. In **Figure 4-3**, annual water supply provided through the Lessalt WTP is shown in maroon and West Hills WTP in grey. In 2019, these two treatment plants served over 70 percent of the M&I supply. This ability to maximize CVP use will increase flexibility for local water users to use groundwater or CVP. It also provides better quality water for delivery to municipal customers and result in improved wastewater quality, which supports water recycling.

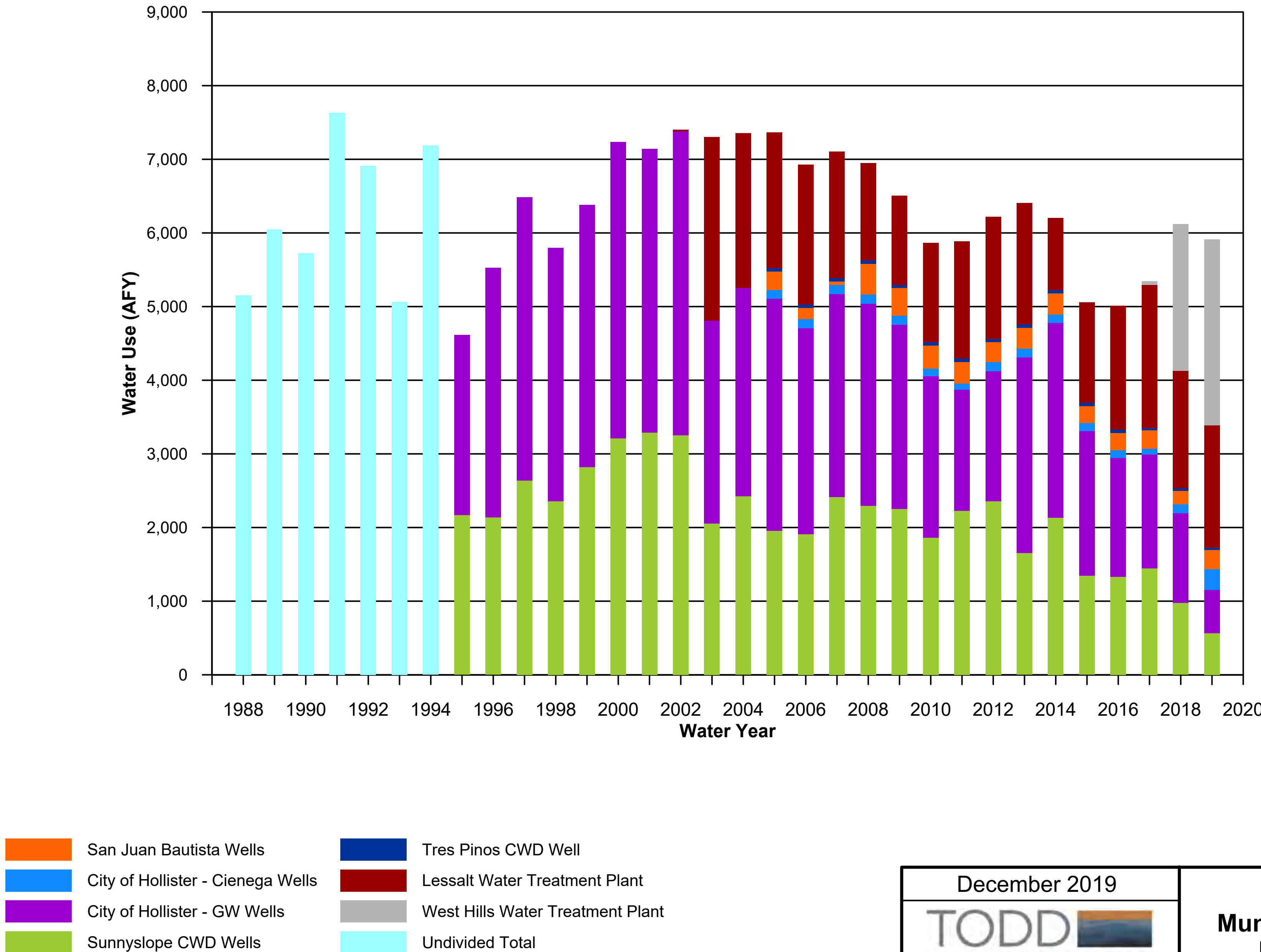




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**Figure 4-3**
**Municipal Supply by Source**

## Difference Between Meters and Model

As noted above, this section addresses Zone 6, where CVP water use for agriculture is measured through the blue valves and groundwater use for agriculture is evaluated through hour meters that measure power use. Municipal use of CVP water is measured; the major municipal providers (Hollister, San Juan Bautista, SSCWD) also measure groundwater production through meters. Groundwater use beyond Zone 6 for agricultural, domestic, and community water supplies generally is not metered.

For comprehensive evaluation of groundwater pumping across the basin (including Zone 6 and beyond), an alternative methodology has been used for development of the basin-wide numerical model and water balance for the GSP. The methodology evaluates groundwater pumping using land use maps and information on the consumptive use of crops and other factors such as rainfall, runoff, and evapotranspiration. This analytical estimate, calculated independently from the hour meters, indicates that groundwater use in the basin is greater than the use observed from hour meters and reported in annual reports. SGMA requires annual reporting of all groundwater extractions (except de minimis pumpers using less than two AFY) using best available measurement methods. Accordingly, the District has identified groundwater pumping amounts as a data gap and as part of the GSP is identifying alternative methods to accurately measure the annual volume of groundwater pumping.

# 5-WATER MANAGEMENT ACTIVITIES

District water management activities include comprehensive monitoring (summarized in Section 2) and importation and distribution of CVP water in Zone 6 (Section 4). In addition, the District provides water resources planning, water conservation support services, and managed percolation of local surface water to augment groundwater; these are summarized in this section. Sources of revenue to support District operations also are presented here.

## Water Resources Planning

The District has used multiple planning efforts to support groundwater sustainability. These have included water management plans such as the Groundwater Management Plan (1998 and 2003), Integrated Regional Water Management Plan (2007) and subsequent updates, Salt and Nutrient Management Plan (2014), Agricultural Water Management Plan (2015), and Urban Water Management Plans (2016). These plans have addressed a range of groundwater sustainability issues with advancement of conjunctive use of imported water, local surface water, recycled water and groundwater; with water conservation, and with protection of water quality. Current efforts and recent accomplishments are summarized below.

**Hollister Urban Area Water Project.** This project is an ongoing collaborative effort with local agencies to provide a secure and stable water supply to the region. The project has involved provision of water treatment for CVP water, which allows its direct use for municipal and industrial (M&I) purposes. It also allows delivery of improved quality water to customers. 2019 continues to see the beneficial effects of the new West Hills WTP and newly expanded Lessalt WTP. The District also has worked cooperatively for years with the City of Hollister to implement recycled water use primarily for agricultural irrigation, which is expected to increase in coming years.

**Pacheco Reservoir Expansion Project.** The District has been collaborating with Santa Clara County Water District and Pacheco Pass Water District on planning and studies related to the Pacheco Reservoir Expansion Project. The reservoir would allow storage of CVP supplies and local flows from the Pacheco Creek watershed. The District is contributing modeling services to evaluate potential impacts on stream flow, steelhead trout migration, and groundwater recharge along Pacheco Creek downstream of the dam. These studies are being conducted concurrently with the GSP, which will address related issues of surface water-groundwater interactions along Pacheco Creek. The analysis is addressing the 1922-2003 period, consistent with CVP operations modeling. This work is in progress and expected to continue into 2020.

**North County Project.** In collaboration with the City of Hollister and Sunnyslope County Water District, the District is proceeding with Phase I of the North County Project. The goal of this phase is to install a new municipal well near the northern part of Hollister. A key objective is to obtain groundwater of relatively high quality (low hardness, TDS and nitrate); the effort will commence with a survey of existing groundwater quality to support selection of two sites for test wells. The work will commence in 2020.

## Water Conservation

Water conservation is an important tool to manage demands on the groundwater basin particularly during drought. Water conservation efforts in San Benito County are conducted through the Water Resources Association (WRA). WRA is a cooperative effort among the District, City of Hollister, City of San Juan Bautista, and Sunnyslope County Water District.

The WRA worked tirelessly during the recent drought (2013-2015 plus 2016 with reduced CVP) to decrease water use and many of these initiatives continue to show results. Water demand for the large municipal retailers has remained lower than 2013 volumes. For example, SSCWD average monthly water use in 2019 was 17.3 percent lower than respective water use in 2013.

Water Conservation continues throughout the basin with activities including provision of information, home surveys, and rebates. To keep the public informed, the WRA has prepared bill inserts that highlight water conservation programs and provide updates on water conditions. The WRA takes an active role in SGMA public workshops educating the public on changes in groundwater management.

In 2019, WRA provided presentations to 28 schools (reaching over 850 students last year) and to local organizations such as the Chamber of Commerce, Association of Realtors, and Rotary Club. WRA also has staffed a booth at the County Fair and at the League of United Latin American Citizens (LULAC) Health Fair, with posters and handouts providing information on local water resources. In addition, print and online articles promoting water conservation have been published in the Free Lance newspaper and Benito Link. The Home Water Survey allows the WRA to directly work with customers who have a leak or large water bill. The WRA has been able to reach approximately 250 people a year with this service.

WRA also provides various rebates (toilets, landscape hardware, etc.) The most popular rebate program is the water softener demolishing/replacement program. With provision of CVP supply for municipal use, the delivered water quality has improved, and customers are willing to abandon unneeded water softeners. This program has the benefit of improving the water quality of municipal wastewater and recycled water.

## Managed Percolation

**Percolation of Local Surface Water.** In most years, local surface water released from Hernandez and Paicines reservoirs is percolated along the San Benito River and Tres Pinos Creek. Releases are managed to maximize percolation along the stream channels of the San Benito River and Tres Pinos Creek and to avoid any losses out of the basin. Hernandez Reservoir releases in 2019 were above average (reflecting the above normal rainfall), amounting to 15,924 AF. Releases from Paicines were 2,045 AF, also above average.

**Percolation of Wastewater.** Wastewater is percolated by the City of Hollister at its Domestic and Industrial plants, by SSCWD at its Ridgemark Facilities, and by Tres Pinos County Water District. Recent changes in operation of the wastewater facilities (including increased water recycling) and decreased municipal water use have decreased the volume percolating to the groundwater. Information about the amount of groundwater recharged from these wastewater facilities is found in **Appendix D**.

**Percolation of CVP Water.** In Water Year 2019, the District percolated 5,043 AF of CVP water in three dedicated off-stream basins; locations are shown in **Figure 5-1. Figure 5-2** shows the volume of CVP recharge by major water way over time. The managed recharge of the imported water was critical in replenishing the basin in the 1980s and 1990s; however, the threat of zebra mussel contamination and low CVP allocations prevented the practice from 2008 to 2016. The District has resumed recharge at dedicated basins adjacent to streams.

## Financial Information

The District derives its operating revenue from charges levied on landowners and water users. Non-operating revenue is generated from property taxes, interest, standby and availability charges, and grants. District zones of benefit are listed in Appendix A. Zone 6 charges, relating to the importation and distribution of CVP water, are the focus of this section.

**Table 5-1** presents the groundwater charges for Zone 6 water users, which reflect costs associated with monitoring and management. A full worksheet of how groundwater charges are determined can be found in **Appendix F**. Groundwater charges are adjusted annually in March. For March 2019 – February 2020, District rates are $12.75 for agricultural use and $38.25 for M&I use. The District adopts rates on a three-year cycle. Current water rates were adopted January 30, 2019.

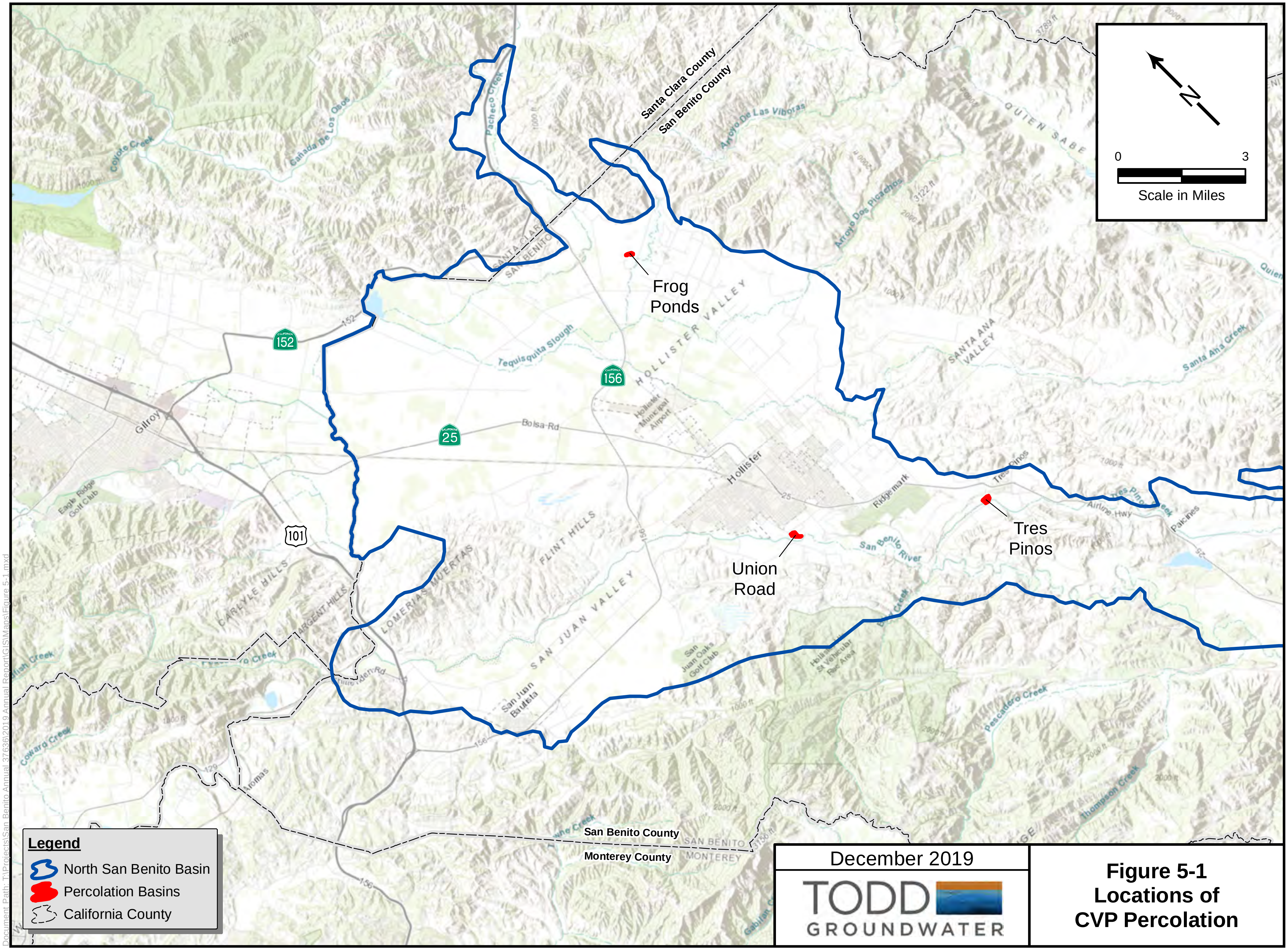


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**Figure 5-1**
**Locations of CVP Percolation**

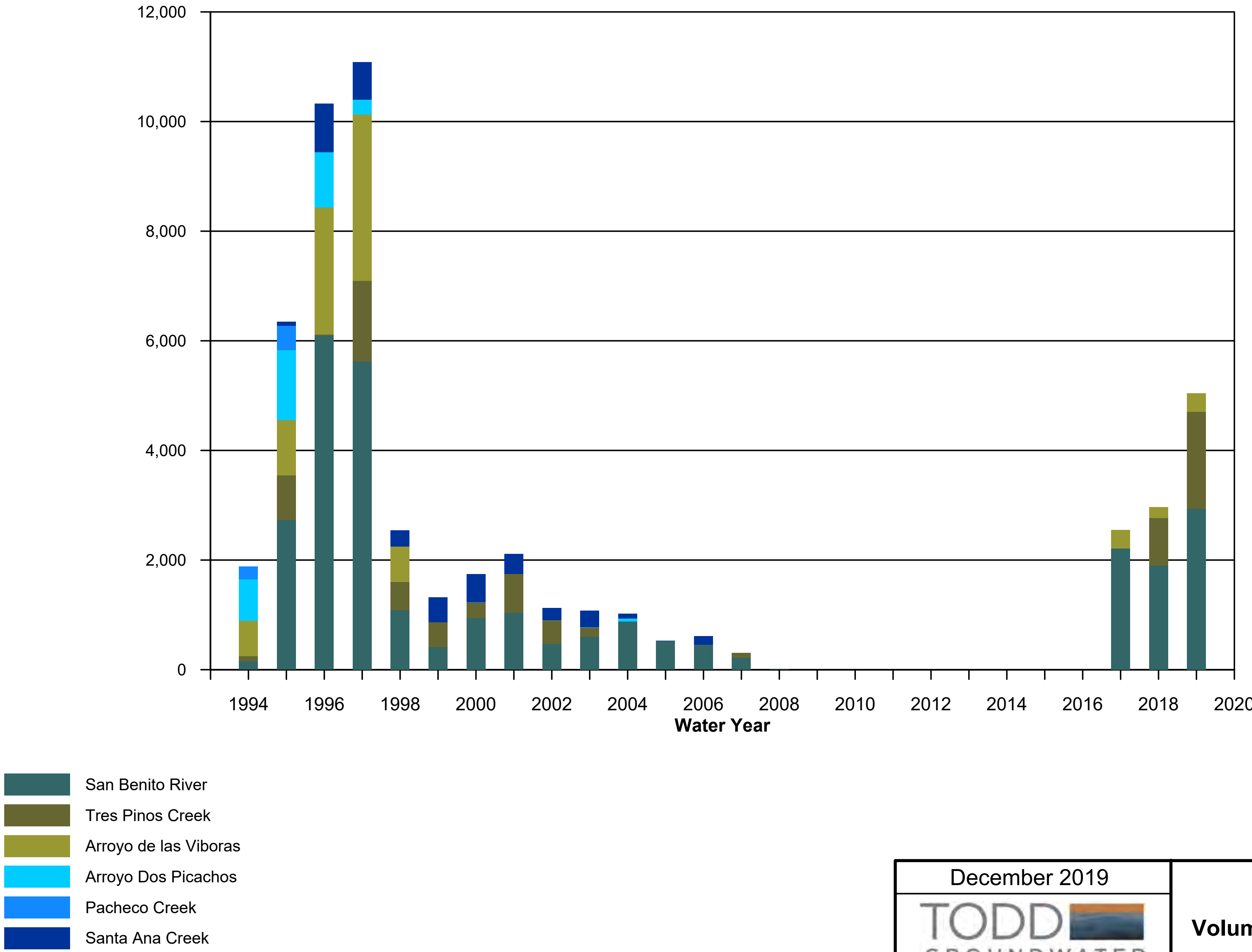




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**Figure 5-2**
**Volume of Percolation**

**Table 5-1. Adopted Groundwater Charges**

| Year | Agriculture ($/AF) | M&I ($/AF) |
|---|---|---|
| 2019-2020 | $12.75 | $38.25 |
| 2020-2021 | $13.15 | $39.40 |

CVP rates (provided by the USBR) include the cost of service, restoration fund payment, charges for maintenance of San Luis Delta Mendota Water Authority facilities, and other fees (the breakdown is found in **Appendix F**). The District's blue valve rates (paid by users of CVP water) include a water charge and a power charge. Additionally, the standby and availability charge is a $6 per-acre charge assessed on all parcels with access to CVP water (an active or idle turnout from the distribution system). **Table 5-2** shows the CVP water charge and **Table 5-3** shows the CVP power charge.

**Table 5-2. Adopted Blue Valve Water Charges**

| | Blue Valve Water Charge ($/AF) | | | |
|---|---|---|---|---|
| | | Agricultural | | |
| Year | Non - Full Cost | Full Cost (1a) | Full Cost (1b) | Municipal & Industrial |
| 2019-2020 | $254.00 | $386.00 | $407.00 | $404.00 |
| 2020-2021 | $265.00 | $400.00 | $421.00 | $415.00 |

**Table 5-3. Adopted Blue Valve Power Charges**

| Blue Valve Power Charge ($/AF) | Subsystem 2 | Subsystem 6H | Subsystem 9L | Subsystem 9H | All other subsystems |
|---|---|---|---|---|---|
| 2019-2020 | $80.45 | $39.30 | $88.15 | $130.30 | $33.70 |
| 2020-2021 | $82.85 | $40.45 | $90.80 | $134.20 | $34.75 |

Recycled water charges (**Table 5-4**) are set to recover current operating and maintenance costs related to the water service. Recycled water rates include those associated with water supply, water quality, and infrastructure.

**Table 5-4. Adopted Recycled Water Charges**

| | Recycled Water ($/AF) | |
|---|---|---|
| Effective | Agriculture Rate | Power Charge |
| Mar-18 | $183.45 | $59.45 |
| Mar-19 | $183.45 | $59.45 |

# 6-GROUNDWATER SUSTAINABILITY

## Sustainable Groundwater Management Act (SGMA)

The Sustainable Groundwater Management Act (SGMA) requires sustainable management of priority groundwater basins and empowers local Groundwater Sustainability Agencies (GSAs) to manage groundwater resources. San Benito County Water District GSA (SBCWD GSA), in partnership with Santa Clara Valley Water District GSA (SCVWD GSA) for small portions of the basin in Santa Clara County, is developing a Groundwater Sustainability Plan (GSP) for the North San Benito Basin, which encompasses the historically-defined Bolsa, Hollister, and San Juan Bautista Subbasins of the Gilroy-Hollister Basin and the Tres Pinos Valley Basin. This GSP is being funded in part with a $830,000 grant from the California Department of Water Resources (DWR) and with GSA cost sharing. **Figure 1-1** shows the GSP area, which is mostly in San Benito County with small portions extending into Santa Clara County.

## Groundwater Sustainability Plan Development

The District began GSP development in 2018 and several draft plan sections are already available to the public through the District's website SBCWD website: [https://www.sbcwd.com/sustainable-groundwater-management/](https://www.sbcwd.com/sustainable-groundwater-management/). These draft sections of the initial GSP include the following.

**Plan Area/Institutional Setting.** The first two sections of the GSP, Introduction and Plan Area, describe the North San Benito Basin and the institutional setting. The *Introduction* presents the North San Benito Basin and the authority of the GSAs to prepare a GSP. The *Plan Area* section provides basic information on the North San Benito Basin including its physical boundaries, jurisdictions of water and land use planning agencies, water sources and water use sectors, existing monitoring and management, land use planning, and well permitting. The public draft of these sections is available on the District's website.

**Hydrogeologic Conceptual Model/Groundwater Conditions.** The hydrogeologic conceptual model is a description of the structural and physical characteristics that govern groundwater occurrence, flow, storage, and quality. These characteristics—described in text, tables, maps, and cross-sections—include regional geology, soils, geologic structures (such as faults) and boundaries (including bottom of the basin), and aquifer properties. The Groundwater Conditions section documents historical and current groundwater conditions including groundwater levels and flow, groundwater quality, land subsidence, and interactions of groundwater and surface water. In brief, these sections describe how the local surface water-groundwater system works. The public draft is available on the District's website.

**Water Budgets.** Currently in preparation, the water budget section quantifies the surface water and groundwater inflows, outflows, and change in storage. Water budgets are provided for historical and current conditions and simulated into the future using the newly updated and expanded numerical model of the basin. Water balances developed by SCVWD for the adjacent Llagas Basin were reviewed to promote a consistent approach. The GSP Water Budget Section discusses sustainable yield and considers potential overdraft. This section also includes the definition of *management areas*, involving subdivision of the North San Benito Basin to facilitate sustainable groundwater management. The public draft of this section will be available on the District's website soon.

## Technical Advisory Committee (TAC)

Development of an effective and credible GSP is a multi-disciplinary process that combines engineering, science, and planning with local stakeholder interests and community values. To help guide this process, a Technical Advisory Committee (TAC) was organized in 2018. The TAC has held six quarterly public meetings to incorporate community and stakeholder interests into the GSP process. The TAC members are responsible for reviewing draft products and materials and providing input to support a technically sound GSP. Members of the TAC have been selected to represent GSP-related subject areas, including but not limited to environmental, technical, and land use planning fields. The TAC members will continue their quarterly meetings working collaboratively with SBCWD GSA staff and consultants throughout the GSP process. Information is provided at https://www.sbcwd.com/community-involvement/.

## Community Engagement

The GSP process seeks to engage the diverse public, stakeholders, and groundwater interests. The first two public workshops were held in Water Year 2019. These workshops focused on:

**Introduction to SGMA and GSPs** – The November 2018 workshop detailed what is required through SGMA and described the District's approach to management. In addition, the first two sections of the GSP (Introduction and Plan Area) were presented. The meeting was well attended and provided a forum for the community to engage and ask questions of the District staff and consultants.

**Hydrogeological Conceptual Model (HCM) and Groundwater Conditions (GW)** – The May 2019 workshop presented the preliminary findings of the HCM and GW. The formal presentation was followed by an informal poster session where District staff and consultants were available to discuss specific findings with the public.

Additional workshops will be scheduled in 2020 to discuss the water budget, sustainability criteria, and possible management actions. Announcements are provided on the website above.

# 6-GROUNDWATER SUSTAINABILITY

## GSP Next Steps

Additional portions of the GSP are currently being discussed and developed, including:

**Sustainability Criteria**. While SBCWD has a long history of groundwater management, such management has not included systematic quantification of undesirable results, minimum thresholds, or measurable objectives to the extent required by SGMA. The GSP process will address the five undesirable results/sustainability indicators relevant to North San Benito Basin and indicated by the icons below. These include: chronic lowering of groundwater levels, groundwater storage depletion, water quality degradation, land subsidence, and depletion of interconnected surface water. Each of these will be defined in terms of minimum thresholds where occurrence of an undesirable result becomes significant and unreasonable and in terms of measurable management objectives.

**Management Actions/Monitoring.** The GSP will present management actions—policies, programs, and projects—that will address the sustainability criteria and provide for sustainable management into the future. This GSP also will establish the GSP monitoring network and protocols that: 1) provide data to inform the hydrogeologic conceptual model, water budget and numerical model, 2) provide tracking and early warning regarding groundwater conditions and undesirable results, and 3) demonstrate progress toward and achievement of sustainability.

**Data Compilation/Data Management System.** SBCWD has an annual program of collecting and compiling groundwater data into a data management system (DMS) that includes groundwater elevation, water quality, and water use data for the Annual Groundwater Reports. The GSP will review and update the DMS, identify data gaps, and support the GSP monitoring program. Available information will support the entire GSP including analysis of the hydrologic setting, groundwater conditions, sustainability criteria, and potential projects and management actions. This process will be ongoing throughout the initial GSP, annual reports, and GSP updates.

**Annual Reporting.** Once the GSP is completed (before January 31, 2022) the SGMA process will continue through annual reporting and through five-year updates. SBCWD has been preparing Annual Groundwater Reports for many decades consistent with the District Act (see **Appendix A**) and it is anticipated that future Annual Reports will be responsive to both SGMA and the District Act. SGMA Annual Reports have specific requirements that include documentation of groundwater levels and storage change and reporting of basin-wide groundwater extraction. Five-year updates are intended mostly to identify new information, to address newly-identified data gaps (and what to do about them), to discuss changed conditions, to consider if changes are needed for any aspect of the GSP (including sustainability criteria), to describe recent management actions and GSP amendments (if any), and to summarize current coordination among local agencies; in other words, to provide an update on how sustainable management is proceeding.

# 7-RECOMMENDATIONS

District policies and programs have served to effectively manage water resources for many years. The District, working collaboratively with other agencies, has eliminated historical overdraft through importation of CVP water, has developed and managed multiple sources of supply to address drought, has established an active and effective water conservation program, has initiated programs to protect water quality, and has improved delivered water quality to many municipal customers. The District also has provided consistent reporting and outreach. The following recommendations are responsive to the District Act and look forward to continuing effective management consistent with SGMA.

## Monitoring Programs

The monitoring programs will be expanded to the entire North San Benito Groundwater Basin and improved to ensure accurate and consistent data for GSP development and the Annual Reports. A network of dedicated monitoring wells would support documentation in the Annual Reports and GSP of groundwater levels and quality. Accurate measurement of groundwater pumping has been identified as a data gap and the GSP includes consideration of different methods to evaluate groundwater pumping. SGMA Annual Reports will need to document groundwater extraction for the entire basin.

## Groundwater Charges

The groundwater charge for the USBR contract year (March 2020-February 2021) is recommended to be $13.15 per AF for agricultural use in Zone 6 and a groundwater charge of $39.40 per AF is recommended for M&I use The District adopts rates on a three-year cycle. Current water rates were adopted January 30, 2019.

## Groundwater Production and Replenishment

Past District percolation operations helped to reverse historical overdraft and then accumulate a water supply reserve. The District currently manages groundwater storage and surface water to minimize excessively high or low groundwater elevations on a temporal and geographic basis. The District should continue to operate Hernandez and Paicines to improve downstream groundwater conditions. In 2018, the District provided off-channel percolation of CVP water; this too should be continued given availability of CVP water and persistence of local low groundwater levels. Basin-wide analysis of opportunities for additional percolation (i.e., managed aquifer recharge) would support development of additional percolation capacity to capture surface water when available. Given the decreased reliability of imported supplies and continuing threat of drought, such replenishment operations are critical to sustainable groundwater supply.

# 8-REFERENCES


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# APPENDIX A REPORTING REQUIREMENTS

## List of Tables

# APPENDIX A REPORTING REQUIREMENTS

The San Benito County Water District Act (1953) is codified in California Water Code Appendix 70. Section 70-7.6 authorizes the District Board of Directors to require the District to prepare an annual groundwater report; this report addresses groundwater conditions of the District and its zones of benefit (**Table A-1**) for the water year, which begins October 1 of the preceding calendar year and ends September 30 of the current calendar year. The Board has consistently ordered preparation of Annual Reports, and the reports have included the contents specified Section 70-7.6:

- An estimate of the annual overdraft for the current water year and for the ensuing water year
- Information for the consideration of the Board in its determination of the annual overdraft and accumulated overdraft as of September 30 of the current year
- A report as to the total production of water from the groundwater supplies of the District and its zones as of September 30 of the current year
- Information for the consideration of the Board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the District and its zones
- The amount of water the District is obligated to purchase during the ensuing water year
- A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the District and its zones during the ensuing water year
- A recommendation as to whether or not a groundwater charge should be levied in any zone(s) of the District in the ensuing water year and if so, a rate per acre-foot for all water other than agricultural water for such zone(s)
- Any other information the Board requires.
- The full text of Appendix 70, Section 70-7.6 through 7.8 is enclosed at the end of this appendix.
- Each water year a special topic is identified for further consideration. These topics have included water quality, salt loading, shallow wells, and others. Additional analyses and documentation provided in previous annual reports are summarized in **Table A-2.**

District management of water resources is focused on three Zones of Benefit, listed below.

**Table A-1. District Zones of Benefit**

| Zone | Area | Provides |
|---|---|---|
| 1 | Entire County | Specific District administrative expenses |
| 3 | San Benito River Valley (Paicines to San Juan) and Tres Pinos River Valley (Paicines to San Benito River) | Operation of Hernandez and Paicines reservoirs and related groundwater recharge and management activities |
| 6 | San Juan, Hollister East, Hollister West, Pacheco, Bolsa SE, and Tres Pinos subbasins | Importation and distribution of CVP water and related groundwater management activities |

**Table A-2. Special Topics in Previous Annual Reports**

# APPENDIX A REPORTING REQUIREMENTS

| Water Year | Additional Analyses and Reporting |
|---|---|
| 2000 | Methodology to calculate water supply benefits of Zone 3 and 6 operations |
| 2001 | Preliminary salt balance |
| 2002 | Investigation of individual salt loading sources |
| 2003 | Documentation of nitrate in supply wells, drains, monitor wells, San Juan Creek |
| 2004 | Documentation of depth to groundwater in shallow wells |
| 2005 | Tabulation of waste discharger permit conditions and recent water quality monitoring results |
| 2006 | Rate study |
| 2007 | Water quality update |
| 2008 | Water budget update |
| 2009 | Water demand and supply |
| 2010 | Water quality update |
| 2011 | Water budget update |
| 2012 | Land use update |
| 2013 | Water quality update |
| 2014 | Water balance update and Groundwater Sustainability |
| 2015 | Groundwater Sustainability – Basin Boundaries and GSAs |
| 2016 | Water quality update |
| 2017 | Water budget update |
| 2018 | GSP Update |
| 2019 | Water quality update |

# APPENDIX A REPORTING REQUIREMENTS

## Water Code Appendix 70 Excerpts

Section 70-7.6. Groundwater; investigation and report: recommendations San Benito County

Sec. 7.6. the board by resolution require the district to annually prepare an investigation and report on groundwater conditions of the district and the zones thereof, for the period from October 1 of the preceding calendar year through September 30 of the current year and on activities of the district for protection and augmentation of the water supplies of the district and the zones thereof. The investigation and report shall include all of the following information:

(a) Information for the consideration of the board in its determination of the annual overdraft.

(b) Information for the consideration of the board in its determination of the accumulated overdraft as of September 30 of the current calendar year.

(c) A report as to the total production of water from the groundwater supplies of the district and the zones thereof as of September 30 of the current calendar year.

(d) An estimate of the annual overdraft for the current water year and for the ensuing water year.

(e) Information for the consideration of the board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the district and the zones thereof for the ensuing water year.

(f) The amount of water the district is obligated to purchase during the ensuing water year.

(g) A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the district and the zones thereof the ensuing water year.

(h) A recommendation as to whether or not a groundwater charge should be levied in any zone or zones of the district during the ensuing year.

(i) If any groundwater charge is recommended, a proposal of a rate per acre-foot for agricultural water and a rate per acre-foot for all water other than agricultural water for such zone or zones.

(j) Any other information the board requires.

(Added by Stats. 1965, c. 1798, p.4167, 7. Amended by Stats.1967,c.934, 5, eff. July27,1967; Stats. 1983, c. 402, 1; Stats. 1998, c. 219 (A.B.2135), 1.)

**Section 70-7.7. Receipt of report; notice of hearing; contents; hearing**

Sec. 7.7. (a) On the third Monday in December of each year, the groundwater report shall be delivered to the clerk of the board in writing. The clerk shall publish, pursuant to Section 6061 of the Government Code, a notice of the receipt of the report and of a public hearing to be held on the second Monday of January of the following year in a newspaper of general circulation printed and published within the district, at least 10 days prior to the date at which the public hearing regarding the groundwater report shall be held. The notice shall include, but is not limited to, an invitation to all operators of water producing facilities within the district to call at the offices of the district to examine the groundwater report.

(b) The board shall hold, on the second Monday of January of each year, a public hearing, at which time any operator of a water-producing facility within the district, or any person interested in the condition of the groundwater supplies or the surface water supplies of the district, may in person, or by representative, appear and submit evidence concerning the groundwater conditions and the surface water supplies of the district. Appearances also may be made supporting or protesting the written groundwater report, including, but not limited to, the engineer's recommended groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4167, 8. Amended by Stats. 1983, c. 02,2; Stats. 1998, c. 219 (A.B.2135,2.)

Section 70-7.8. Determination of groundwater charge; establishment of rates; zones; maximum charge; clerical errors

Sec. 7.8. (a) Prior to the end of the water year in which a hearing is held pursuant to subdivision (b) of Section 7.7, the board shall hold a public hearing, noticed pursuant to Section 6061 of the government Code, to determine if a groundwater charge should be levied, it shall levy, assess, and affix such a charge or charges against all persons operating groundwater- producing facilities within the zone or zones during the ensuing water year. The charge shall be computed at fixed and uniform rate per acre-foot for agricultural water, and at a fixed and uniform rate per acre-foot for all water other than agricultural water. Different rates may be established in different zones. However, in each zone, the rate for agricultural water shall be fixed and uniform and the rate for water other than agricultural water shall be fixed and uniform. The rate for agricultural water shall not exceed one-third of the rate for all water other than agricultural water.

(b) The groundwater charge in any year shall not exceed the costs reasonably borne by the district in the period of the charge in providing the water supply service authorized by this act in the district or a zone or zones thereof.

(c) Any groundwater charge levied pursuant to this section shall be in addition to any general tax or assessment levied within the district or any zone or zones thereof.

(d) Clerical errors occurring or appearing in the name of any person or in the description of the water-producing facility where the production of water there from is otherwise properly charged, or in the making or extension of any charge upon the records which do not affect the substantial rights of the assesse or assesses, shall not invalidate the groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4168, 9. Amended by Stats. 1983, c. 402, 3; Stats.1983, c. 402, 3; Stats. 1998, c. 219 (A.B.2135), 3.)

**Section 70-7.7. Receipt of report; notice of hearing; contents; hearing**

Sec. 7.7. (a) On the third Monday in December of each year, the groundwater report shall be delivered to the clerk of the board in writing. The clerk shall publish, pursuant to Section 6061 of the Government Code, a notice of the receipt of the report and of a public hearing to be held on the second Monday of January of the following year in a newspaper of general circulation printed and published within the district, at least 10 days prior to the date at which the public hearing regarding the groundwater report shall be held. The notice shall include, but is not limited to, an invitation to all operators of water producing facilities within the district to call at the offices of the district to examine the groundwater report.

(b) The board shall hold, on the second Monday of January of each year, a public hearing, at which time any operator of a water-producing facility within the district, or any person interested in the condition of the groundwater supplies or the surface water supplies of the district, may in person, or by representative, appear and submit evidence concerning the groundwater conditions and the surface water supplies of the district. Appearances also may be made supporting or protesting the written groundwater report, including, but not limited to, the engineer's recommended groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4167, 8. Amended by Stats. 1983, c. 02,2; Stats. 1998, c. 219 (A.B.2135,2.)

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(b) The groundwater charge in any year shall not exceed the costs reasonably borne by the district in the period of the charge in providing the water supply service authorized by this act in the district or a zone or zones thereof.

(c) Any groundwater charge levied pursuant to this section shall be in addition to any general tax or assessment levied within the district or any zone or zones thereof.

(d) Clerical errors occurring or appearing in the name of any person or in the description of the water-producing facility where the production of water there from is otherwise properly charged, or in the making or extension of any charge upon the records which do not affect the substantial rights of the assesse or assesses, shall not invalidate the groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4168, 9. Amended by Stats. 1983, c. 402, 3; Stats.1983, c. 402, 3; Stats. 1998, c. 219 (A.B.2135), 3.)

# APPENDIX B CLIMATE DATA

## List of Tables and Figures

**Table B-1. Monthly Precipitation at the SBCWD CIMIS Station (inches)**

| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.12 | 0.01 | 2.21 | 4.38 | 4.52 | 1.56 | 1.33 | 1.32 | 0.00 | 0.01 | 0.00 | 0.00 | 15.46 | 116% |
| 1997 | 0.96 | 3.16 | 4.26 | 6.84 | 0.21 | 0.09 | 0.19 | 0.02 | 0.10 | 0.00 | 0.00 | 0.03 | 15.86 | 119% |
| 1998 | 0.16 | 3.78 | 2.59 | 4.94 | 9.06 | 2.70 | 2.31 | 2.40 | 0.09 | 0.02 | 0.00 | 0.08 | 28.13 | 212% |
| 1999 | 0.54 | 1.93 | 0.79 | 2.54 | 2.49 | 1.52 | 0.67 | 0.06 | 0.07 | 0.00 | 0.00 | 0.00 | 10.61 | 80% |
| 2000 | 0.14 | 0.98 | 0.11 | 4.05 | 4.53 | 0.68 | 0.40 | 0.45 | 0.10 | 0.00 | 0.00 | 0.02 | 11.46 | 86% |
| 2001 | 3.54 | 0.80 | 0.23 | 2.86 | 2.77 | 0.62 | 2.20 | 0.01 | 0.01 | 0.03 | 0.02 | 0.00 | 13.09 | 99% |
| 2002 | 0.70 | 11.48 | 11.93 | 0.66 | 1.15 | 1.57 | 0.37 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 28.14 | 212% |
| 2003 | 0.00 | 1.67 | 5.04 | 0.77 | 1.41 | 1.06 | 3.05 | 0.06 | 0.00 | 0.00 | 0.06 | 0.00 | 13.12 | 99% |
| 2004 | 0.20 | 0.60 | 5.25 | 1.31 | 4.21 | 0.59 | 0.27 | 0.08 | 0.01 | 0.00 | 0.00 | 0.01 | 12.53 | 94% |
| 2005 | 1.95 | 0.54 | 3.46 | 2.49 | 2.89 | 3.42 | 0.83 | 0.64 | 0.43 | 0.00 | 0.00 | 0.04 | 16.69 | 126% |
| 2006 | 0.07 | 0.27 | 3.08 | 1.49 | 1.01 | 4.96 | 1.73 | 0.39 | 0.01 | 0.00 | 0.02 | 0.01 | 13.04 | 98% |
| 2007 | 0.20 | 0.73 | 1.69 | 0.57 | 2.22 | 0.29 | 0.55 | 0.02 | 0.00 | 0.02 | 0.00 | 0.43 | 6.72 | 51% |
| 2008 | 0.71 | 0.67 | 0.92 | 4.56 | 2.06 | 0.09 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9.07 | 68% |
| 2009 | 0.28 | 1.05 | 1.89 | 0.35 | 3.73 | 1.83 | 0.20 | 0.47 | 0.00 | 0.00 | 0.00 | 0.15 | 9.95 | 75% |
| 2010 | 0.50 | 0.02 | 1.31 | 2.29 | 2.19 | 1.74 | 3.44 | 0.61 | 0.00 | 0.01 | 0.00 | 0.00 | 12.11 | 91% |
| 2011 | 0.72 | 1.85 | 2.59 | 1.57 | 2.63 | 2.33 | 0.19 | 0.78 | 0.30 | 0.00 | 0.00 | 0.00 | 12.96 | 98% |
| 2012 | 0.69 | 0.96 | 0.07 | 0.81 | 0.46 | 2.34 | 1.39 | 0.26 | 0.09 | 0.00 | 0.00 | 0.00 | 7.07 | 53% |
| 2013 | 0.01 | 2.23 | 1.15 | 1.35 | 0.64 | 0.46 | 0.30 | 0.02 | 0.01 | 0.00 | 0.03 | 0.10 | 6.30 | 47% |
| 2014 | 0.07 | 0.37 | 0.17 | 0.22 | 1.91 | 1.59 | 0.86 | 0.02 | 0.00 | 0.00 | 0.00 | 0.14 | 5.35 | 40% |
| 2015 | 1.57 | 0.48 | 5.78 | 0.02 | 1.20 | 0.22 | 0.24 | 0.87 | 0.00 | 0.01 | 0.09 | 0.08 | 10.56 | 80% |
| 2016 | 0.22 | 3.65 | 1.58 | 3.98 | 0.57 | 3.72 | 0.79 | 0.05 | 0.08 | 0.08 | 0.06 | 0.10 | 14.88 | 112% |
| 2017 | 1.77 | 2.48 | 3.33 | 4.66 | 6.05 | 1.70 | 1.09 | 0.50 | 0.32 | 0.00 | 0.02 | 0.00 | 21.92 | 165% |
| 2018 | 0.20 | 1.12 | 0.19 | 2.39 | 0.29 | 2.74 | 1.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.26 | 62% |
| 2019 | 0.17 | 2.52 | 1.48 | 2.24 | 4.02 | 2.55 | 0.25 | 1.95 | 0.20 | 0.00 | 0.00 | 0.00 | 15.38 | 116% |
| AVG | 0.65 | 1.81 | 2.55 | 2.39 | 2.59 | 1.68 | 1.00 | 0.47 | 0.08 | 0.01 | 0.01 | 0.05 | 13.28 | 100% |

-The CIMIS value for September 2017 (2.4") includes measurement error due to irrigation overspray. The corrected District value is 0".

-The CIMIS value for February, May, June, and August 2018 (0.8", 2.6", 0.1", 0.03") includes measurement error due to irrigation overspray. The corrected District value is 0.3" for February and 0" for all other months.

-The CIMIS value for October and November 2018 included measurement error due to irrigation overspray. The corrected District value is 0.17" for October and 2.52" for November (WRCC Hollister2 Station)

**Table B-2. Reference Evapotranspiration at the SBCWD CIMIS Station (inches)**

| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 3.88 | 2.24 | 1.22 | 1.48 | 1.88 | 3.67 | 5.10 | 6.06 | 6.73 | 7.39 | 6.68 | 4.71 | 51.04 | 104% |
| 1997 | 3.84 | 1.84 | 1.37 | 1.38 | 2.48 | 4.27 | 5.84 | 7.51 | 7.13 | 7.18 | 6.71 | 5.67 | 55.22 | 112% |
| 1998 | 3.85 | 1.84 | 1.52 | 1.29 | 1.38 | 2.82 | 4.26 | 4.53 | 5.27 | 6.91 | 6.83 | 4.72 | 45.22 | 92% |
| 1999 | 3.51 | 1.73 | 1.52 | 1.54 | 1.84 | 3.01 | 4.72 | 5.80 | 6.66 | 6.92 | 5.91 | 4.67 | 47.83 | 97% |
| 2000 | 4.00 | 1.98 | 1.89 | 1.22 | 1.62 | 3.69 | 5.14 | 6.04 | 6.73 | 6.74 | 6.19 | 4.74 | 49.98 | 102% |
| 2001 | 2.91 | 1.71 | 1.47 | 1.47 | 1.81 | 3.07 | 3.90 | 6.15 | 6.54 | 6.02 | 6.23 | 4.75 | 46.03 | 94% |
| 2002 | 3.51 | 1.91 | 1.24 | 1.53 | 2.26 | 3.66 | 4.21 | 6.37 | 7.05 | 7.24 | 6.14 | 5.39 | 50.51 | 103% |
| 2003 | 3.57 | 1.94 | 1.25 | 1.56 | 1.80 | 3.87 | 3.79 | 6.00 | 6.47 | 7.29 | 6.15 | 5.07 | 48.76 | 99% |
| 2004 | 4.11 | 1.73 | 1.24 | 1.32 | 1.72 | 3.98 | 5.19 | 6.38 | 6.71 | 6.63 | 5.98 | 5.32 | 50.31 | 102% |
| 2005 | 3.08 | 1.69 | 1.44 | 1.30 | 1.69 | 2.95 | 4.38 | 5.74 | 6.36 | 6.86 | 6.13 | 4.55 | 46.17 | 94% |
| 2006 | 3.59 | 2.00 | 1.19 | 1.43 | 2.18 | 2.43 | 3.00 | 5.49 | 6.41 | 7.02 | 5.60 | 4.38 | 44.72 | 91% |
| 2007 | 3.28 | 1.69 | 1.37 | 1.77 | 1.77 | 4.11 | 4.76 | 6.29 | 6.89 | 6.79 | 6.46 | 4.65 | 49.83 | 101% |
| 2008 | 3.48 | 2.21 | 1.44 | 1.25 | 2.03 | 3.76 | 5.17 | 5.97 | 6.88 | 6.74 | 6.31 | 5.00 | 50.24 | 102% |
| 2009 | 3.82 | 1.87 | 1.36 | 1.70 | 1.72 | 3.51 | 4.83 | 5.53 | 6.31 | 7.08 | 6.31 | 5.30 | 49.34 | 100% |
| 2010 | 3.45 | 2.21 | 1.71 | 1.26 | 1.80 | 3.49 | 3.87 | 5.37 | 6.71 | 6.29 | 5.88 | 4.98 | 47.02 | 96% |
| 2011 | 3.02 | 1.86 | 1.05 | 1.59 | 2.05 | 2.71 | 4.43 | 5.34 | 5.99 | 6.56 | 5.74 | 4.64 | 44.98 | 91% |
| 2012 | 3.27 | 1.89 | 1.83 | 1.84 | 2.46 | 3.34 | 4.39 | 6.39 | 6.81 | 6.63 | 6.00 | 4.60 | 49.45 | 101% |
| 2013 | 3.25 | 1.82 | 1.16 | 1.50 | 2.10 | 3.71 | 5.39 | 6.26 | 6.36 | 6.46 | 5.98 | 4.83 | 48.82 | 99% |
| 2014 | 3.51 | 2.02 | 1.80 | 2.08 | 1.85 | 3.58 | 4.89 | 6.83 | 6.61 | 6.43 | 6.02 | 4.74 | 50.36 | 102% |
| 2015 | 3.90 | 1.86 | 1.45 | 1.80 | 2.16 | 4.13 | 5.12 | 5.01 | 6.41 | 6.52 | 6.49 | 5.34 | 50.19 | 102% |
| 2016 | 4.11 | 2.05 | 1.39 | 1.32 | 2.72 | 3.40 | 4.65 | 5.71 | 7.54 | 7.22 | 5.74 | 5.15 | 51.00 | 104% |
| 2017 | 3.40 | 2.11 | 1.47 | 1.55 | 1.76 | 3.73 | 4.45 | 6.29 | 6.82 | 7.62 | 6.03 | 5.16 | 50.39 | 102% |
| 2018 | 4.15 | 1.93 | 1.98 | 1.57 | 2.66 | 3.25 | 4.81 | 5.83 | 7.29 | 7.65 | 6.60 | 5.15 | 52.87 | 107% |
| 2019 | 3.85 | 2.20 | 1.54 | 1.58 | 1.91 | 3.42 | 4.81 | 5.17 | 6.68 | 7.15 | 6.54 | 5.36 | 50.21 | 102% |
| AVG | 3.60 | 1.93 | 1.45 | 1.51 | 1.99 | 3.48 | 4.63 | 5.92 | 6.64 | 6.89 | 6.19 | 4.95 | 49.19 | 100% |

Note: The averages are for the available period of record, 1995 for reference evapotranspiration.

# APPENDIX C HYDROLOGIC DATA

## List of Tables and Figures

| Table C-1. Groundwater Elevations October 2018 through October 2019 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Well Number | Well Depth (feet) | Depth to Top of Screens (feet) | Subbasin | Groundwater Elevations (feet MSL) | | | | |
| | | | | Oct-18 | Jan-19 | Apr-19 | Jul-19 | Oct-19 |
| **Southern Management Area** | | | | | | | | |
| 14-6-14Q | UNK | UNK | Paicines | 617.68 | 630.06 | 632.73 | 616.75 | 634.54 |
| 14-6-35B | UNK | UNK | Paicines | 657.82 | 655.13 | 655.10 | 653.05 | 654.95 |
| 14-6-26K1 | UNK | UNK | Paicines | 635.10 | 634.73 | 637.68 | 634.32 | 642.55 |
| 14-6-26F | UNK | UNK | Paicines | 638.25 | 639.00 | 639.90 | 634.15 | 644.82 |
| 14-6-26H1 | UNK | UNK | Paicines | 608.26 | 634.26 | 638.31 | 629.81 | 640.10 |
| 1536 | UNK | UNK | TPCV | 293.00 | 299.00 | 297.50 | 298.00 | 298.00 |
| 14-6-13B | UNK | UNK | TPCV | 636.43 | 639.68 | 642.43 | 640.38 | 648.16 |
| GRANITE ROCK WELL 1 | UNK | UNK | TPCV | 305.50 | 307.40 | 313.60 | 306.32 | 312.40 |
| GRANITE ROCK WELL 2 | UNK | UNK | TPCV | 315.90 | 318.68 | 338.20 | 327.50 | 337.00 |
| San Justo 5 | UNK | UNK | TPCV | 275.40 | 275.18 | 275.52 | 275.08 | 275.45 |
| 14-7-19G | UNK | UNK | TPCV | NM | NM | NM | NM | 711.34 |
| 14-7-20K | UNK | UNK | TPCV | 711.50 | 715.75 | 716.50 | 712.75 | 719.25 |
| **San Juan Management Area** | | | | | | | | |
| 12-4-17L20 | UNK | UNK | SJ | 118.85 | 122.47 | 122.37 | 123.19 | 120.47 |
| 12-4-18J1 | UNK | UNK | SJ | 122.62 | 124.00 | 127.00 | 123.75 | 123.04 |
| 12-4-20C3 | UNK | UNK | SJ | 109.97 | 106.90 | 113.82 | 113.67 | 111.83 |
| 12-4-21M1 | 250 | UNK | SJ | 142.62 | 145.29 | 144.98 | 141.25 | 142.38 |
| 12-4-26G1 | 876 | 240 | SJ | 154.25 | 156.75 | 157.00 | 155.75 | 148.25 |
| 12-4-34H1 | 387 | 120 | SJ | 156.65 | 167.30 | 175.18 | 147.50 | 151.72 |
| 12-4-35A1 | 325 | 110 | SJ | 174.05 | 188.00 | 195.60 | 169.34 | 172.55 |
| 12-5-30H1 | 240 | UNK | SJ | 204.75 | 205.05 | 205.64 | 206.64 | 206.22 |
| 12-5-30R1 | 199 | 87 | SJ | NM | NM | NM | NM | 366.50 |
| 12-5-31H1 | UNK | UNK | SJ | 198.60 | 204.00 | 210.10 | 194.47 | 199.53 |
| 13-4-03H1 | 312 | 168 | SJ | 156.10 | 165.75 | 172.58 | 147.33 | 149.77 |
| 13-4-4A3 | UNK | UNK | SJ | 188.05 | 189.43 | 193.28 | 192.65 | 191.20 |
| RIDER BERRY | UNK | UNK | SJ | 146.67 | 159.98 | -77.33 | -86.68 | 146.15 |
| **Bolsa Management Area** | | | | | | | | |
| 11-4-25H1 | UNK | UNK | B | 23.70 | 130.79 | 117.58 | 64.20 | 75.30 |
| 11-4-34A1 | 100 | UNK | B | 127.75 | 128.65 | 138.75 | 130.50 | 132.77 |
| 11-5-20N1 | 300 | UNK | B | 71.31 | 111.60 | 112.72 | 59.15 | 68.84 |
| 11-5-21E2 | 220 | 100 | B | 155.00 | 155.00 | 155.00 | 155.00 | 155.00 |
| 11-5-27P2 | 331 | 67 | B | 168.50 | 168.72 | 174.69 | 169.73 | 170.40 |
| 11-5-28B1 | 198 | 125 | B | 168.00 | 168.00 | 168.00 | 168.00 | 168.00 |
| 11-5-28P4 | 140 | 80 | B | 165.00 | 165.00 | 165.00 | 165.00 | 165.00 |
| 11-5-31F1 | 515 | 312 | B | 67.45 | 94.87 | 88.66 | 49.30 | 57.18 |
| 11-5-33B1 | 125 | UNK | B | 169.00 | 169.00 | 169.00 | 169.00 | 169.00 |
| 12-5-05G1 | 500 | 150 | B | NM | NM | NM | NM | 107.07 |
| 12-5-05M1 | UNK | UNK | B | 61.38 | 83.00 | 66.62 | 45.90 | 58.32 |
| 12-5-06L1 | UNK | UNK | B | 145.22 | 146.04 | 149.16 | 145.89 | 147.00 |
| 12-5-07P1 | 750 | 360 | B | 50.00 | 51.00 | 71.00 | 47.20 | 68.00 |
| 12-5-17D1 | 950 | 314 | B | 67.00 | 68.50 | 79.00 | 65.00 | 75.00 |
| **Llagas - SCVWD** | | | | | | | | |
| 11S04E02D008 | UNK | UNK | SCVWD | 142.70 | 160.95 | 162.23 | 137.04 | 146.30 |
| 11S04E02N001 | UNK | UNK | SCVWD | 134.76 | 155.81 | 154.66 | 119.43 | 139.58 |
| 11S04E03J002 | UNK | UNK | SCVWD | 140.40 | 160.35 | 160.82 | 132.06 | 144.86 |
| 11S04E08K002 | UNK | UNK | SCVWD | 145.00 | 159.10 | 163.79 | 151.31 | 152.07 |
| 11S04E10D004 | UNK | UNK | SCVWD | 137.92 | 156.82 | 157.41 | 139.01 | 145.57 |
| 11S04E15J002 | UNK | UNK | SCVWD | 123.06 | NM | NM | 123.79 | 133.15 |
| 11S04E17N004 | UNK | UNK | SCVWD | 144.93 | 159.83 | 163.32 | 151.18 | 151.63 |
| 11S04E21P003 | UNK | UNK | SCVWD | 132.78 | 146.92 | 149.90 | 136.08 | 141.44 |
| 11S04E22N001 | UNK | UNK | SCVWD | 128.03 | 141.80 | 141.18 | 121.94 | 123.96 |
| 11S04E32R002 | UNK | UNK | SCVWD | 121.35 | 133.42 | 131.79 | 117.40 | 120.89 |

| Table C-1. Groundwater Elevations October 2018 through October 2019 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Well Number | Well Depth (feet) | Depth to Top of Screens (feet) | Subbasin | Groundwater Elevations (feet MSL) | | | | |
| | | | | Oct-18 | Jan-19 | Apr-19 | Jul-19 | Oct-19 |
| Hollister Management Area | | | | | | | | |
| 12-5-09M1 | 240 | 105 | BSE | 123.65 | 124.26 | 125.31 | 122.22 | 124.87 |
| 2317 | UNK | UNK | HE | 222.68 | 223.90 | 224.56 | 222.89 | 224.50 |
| 12-5-22C1 | 237 | 102 | HE | 169.68 | 177.49 | 181.72 | 119.62 | 176.00 |
| 12-5-22J2 | 355 | 120 | HE | 199.45 | 191.97 | 193.35 | 192.60 | 192.45 |
| 12-5-23A20 | 862 | 178 | HE | 181.00 | 181.50 | 183.20 | 186.68 | 184.00 |
| 12-5-36B20 | 500 | 430 | HE | 191.03 | NM | 197.14 | 194.75 | 199.23 |
| 12-6-07P1 | 147 | UNK | HE | 240.20 | 243.86 | 248.69 | 244.59 | 243.56 |
| 12-6-18G1 | 198 | 70 | HE | 277.20 | 268.98 | 278.18 | 271.44 | 265.30 |
| 12-6-30E1 | UNK | UNK | HE | 347.54 | 348.10 | 348.80 | 346.83 | 347.90 |
| 13-6-07D2 | UNK | UNK | HE | 337.90 | 338.50 | 338.39 | 334.85 | 338.25 |
| ROSSI 1 | UNK | UNK | HE | 228.97 | 231.23 | 237.38 | 232.00 | 231.60 |
| 12-5-27E1 | 175 | UNK | HW | 198.78 | 202.90 | 204.76 | 200.12 | 201.73 |
| 12-5-28J1 | 220 | UNK | HW | 210.70 | 213.64 | 214.35 | 213.60 | 215.00 |
| 12-5-28N1 | 408 | 168 | HW | 217.66 | NM | 220.48 | 216.16 | 222.66 |
| 12-5-33E2 | 121 | 81 | HW | 211.78 | 213.50 | 214.10 | 215.00 | 216.00 |
| 12-5-34P1 | 195 | 153 | HW | 217.55 | 219.50 | 219.10 | 215.50 | 220.00 |
| 13-5-03L1 | 126 | UNK | HW | 225.60 | 226.55 | 227.00 | 229.80 | 231.00 |
| 13-5-04B | UNK | UNK | HW | 226.80 | 228.21 | 232.48 | 229.73 | 230.35 |
| 13-5-10B1 | UNK | UNK | HW | 215.55 | 216.85 | 217.52 | 216.00 | 220.50 |
| 13-5-10L1 | 252 | 52 | HW | NM | 312.00 | NM | NM | 292.04 |
| 13-5-11E1 | UNK | UNK | HW | 277.30 | 279.25 | 281.38 | 284.79 | 281.68 |
| San Justo 4 | UNK | UNK | HW | 271.38 | 274.70 | 272.55 | 271.05 | 272.10 |
| San Justo 6 | UNK | UNK | HW | 234.16 | 235.37 | 233.65 | 231.79 | 236.15 |
| 11-5-26N2 | 232 | 95 | P | 168.65 | 171.62 | 174.90 | 171.60 | 171.00 |
| 11-5-26R3 | 225 | 65 | P | 177.49 | 181.09 | 185.97 | 183.49 | 188.96 |
| 11-5-35C1 | 180 | UNK | P | 169.70 | 171.21 | 180.00 | 173.27 | 157.52 |
| 11-5-35G1 | 230 | UNK | P | 179.25 | 180.65 | 185.70 | 183.30 | 182.20 |
| 11-5-35Q3 | UNK | UNK | P | 167.78 | 175.10 | 169.87 | 158.89 | 170.00 |
| 11-5-36C1 | 98 | UNK | P | 194.00 | 193.25 | 198.14 | 196.39 | 195.40 |
| 11-5-36M1 | UNK | UNK | P | 180.38 | 181.50 | 187.90 | 184.25 | 183.90 |
| 11-6-31M2 | 188 | 155 | P | 230.98 | 227.25 | 234.13 | 231.31 | 236.52 |
| 12-5-01G2 | 300 | UNK | P | 180.40 | 186.90 | 184.30 | 183.73 | 183.65 |
| 12-5-02H5 | 128 | 42 | P | 176.80 | 177.64 | 184.82 | 180.37 | 182.79 |
| 12-5-02L2 | 170 | UNK | P | 192.42 | 193.72 | 198.55 | 197.29 | 195.05 |
| 12-5-03B1 | 128 | 100 | P | 182.00 | 182.00 | 182.00 | 182.00 | 182.00 |
| 12-6-06K1 | 260 | 16 | P | 260.00 | 260.00 | 260.00 | 260.00 | 260.00 |
| 12-6-06L4 | 235 | 50 | P | 218.12 | 219.90 | 220.51 | 215.00 | 220.40 |
| 13-5-11Q1 | 178 | 61 | TP | NM | NM | NM | NM | 294.37 |
| 13-5-12D4 | UNK | UNK | TP | 234.50 | 249.00 | 252.00 | 239.00 | 229.00 |
| 13-5-12K1 | UNK | UNK | TP | 321.90 | 325.00 | 325.90 | 328.00 | 328.00 |
| 13-5-12N20 | 352 | 301 | TP | 308.32 | 315.44 | 316.75 | 318.75 | 319.63 |
| 13-5-13F1 | 134 | 30 | TP | 323.61 | 333.10 | 335.74 | 333.70 | 334.13 |
| 13-5-13H1 | 252 | 112 | TP | NM | NM | NM | NM | 344.80 |
| 13-5-13J2 | 180 | UNK | TP | 325.24 | 328.22 | 329.35 | 347.25 | 347.08 |
| 13-5-13Q1 | 185 | 44 | TP | NM | NM | NM | NM | 333.00 |
| 13-5-14C1 | UNK | UNK | TP | NM | NM | NM | NM | 293.00 |
| 13-6-19J1 | 340 | 128 | TP | 429.03 | 434.20 | 436.32 | 434.41 | 435.17 |
| 13-6-19K1 | 211 | UNK | TP | 357.50 | 359.75 | 361.08 | 357.75 | 360.84 |
| 13-6-20K1 | UNK | UNK | TP | 426.20 | 424.55 | 427.75 | 426.38 | 429.03 |
| 11-5-13D1 | 125 | UNK | PC | 190.07 | 217.25 | 233.77 | 228.33 | 227.31 |
| 11-5-23R2 | 118 | 43 | PC | NM | NM | NM | NM | 206.68 |
| 11-5-24C1 | 134 | UNK | PC | 207.35 | 205.36 | NM | NM | 212.97 |
| 11-5-24C2 | 165 | 70 | PC | 216.33 | 215.38 | 227.81 | 226.15 | 223.00 |
| 11-5-24L1 | 70 | UNK | PC | 211.75 | 212.68 | 213.39 | 211.15 | 207.63 |
| 11-5-25G1 | 225 | UNK | PC | 210.73 | 210.97 | 210.83 | 213.27 | 208.41 |

UNK - Unknown
NM - Not Monitored

**Table C-2. Groundwater Change Attributes**

| Subbasin | Subbasin Area (Acres) | Average Storativity |
|---|---|---|
| San Juan | 11,708 | 0.05 |
| Hollister West | 6,050 | 0.05 |
| Tres Pinos | 4,725 | 0.05 |
| Pacheco | 6,743 | 0.03 |
| Northern Hollister East | 10,686 | 0.03 |
| Southern Hollister East | 5,175 | 0.03 |
| Bolsa SE | 2,691 | 0.08 |
| Bolsa | 20,003 | 0.01 |

**Table C-3. Groundwater Change in Elevation 2006-2019 (feet)**

| | Average Change in Groundwater Elevation | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subbasin | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| San Juan | 0.9 | (4.5) | 0.3 | (0.7) | (1.4) | (0.9) | 0.0 | (10.7) | (7.9) | (9.4) | (3.6) | 14.6 | 3.5 | (1.7) |
| Hollister West | 3.1 | (1.7) | 3.3 | (1.4) | (1.6) | (0.7) | 2.1 | (5.7) | (17.4) | (3.6) | 0.9 | 6.9 | 9.5 | 6.5 |
| Tres Pinos | 2.5 | (2.3) | 0.7 | 8.1 | (10.5) | 1.0 | 2.5 | (2.5) | (6.7) | (6.7) | (6.0) | 4.4 | 0.9 | 15.0 |
| Pacheco | 1.9 | (4.4) | (1.4) | 8.1 | (6.6) | 1.9 | (4.4) | (3.0) | (7.4) | 1.9 | 3.0 | 8.6 | (2.4) | 1.8 |
| Northern Hollister East | 3.6 | (6.5) | (4.2) | 10.1 | (8.7) | 2.7 | (2.4) | 1.6 | (9.1) | 0.8 | (1.5) | 5.8 | 2.6 | 0.6 |
| Southern Hollister East | 3.3 | (1.5) | 5.5 | 9.4 | 4.9 | (1.9) | (2.2) | (1.1) | (6.9) | 1.6 | 8.1 | 0.5 | 7.2 | 2.4 |
| Bolsa SE | 1.5 | (6.8) | 11.5 | (24.8) | 25.3 | (11.6) | 0.2 | (4.3) | (10.7) | (3.3) | (9.9) | 8.2 | 7.2 | 3.2 |
| Bolsa | 6.8 | (3.3) | 9.0 | (16.9) | 23.2 | (11.2) | 10.7 | (3.4) | (25.6) | 4.6 | (2.9) | 10.6 | (2.6) | (0.6) |

**Table C-4. Groundwater Change in Storage 2006-2019 (acre-feet)**

| | Average Change in Groundwater Storage (AF) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subbasin | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
| San Juan | 510 | (2,626) | 168 | (437) | (811) | (523) | 0 | (6,239) | (4,653) | (5,530) | (2,086) | 8,531 | 2,077 | (1,016) |
| Hollister West | 947 | (510) | 1,001 | (431) | (477) | (198) | 640 | (1,730) | (5,267) | (1,090) | 282 | 2,084 | 2,878 | 1,962 |
| Tres Pinos | 584 | (553) | 169 | 1,913 | (2,485) | 228 | 601 | (586) | (1,574) | (1,579) | (1,427) | 1,034 | 216 | 3,552 |
| Pacheco | 391 | (892) | (275) | 1,639 | (1,335) | 389 | (882) | (597) | (1,490) | 388 | 604 | 1,736 | (488) | 362 |
| Northern Hollister East | 1,167 | (2,087) | (1,350) | 3,253 | (2,798) | 870 | (757) | 528 | (2,918) | 242 | (474) | 1,867 | 818 | 203 |
| Southern Hollister East | 506 | (227) | 846 | 1,457 | 766 | (301) | (339) | (177) | (1,067) | 250 | 1,263 | 72 | 1,123 | 365 |
| Bolsa SE | 333 | (1,458) | 2,478 | (5,338) | 5,443 | (2,508) | 53 | (918) | (2,300) | (719) | (2,139) | 1,767 | 1,543 | 695 |
| Bolsa | 1,358 | (659) | 1,794 | (3,372) | 4,631 | (2,239) | 2,144 | (674) | (5,112) | 915 | (578) | 2,125 | (514) | (112) |

Table C-5. SBCWD Monitoring Well Water Quality Data - Total Dissolved Solids (mg/L)

## See Figure 3-6 for well locations

| | Brian's Nested Well | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | A | B | C | D | E | MW 11 | MW 12 | MW 17 | MW 18 | MW 19 | MW 21 | MW 24 | MW 28 | MW 31 | MW 36 | MW 39 | MW 41 | MW 42 | MW 43 | MW 45 | MW 46 | MW 47 | MW 48 | MW 49 | MW 51 | MW 52 | MW 1202 |
| | Total Dissolved Solids (TDS) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Apr-97 | | | | | | | | | | | 1,500 | 2,300 | | | | | | | | | | | | | | | |
| Aug-98 | | | | | | 1,010 | 1,160 | 600 | 800 | | 1,720 | 2,780 | | | | | | | | 840 | | | | | | | |
| Sep-01 | | | | | | 1,175 | 1,220 | 543 | 810 | 1,168 | 2,100 | 2,482 | 875 | | 1,173 | 852 | 2,135 | 347 | 493 | 845 | 593 | | 1,098 | | | | |
| Oct-01 | | | | | | | | | | | | | | 1,360 | | | | | | | | 2,032 | | | | | |
| Jan-02 | | | | | | 1,156 | 1,292 | 538 | | | | 2,786 | 948 | 1,376 | 1,178 | 816 | 2,032 | 360 | 564 | 836 | 582 | 1,774 | | 1,084 | | | |
| Mar-02 | | | | | | | | | | | | | | | | | | | | | | | 1,078 | | | | |
| Apr-02 | | | | | | 1,180 | 1,266 | 538 | | 1,398 | 1,630 | 538 | 926 | 1,352 | 1,152 | 782 | 1,964 | 368 | 726 | 824 | 582 | 1,760 | 1,090 | 932 | | | |
| Jul-02 | | | | | | 1,216 | 1,216 | 542 | | 1,114 | 1,676 | 2,506 | 926 | 1,386 | 1,170 | 868 | 2,014 | 354 | 724 | 806 | 594 | 1,996 | | 1,078 | | | |
| Oct-02 | | | | | | 1,178 | 1,186 | 570 | | 1,120 | 2,052 | | 926 | 1,326 | 1,178 | 1,014 | | 394 | 532 | 834 | 628 | 1,862 | 1,084 | 1,020 | | | |
| Jan-03 | | | | | | 1,056 | 1,086 | 516 | | 966 | 2,024 | 2,448 | 870 | 1,198 | 1,094 | 838 | 1,970 | 346 | 470 | 768 | 550 | 1,548 | 1,046 | 746 | | | |
| Apr-03 | | | | | | 1,182 | 1,294 | 514 | | 1,140 | 2,072 | 2,736 | 914 | 1,444 | 1,132 | 900 | 2,092 | 362 | 528 | 818 | 598 | 1,892 | 1,076 | 976 | | | |
| Jul-03 | | | | | | 1,244 | 1,312 | 542 | | 1,084 | 1,640 | 2,692 | 950 | 1,376 | 1,180 | 888 | 2,144 | 372 | 546 | 802 | 610 | 2,004 | 856 | 1,004 | | | |
| Aug-03 | | | | | | | | | | | | | | | | 1,000 | | | | | | | | | | | |
| Oct-03 | | | | | | 1,188 | 1,164 | 556 | | 1,110 | 2,110 | 3,064 | 892 | 1,424 | 1,200 | 942 | 2,144 | 394 | 526 | 836 | 628 | 1,888 | 966 | 948 | | | |
| Jan-04 | | | | | | 1,218 | 1,316 | 528 | 774 | | 1,766 | 2,910 | 870 | 1,282 | 1,156 | 844 | 2,074 | 380 | 502 | 798 | | | 1,058 | 902 | | | |
| Nov-04 | | | | | | 1,302 | 1,372 | 544 | 740 | | 1,936 | 3,470 | 946 | 1,336 | 1,202 | 888 | 2,128 | 368 | 540 | 854 | 568 | 2,194 | | 1,012 | | | |
| May-05 | | | | | | 1,168 | 1,308 | 518 | 706 | | 1,574 | 2,250 | 886 | 1,178 | 1,112 | 866 | 2,092 | 374 | 542 | 874 | 580 | 1,964 | | 768 | | | |
| Nov-05 | | | | | | 1,246 | 1,398 | 532 | 774 | 1,114 | 1,874 | 3,544 | 888 | 1,390 | 1,232 | 982 | 2,110 | 386 | 562 | 854 | 590 | 2,208 | 1,034 | 876 | | | |
| Apr-06 | | | | | | 1,184 | | 528 | 818 | | 2,006 | 3,120 | 902 | 1,280 | 1,178 | 922 | 2,076 | 372 | 548 | 902 | 592 | 1,958 | | 904 | | | |
| Oct-06 | | | | | | 1,292 | 1,294 | 666 | 786 | 1,460 | 1,090 | 2,826 | 1,012 | 1,374 | 1,074 | 940 | 1,924 | 440 | 630 | 758 | 628 | 1,772 | 676 | | | | |
| Feb-07 | 2,440 | 1,302 | 1,372 | 1,128 | 1,410 | | | | | | | | | | | | | | | | | | | | | | |
| Apr-07 | | | | | | 1,088 | | 526 | 762 | | | 2,486 | 664 | 1,242 | 1,096 | 980 | 2,030 | 264 | 528 | 780 | 566 | 1,848 | | | | | |
| Nov-07 | | | | | | 882 | | 476 | 616 | | 1,256 | 2,024 | 656 | 900 | 886 | 782 | 1,434 | 316 | 466 | 696 | 512 | 1,414 | | 654 | | | |
| Apr-08 | | | | | | 1,076 | | | | | | | 810 | 970 | | | | 370 | 546 | | 562 | | | | | | |
| May-08 | | | | | | | | | | | 1,462 | 2,528 | | | 1,102 | 872 | | | | 814 | | 1,782 | | | | | |
| Nov-08 | | | | | | 1,064 | | 560 | | | | 3,036 | 856 | 2,152 | 868 | 1,116 | 2,400 | 372 | 568 | 860 | | 1,536 | | 400 | | | |
| Apr-09 | | | | | | 1,112 | 916 | 528 | | | 312 | 2,780 | 848 | 2,068 | 2,428 | 1,100 | 860 | 346 | | 780 | 568 | 1,772 | | 728 | 644 | | |
| Oct-09 | | | | | | 1,024 | 548 | 576 | | 1,092 | 360 | 2,864 | | 2,088 | 848 | 1,444 | 1,040 | 352 | 528 | 656 | 1,008 | 1,436 | | | 656 | 768 | |
| Nov-09 | 1,136 | 1,140 | 1,160 | 1,108 | 1,148 | | | | | | | | | | | | | | | | | | | | | | |
| Apr-10 | | | | | | 955 | 955 | 555 | | 422 | 343 | 1,783 | 850 | 2,032 | 330 | | | 363 | | 815 | | 1,812 | | 688 | 695 | 794 | |
| Oct-10 | 1,105 | 887 | | 1,000 | 753 | 1,168 | | 528 | | 967 | 352 | 2,683 | 335 | 1,928 | | 1,057 | | 368 | 528 | 815 | 572 | 1,215 | | | 703 | 843 | |
| Apr-11 | | | | | | 1,192 | 1,168 | 524 | | 944 | 348 | 2,752 | 868 | 1,784 | 732 | 1,120 | | 376 | 532 | 560 | 848 | 1,600 | | 660 | 704 | 764 | |
| Jun-11 | 772 | 1,028 | 644 | 2,764 | 724 | | | | | | | | | | | | | | | | | | | | | | |
| Nov-11 | | | | | | | | 532 | | 932 | | | 848 | 1,648 | | | | 368 | 468 | 796 | 548 | | | 232 | 320 | 704 | |
| Dec-12 | | | | | | 1,096 | 1,580 | 516 | | | 288 | 1,348 | 824 | 1,648 | 720 | | | 376 | 508 | 892 | 512 | 1,760 | | | 788 | 1,032 | |
| Jun-13 | 796 | 600 | 624 | 936 | 2,784 | 1,124 | | 500 | | | 348 | 2,444 | 1,028 | 1,820 | 480 | 964 | | 368 | 520 | | | | | 1,028 | 712 | 840 | |
| Dec-13 | | | | | | 1,012 | | 524 | | | | 2,520 | 320 | 1,704 | | 916 | | | 536 | 800 | 544 | 1,344 | | 552 | 708 | 744 | |
| Jan-14 | 928 | 792 | 992 | 1,112 | 2,868 | | | | | | | | | | | | | | | | | | | | | | |
| May-14 | 808 | 568 | 1,004 | 1,564 | 2,880 | 1,208 | 1,232 | 536 | | | 352 | 2,756 | 712 | 1,720 | | 912 | | 388 | 556 | 856 | | | | 540 | 840 | | |
| Nov-14 | 900 | 820 | 888 | 1,816 | 2,880 | | | 548 | | | | 2,904 | 704 | 2,000 | | | | 1,484 | 532 | 876 | 1,212 | | | | 724 | 740 | |
| May-15 | 916 | 812 | 856 | 1,696 | 2,860 | 1,160 | 1,204 | 560 | | | 356 | | 708 | 1,960 | | 992 | | 798 | | 868 | | | | | | 900 | |
| May-16 | 832 | 652 | 520 | 1,592 | 2,788 | 1,152 | 2,276 | 540 | | 960 | 332 | 1,184 | 1,252 | 1,696 | | 1,192 | | 420 | | | 564 | | | | 720 | 1,304 | |
| Nov-16 | | | | | | | | 536 | | | 316 | 2,840 | 656 | | | 1,412 | | 1,900 | 484 | | | 1,328 | | | 676 | 684 | |
| Nov-17 | | | | | | 1,616 | | 520 | | | 328 | 2,496 | 2,496 | 1,572 | | 1,380 | | 632 | 520 | 788 | 520 | 1,376 | | | 680 | 656 | |
| Feb-18 | | | | | | | | | | | | | 240 | | | | | | | | | 1,300 | | | | | |
| Jun-18 | | | | | | 1,500 | 1,300 | 530 | | 1,000 | 350 | 1,600 | 240 | 1,200 | | 1,200 | | 1,600 | 510 | | 540 | 1,200 | | | | 740 | 1,700 |
| Nov-18 | | | | | | 1,200 | 1,300 | | | 960 | 330 | 1,700 | 250 | 1,700 | | 1,300 | | | 490 | | 540 | 1,300 | | 720 | | | 820 |
| Dec-18 | 850 | 540 | 660 | 1,300 | 2,700 | | | | | | | | | | | | | | | | | | | | | | |
| May-19 | | | | 1,200 | | 1,300 | | 540 | | 990 | 340 | 1,700 | 300 | 2,100 | | 1,300 | | 5,600 | 640 | | 560 | 1,300 | | | | | 1,900 |
| Jun-19 | 920 | 540 | 630 | | 1,700 | | | | | | | | | | | | | | | | | | | | 730 | 400 | |

Note: Shading indicates values that exceed water quality goals (light green > 500 mg/L and dark green > 1,000 mg/L)

**Table C-6. SBCWD Monitoring Well Water Quality Data - Nitrate as NO3 (mg/L)**

## See Figure 3-6 for well locations

| | Brian's Nested Well | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Date | A | B | C | D | E | MW 11 | MW 12 | MW 17 | MW 18 | MW 19 | MW 21 | MW 24 | MW 28 | MW 31 | MW 36 | MW 39 | MW 41 | MW 42 | MW 43 | MW 45 | MW 46 | MW 47 | MW 48 | MW 49 | MW 51 | MW 52 | MW 1202 |
| | | | | | | | | | | | | | | NITRATE (AS NO3) | | | | | | | | | | | | | |
| Apr-97 | | | | | | | | | | | 32 | 170 | | | | | | | | | | | | | | | |
| Aug-98 | | | | | | | 7 | 6 | 12 | | 46 | 220 | | | | | | | | 16 | | | | | | | |
| Sep-01 | | | | | | 15 | 14 | 3 | 17 | 16 | 83 | 228 | 2 | | 8 | 15 | 4 | 31 | 3 | 24 | 3 | | 12 | | | | |
| Oct-01 | | | | | | | | | | | | | | 57 | | | | | | | | 86 | | | | | |
| Jan-02 | | | | | | 21 | 13 | 2 | | | | 242 | 2 | 53 | 8 | 12 | 2 | 30 | 2 | 20 | 2 | 124 | | 106 | | | |
| Mar-02 | | | | | | | | | | | | | | | | | | | | | | | 32 | | | | |
| Apr-02 | | | | | | 19 | 13 | 3 | | 80 | 33 | 3 | 3 | 53 | 7 | 10 | 3 | 28 | 3 | 21 | 3 | 114 | 10 | 112 | | | |
| Jul-02 | | | | | | 17 | 14 | 3 | | 15 | 37 | 199 | 3 | 54 | 9 | 16 | 3 | 30 | 3 | 24 | 3 | 122 | | 111 | | | |
| Oct-02 | | | | | | 20 | 18 | 2 | | 15 | 80 | | 3 | 55 | 9 | 16 | | 35 | 3 | 28 | 3 | 129 | 13 | 112 | | | |
| Jan-03 | | | | | | 17 | 17 | 4 | | 4 | 66 | 336 | 4 | 56 | 11 | 13 | 4 | 35 | 4 | 22 | 4 | 122 | 13 | 104 | | | |
| Apr-03 | | | | | | 21 | 20 | 3 | | 11 | 83 | 327 | 4 | 69 | 9 | 12 | 3 | 36 | 3 | 27 | 3 | 114 | 13 | 116 | | | |
| Jul-03 | | | | | | 20 | 17 | 3 | | 3 | 37 | 108 | 3 | 57 | 7 | 15 | 3 | 33 | 3 | 22 | 3 | 123 | 3 | 98 | | | |
| Aug-03 | | | | | | | | | | | | | | | | 19 | | | | | | | | | | | |
| Oct-03 | | | | | | 19 | 18 | 3 | | 5 | 75 | 228 | 3 | 53 | 8 | 14 | 3 | 33 | 4 | 25 | 3 | 120 | 8 | 94 | | | |
| Jan-04 | | | | | | 15 | 15 | 2 | 24 | | 33 | 513 | 2 | 44 | 13 | 14 | 5 | 31 | 3 | 22 | | | 17 | 81 | | | |
| Nov-04 | | | | | | 16 | 19 | 2 | 8 | | 61 | 259 | 2 | 44 | 5 | 7 | 2 | 35 | 2 | 20 | 2 | 101 | | 82 | | | |
| May-05 | | | | | | 21 | 24 | 2 | 10 | | 45 | 161 | 2 | 44 | 6 | 9 | 2 | 34 | 3 | 24 | 3 | 110 | | 88 | | | |
| Nov-05 | | | | | | 19 | 23 | 3 | 14 | 9 | 57 | 321 | 4 | 47 | 7 | 10 | 3 | 33 | 3 | 23 | 4 | 103 | 11 | 78 | | | |
| Apr-06 | | | | | | 24 | | 4 | 24 | | 82 | 393 | 4 | 63 | 12 | 12 | 4 | 43 | 3 | 35 | 4 | 120 | | 94 | | | |
| Oct-06 | | | | | | 22 | 18 | 5 | 22 | 76 | 47 | 501 | 3 | 53 | 8 | 14 | 4 | 35 | 4 | 25 | 5 | 140 | 14 | | | | |
| Feb-07 | 5 | 1 | 7 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| Apr-07 | | | | | | 20 | | 2 | 14 | | | 321 | 2 | 49 | 6 | 10 | 2 | 32 | 3 | 26 | 2 | 98 | | | | | |
| Nov-07 | | | | | | 23 | | 5 | 14 | | 42 | 295 | 4 | 31 | 9 | 12 | 4 | 33 | 3 | 29 | 3 | 128 | | 74 | | | |
| Apr-08 | | | | | | 26 | | | | | | | 5 | 31 | | | | 31 | 4 | | 5 | | | | | | |
| May-08 | | | | | | | | | | | 36 | 225 | | | 17 | 15 | | | | 25 | | 99 | | | | | |
| Nov-08 | | | | | | 26 | | 8 | | | | 332 | 3 | 216 | 20 | 17 | 40 | 42 | 5 | 36 | | 73 | | 6 | | | |
| Oct-09 | | | | | | 30 | 2 | 7 | | 19 | 23 | 3 | | 175 | 8 | 27 | 44 | 32 | 2 | 7 | 12 | 53 | | | 7 | 2 | |
| Nov-09 | 2 | 2 | 2 | 2 | 2 | | | | | | | | | | | | | | | | | | | | | | |
| Apr-10 | | | | | | 19 | 19 | 8 | | 35 | 4 | 3 | 3 | 208 | 3 | | | 41 | | 29 | | 3 | | 65 | 9 | 3 | |
| Oct-10 | 4 | 5 | | 4 | 4 | 30 | | 13 | | 10 | 5 | 301 | 5 | 225 | | 11 | | 39 | 5 | 27 | 4 | 36 | | | 10 | 4 | |
| Apr-11 | | | | | | 29 | 17 | 10 | | 3 | 4 | 230 | 4 | 179 | 10 | 15 | | 36 | 4 | 3 | 24 | 67 | | 44 | 8 | 3 | |
| Jun-11 | 7 | 4 | 4 | 17 | 3 | | | | | | | | | | | | | | | | | | | | | | |
| Nov-11 | | | | | | | | 11 | | 5 | | | 4 | 170 | | | | 33 | 4 | 26 | 4 | | | 4 | 5 | 5 | |
| Dec-12 | | | | | | 18 | 17 | 11 | | | 5 | 23 | 4 | 74 | 9 | | | 24 | 5 | 17 | 5 | 7 | | | 10 | 5 | |
| Jun-13 | 6 | 5 | 6 | 5 | 25 | 28 | | 19 | | | 6 | 180 | 31 | 211 | 9 | 14 | | 36 | 5 | | | | | 31 | 14 | 6 | |
| Dec-13 | | | | | | 30 | | 17 | | | | 283 | 3 | 222 | | 4 | | | 3 | 27 | 3 | 42 | | 30 | 12 | 3 | |
| Jan-14 | 3 | 3 | 3 | 2 | 15 | | | | | | | | | | | | | | | | | | | | | | |
| May-14 | 3 | 3 | 3 | 2 | 18 | 30 | 16 | 18 | | | 2 | 302 | 2 | 212 | | 3 | | 35 | 3 | 24 | | | | 13 | 3 | | |
| Nov-14 | 6 | 6 | 7 | 7 | 18 | | | 13 | | | | 247 | 6 | 205 | | | | 29 | 7 | 21 | 25 | | | | 12 | 7 | |
| May-15 | 5 | 5 | 5 | 8 | 19 | 26 | 18 | 13 | | | 5 | | 5 | 215 | | 5 | | 23 | | 25 | | | | | | 6 | |
| May-16 | 3 | 3 | 3 | 6 | 4 | 29 | 89 | 11 | | 4 | 4 | 38 | 102 | 198 | | 19 | | 17 | 42 | | 4 | | | | 12 | 4 | |
| Nov-16 | | | | | | | | 12 | | | 6 | 302 | 5 | | | | | 34 | 8 | 10 | | 42 | | | 14 | 4 | |
| Nov-17 | | | | | | 63 | | 7 | | | 4 | 240 | 3 | 206 | | 49 | | 36 | 3 | | 3 | 36 | | | 18 | 3 | |
| Feb-18 | | | | | | | | | | | | | 5 | | | 34 | | | | 22 | | 36 | | | | | |
| Jun-18 | | | | | | 42 | 20 | 8 | | 1 | 1 | 155 | 1 | 234 | | | | 34 | 1 | | 1 | 34 | | | | 1 | 93 |
| Nov-18 | | | | | | 26 | | | | 1 | 1 | 168 | 1 | 226 | | 27 | | | 1 | | 1 | 37 | | 9 | | | 19 |
| Dec-18 | 3 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| May-19 | | | | 1 | | 31 | 20 | 6 | | 1 | 1 | 155 | 2 | 243 | | 24 | | 27 | 1 | | 1 | 33 | | | | | 89 |
| Jun-19 | 3 | 1 | 1 | | 1 | | | | | | | | | | | | | | | | | | | | 9 | 8 | |

Note: Shading indicates values that exceed the primary MCL for drinking water

**Table C-7. Water Quality Goals and Standards**

| Constituents of Concern | Units | Drinking Water Standards Maximum Contaminant Levels (MCLs) | | | | Other Standards | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | State Water Resources Control Board | | USEPA | | California DHS | | | RWQCB Basin Plan Water Quality Objectives for Irrigation | |
| | | Primary | Secondary | Primary | Secondary | Public Health Goal (PHG) | Action Level (AL) | Agricultural Water Quality Limits | Irrigation Supply | Livestock Watering |
| **MAJOR CATIONS:** | | | | | | | | | | |
| calcium | mg/L | – | – | – | – | – | – | – | – | – |
| magnesium | mg/L | – | – | – | – | – | – | – | – | – |
| sodium | mg/L | – | – | – | – | – | – | 69 | – | – |
| potassium | mg/L | – | – | – | – | – | – | – | – | – |
| **MAJOR ANIONS:** | | | | | | | | | | |
| chloride | mg/L | – | 250 | – | 250 | – | – | 106 | – | – |
| sulfate | mg/L | – | 250 | 500 | 250 | – | – | – | – | – |
| bicarbonate | mg/L | – | – | – | – | – | – | – | – | – |
| carbonate | mg/L | – | – | – | – | – | – | – | – | – |
| **MINOR IONS:** | | | | | | | | | | |
| hydroxide (as CaCO3) | mg/L | – | – | – | – | – | – | – | – | – |
| iron | mg/L | – | 0.3 | – | 0.3 | – | – | 0.5 | 5 | – |
| manganese | mg/L | – | 0.05 | – | 0.05 | – | 0.5 | 0.2 | 0.2 | – |
| fluoride* | mg/L | 2 | – | 4 | 2 | 1 | – | 1 | 1 | 2 |
| nitrate as NO3 – | mg/L | 45 | – | – | – | – | – | – | – | – |
| nitrate as nitrogen | mg/L | – | – | 10 | – | 10 | – | – | – | – |
| nitrite (NO2 – ) as nitrogen | mg/L | 1 | – | 1 | – | 1 | – | – | – | 10 |
| nitrate + nitrite as nitrogen | mg/L | 10 | – | 10 | – | 10 | – | – | – | 100 |
| **PHYSICAL PROPERTIES:** | | | | | | | | | | |
| apparent color | Color Units | – | 15 | – | 15 | – | – | – | – | – |
| conductivity | | – | 900 | – | – | – | – | 700 | – | – |
| odor | TON@60°C | – | 3 | – | 3 | – | – | – | – | – |
| total alkalinity (as CaCO3) | mg/L | – | – | – | – | – | – | – | – | – |
| total dissolved solids (TDS) | mg/L | – | 500 | – | 500 | – | – | 450 | – | – |
| total hardness (as CaCO3) | mg/L | – | – | – | – | – | – | – | – | – |
| turbidity | NTU | 1/5** | 5 | 1/5** | – | – | – | – | – | – |
| pH | SU | – | – | – | 6.5 to 8.5 | – | – | 6.5 to 8.4 | 5.5 to 8.3 | – |
| **TRACE IONS:** | | | | | | | | | | |
| aluminum | mg/L | 1 | 0.2 | – | 0.050 to 0.2 | 0.6 | – | 5 | 5 | 5 |
| antimony | mg/L | 0.006 | – | 0.006 | – | 0.02 | – | – | – | – |
| arsenic | mg/L | 0.05 | – | 0.01 | – | 0.000004 | – | 0.1 | 0.1 | 0.2 |
| barium | mg/L | 1 | – | 2 | – | 2 | – | – | – | – |
| beryllium | mg/L | 0.004 | – | 0.004 | – | 0.001 | – | 0.1 | 0.1 | – |
| boron | mg/L | – | – | – | – | – | 1 | 0.700/0.750† | 0.5 | 5 |
| cadmium | mg/L | 0.005 | – | 0.005 | – | 0.00004 | 0.00007 | – | 0.01 | 0.05 |
| chromium vi | ug/L | 20 | – | 0.1 | – | 0.02 | – | – | 0.1 | 1 |
| cobalt | mg/L | – | – | – | – | – | – | – | 0.05 | 1 |
| copper | mg/L | 1.3 | – | 1.3 | 1 | 0.3 | – | 0.2 | – | – |
| lead | mg/L | 1.015 | – | 0.015 | – | 0.0002 | – | 5 | 5 | 0.1 |
| lithium | mg/L | – | – | – | – | – | – | – | 2.5 | – |
| mercury | mg/L | 0.002 | – | 0.002 | – | 0.0012 | – | – | – | – |
| molybdenum | mg/L | – | – | – | – | – | – | – | 0.01 | 0.5 |
| nickel | mg/L | 0.1 | – | – | – | 0.012 | – | 0.2 | 0 | – |
| selenium | mg/L | 0.05 | – | 0.5 | – | – | – | 0.002 | – | – |
| silver | mg/L | – | – | – | 0.1 | – | – | – | 0.02 | 0.05 |
| thallium | mg/L | 0.002 | – | 0.002 | – | 0.0001 | – | – | – | – |
| uranium | ug/L | 30 | – | 30 | – | 0.5 | – | – | – | – |
| vanadium | mg/L | – | – | – | – | – | 0.05 | 0.1 | 0.1 | 0.1 |
| zinc | mg/L | – | 5 | – | 5 | – | – | 2 | 2 | 25 |
| **VOCs:** | | – | – | – | – | – | – | – | – | – |
| 1,1,1-trichloroethane | mg/L | 1000 | – | 0.2 | – | 200 | – | – | – | – |
| 1,1,2-trichloro-1,2,2-trifluoroethane | mg/L | 4000 | – | 1.2 | – | 1200 | – | – | – | – |
| 1,1,2-trichloroethane | mg/L | 5 | – | 0.005 | – | 0.3 | – | – | – | – |
| 1,1-dichloroethane | mg/L | 5 | – | 0.005 | – | 3 | – | – | – | – |
| 1,1-dichloroethene | mg/L | 6 | – | 0.006 | – | 10 | – | – | – | – |
| 1,2,3-trichlorobenzene | mg/L | – | – | 0 | – | – | – | – | – | – |
| 1,2,4-trichlorobenzene | mg/L | – | – | 0.005 | – | – | – | – | – | – |
| 1,2-dichlorobenzene | mg/L | 0.5 | – | 0.6 | – | 0.4 | – | – | – | – |
| 1,2-dichloroethane | mg/L | – | – | 0.0005 | – | – | – | – | – | – |
| 1,2-dichloropropane | mg/L | – | – | 0.005 | – | – | – | – | – | – |
| 1,3-dichlorobenzene | mg/L | – | – | 0.6 | – | – | 0.6 | – | – | – |
| chlorobenzene | mg/L | – | – | 0.07 | – | – | – | – | – | – |
| di(2-ethylhexyl)phthalate | mg/L | – | – | 0.004 | – | – | – | – | – | – |

**Table C-7. Water Quality Goals and Standards**

| Constituents of Concern | Units | Drinking Water Standards Maximum Contaminant Levels (MCLs) | | | | Other Standards | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | State Water Resources Control Board | | USEPA | | California DHS | | | RWQCB Basin Plan Water Quality Objectives for Irrigation | |
| | | Primary | Secondary | Primary | Secondary | Public Health Goal (PHG) | Action Level (AL) | Agricultural Water Quality Limits | Irrigation Supply | Livestock Watering |
| dichlorodifluoromethane | mg/L | – | – | 1 | – | – | – | – | – | – |
| PCE | mg/L | – | – | 0.005 | – | – | – | – | – | – |
| TCE | mg/L | 0.005 | – | 0.005 | – | 0.0017 | – | – | – | – |
| trans-1,2-dichloroethene | mg/L | – | – | 0.01 | – | – | – | – | – | – |
| trichlorofluoromethane | mg/L | – | – | 0.15 | – | – | – | – | – | – |
| vinyl chloride | mg/L | 0.5 | – | 0.0005 | – | 0.05 | – | – | – | – |
| **BTEX:** | | | | | | | | | | |
| MTBE | mg/L | – | – | 0.013 | – | – | – | – | – | – |
| Benzene | mg/L | – | – | 0.001 | – | – | – | – | – | – |
| Toluene | mg/L | 150 | – | 0.15 | – | 150 | – | – | – | – |
| Ethylbenzene | mg/L | 300 | – | 0.7 | – | 300 | – | – | – | – |
| Total xylenes | mg/L | 1750 | – | 1.75 | – | 1800 | – | – | – | – |
| **OTHER:** | | | | | | | | | | |
| MBAS (Surfactants) | mg/L | – | 500 | – | 500 | – | – | – | – | – |
| perchlorate | mg/L | 6 | – | – | – | 1 | 0.006 | 0.006 | – | – |

Notes:

All concentrations in milligrams per liter (mg/L) or parts per million (ppm) except where noted.
Dash (– ) indicates no current standard or no available information.
USEPA = U.S. Environmental Protection Agency.
California DHS = California Department of Health Services, now Department of Public Health
MBAS = Methylene Blue Active Substances.
NTU = Nephalometric Turbidity Units.
TON = Threshold Odor Number.
SU = Standard Units
* Optimal fluoride level and (range) vary with average of maximum daily temperature:
50.0 to 53.7 degrees F – 1.2 (1.1 to 1.7) mg/L; 53.8 to 58.3 degrees F – 1.1 (1.0 to 1.7) mg/L
58.4 to 63.8 degrees F – 1.0 (0.9 to 1.5) mg/L; 63.9 to 70.6 degrees F – 0.9 (0.8 to 1.4) mg/L
70.7 to 79.2 degrees F – 0.8 (0.7 to 1.3) mg/L; 79.3 to 90.5 deg

** Systems that use conventional or direct filtration may not exceed 1 NTU at any time or 0.3 NTU for 95th percentile value; systems that use other “alternative” filtration systems may not exceed 5 NTU at any time or 1 NTU for 95th percentile value.

† USEPA recommended agricultural limit for boron is 0.750 mg/L.
References:
Current USEPA and California DHS drinking water standards from California

Table C-8a. List of Regulated Facilities with Recent Water Quality Data

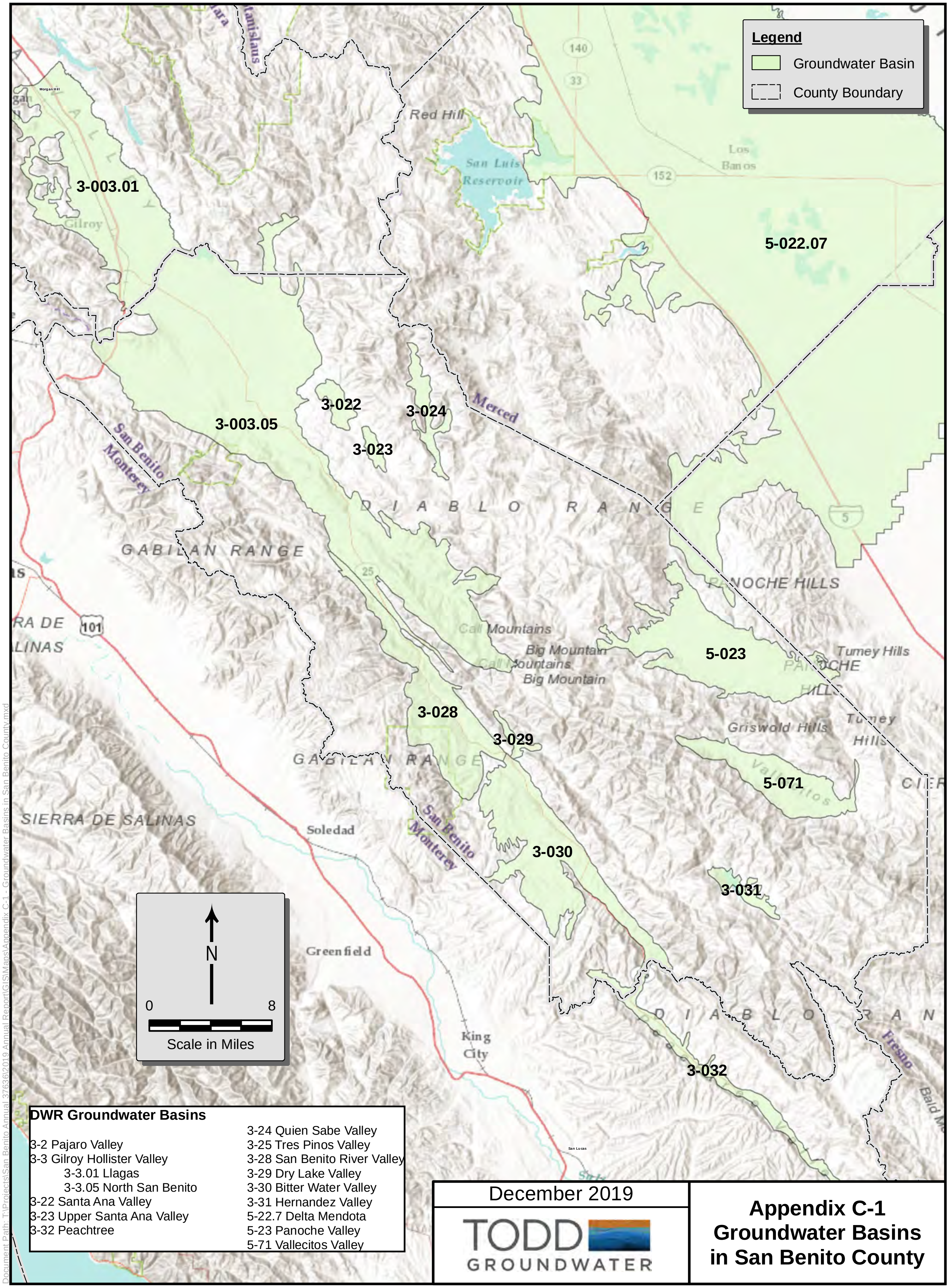
| Name | Current or Former Operations | # of Wells | Potential Water Quality Problems | Order Number | Notes |
|---|---|---|---|---|---|
| Aromas-San Juan USD (Anzar High School) | High school with a wastewater treatment facility | 3 | salinity, nitrogen species | 96-36 | |
| BAE Systems (United Defense) | Ballistics Testing | 64 | perchlorate, nitrogen species | R3-2055-0113 | |
| CEMEX Ready Mix Plant San Juan Bautista | | 2 | | | |
| Chervon 9-1898 | Gas station with a leaking underground storage tank | 10 | | | |
| Chevron 9-9156 | Gas station with a leaking underground storage tank | 1 | BTEX | 00-68 | |
| Cielo Vista Estates | Housing development with a wastewater treatment facility | 3 | TDS, Na, Cl, Nitrogen | | |
| Crop Production Services (Western Farm Service) | Fertilizer and Pesticide storage | 6 | pesticides, nitrogen species, salinity | 01-052 | |
| El Toro | Leaking underground storage tank | 14 | BTEX | | |
| Hollister Domestic WWTP | for the City of Hollister | 13 | salinity, nitrogen species | 87-47 | |
| Hollister Industrial WWTP | Industrial wastewater treatment facility for the City of Hollister | 7 | salinity, nitrogen species | 00-020 | |
| John Smith Landfill | Waste disposal | 19 | organic, inorganic, metals | R3-2002-001 | |
| McCormick Teledyne | Explosive products for the aerospace and automotive safety industries | 38 | perchlorate, nitrogen species, metals, salinity | | |
| MK Ballistics (United Defense) | Ballistics Testing | 9 | perchlorate | CU-06-00123 | |
| NH3 Service Company | Fertilizer and Pesticide storage | 1 | pesticides, nitrogen species, salinity | | |
| PSEMC (former PacSci) | | 11 | | | |
| Sambrailo Packaging | | 6 | BTEX | | |
| San Juan Bautista WWTP | Wastewater disposal | 3 | salinity, nitrogen species | R3-2003-0087 | |
| Sunnyslope WWTP | Wastewater disposal | 3 | salinity, nitrogen species | R3-2004-0065 | |
| Tres Pinos WWTP | Wastewater disposal | 4 | salinity, nitrogen species | 99-101 | |
| Whittaker Ordinance | Manufacturing | 199 | perchlorate | 99-006 | |

**Table C-8b. List of Regulated Facilities with Historical Water Quality Data**

| Name | Current or Former Operations | # of Wells | Potential Water Quality Problems | Order Number | Notes |
|---|---|---|---|---|---|
| Betabel Valley RV Resort | Recreational vehicle camp with a wastewater treatment facility | 2 | salinity, nitrogen species | 88-23 | No recent information |
| Biosystems Management | Biosolids waste disposal | 4 | salinity, nitrogen species, metals | | closed |
| Blossom Hill Winery | Winery | 6 | hardenss, salinity | | |
| Casa De Fruta | Fruit stand/tourist attraction with a wastewater treatment facility | 5 | salinity, nitrogen species | | |
| Chevron 9-1898 | Gas station with a leaking underground storage tank | 9 | BTEX, MTBE | | closed |
| E Ranch Milk | Gas station with a leaking underground storage tank | 23 | BTEX and other organics, pH, EC | 98-68 | |
| El Modeno Gardens | Commercial nursery irrigation runoff | 4 | salinity, nitrogen species | 99-050 | |
| GAF Leatherback Industries Warehouse Facility | Former Saturator | 4 | VOCs, Petroleum products | | Ceased Operations in 2007, RWQCB Site Opened April 2009 |
| Gibson Farms Inc. | Fruit producer (processing wastes) | 1 | salinity, nitrogen species | R3-2004-0066 | |
| Granite Rock Co | Sand and gravel quarry | 6 | turbidity | R3-2005-0063 | |
| Laverone Property (BK Towing) | Leaking underground storage tank | 14 | BTEX | 92-101 | |
| Natural Food Selection/ Earthbound Farms | Fruit and Vegetable processing wastes | 11 | salinity, nitrogen species | R3-2004-006 | |
| Nyland Ranch Warehouse | Leaking underground storage tank | 4 | salinity, boron | | closed |
| PG &E / City of Hollister Fire Department | Leaking underground storage tank | 4 | BTEX | | Closed 7/21/92 |
| Rancho Justo Company | Golf course with domestic wastewater disposal system | 3 | salinity, nitrogen species | | |
| San Juan Bautista City Yard | Underground storage tanks | 6 | BTEX | | No recent information |
| San Juan Oaks Golf Club | Golf course with domestic wastewater disposal system | 2 | salinity, nitrogen species | | |
| TOSCO Facility #3738 | | 3 | BTEX | | Soil samples only |
| Victory Gas and Food | Gas station | 13 | BTEX | | No recent information |
| Wilbur-Ellis | Agricultural products and chemicals marketer and distributor | 3 | salinity, nitrogen species | | |

**Table C-9. Number of Wells with Contaminant Measurements in Each Management Area**

| Contaminant Name | Units | Southern | San Juan | Hollister | Bolsa |
|---|---|---|---|---|---|
| Sodium | MG/L | 4 | 19 | 40 | 2 |
| Chloride | MG/L | 4 | 19 | 41 | 2 |
| Fluoride | MG/L | 0 | 13 | 12 | 2 |
| Iron | UG/L | 6 | 21 | 41 | 2 |
| Manganese | UG/L | 7 | 21 | 41 | 2 |
| Nitrate (As No3) | MG/L | 14 | 26 | 45 | 5 |
| Nitrate + Nitrite (As N) | MG/L | 0 | 12 | 18 | 2 |
| Nitrite (As N) | MG/L | 7 | 23 | 38 | 3 |
| Color | UNITS | 0 | 13 | 20 | 2 |
| Odor Threshold @ 60 C | TON | 0 | 12 | 17 | 2 |
| Specific Conductance | US | 6 | 20 | 40 | 2 |
| Total Dissolved Solids | MG/L | 4 | 20 | 40 | 2 |
| Turbidity, Laboratory | NTU | 0 | 13 | 21 | 2 |
| Antimony | UG/L | 4 | 20 | 37 | 2 |
| Aluminum | UG/L | 4 | 20 | 38 | 2 |
| Arsenic | UG/L | 4 | 20 | 38 | 2 |
| Barium | UG/L | 4 | 20 | 38 | 2 |
| Boron | UG/L | 0 | 6 | 24 | 2 |
| Cadmium | UG/L | 4 | 20 | 37 | 2 |
| Chromium VI | UG/L | 0 | 7 | 16 | 0 |
| Chromium | UG/L | 4 | 20 | 37 | 2 |
| Copper | UG/L | 3 | 18 | 38 | 2 |
| Lead | UG/L | 4 | 15 | 33 | 2 |
| Mercury | UG/L | 4 | 20 | 37 | 2 |
| Nickel | UG/L | 4 | 20 | 37 | 2 |
| Selenium | UG/L | 4 | 20 | 37 | 2 |
| Silver | UG/L | 3 | 15 | 29 | 2 |
| Sulfate | MG/L | 3 | 18 | 41 | 2 |
| Thallium | UG/L | 4 | 20 | 37 | 2 |
| Uranium | UG/L | 3 | 9 | 7 | 0 |
| Zinc | UG/L | 3 | 18 | 39 | 2 |
| Total Trihalomethanes | UG/L | 6 | 9 | 29 | 0 |
| Perchlorate | UG/L | 6 | 14 | 22 | 0 |

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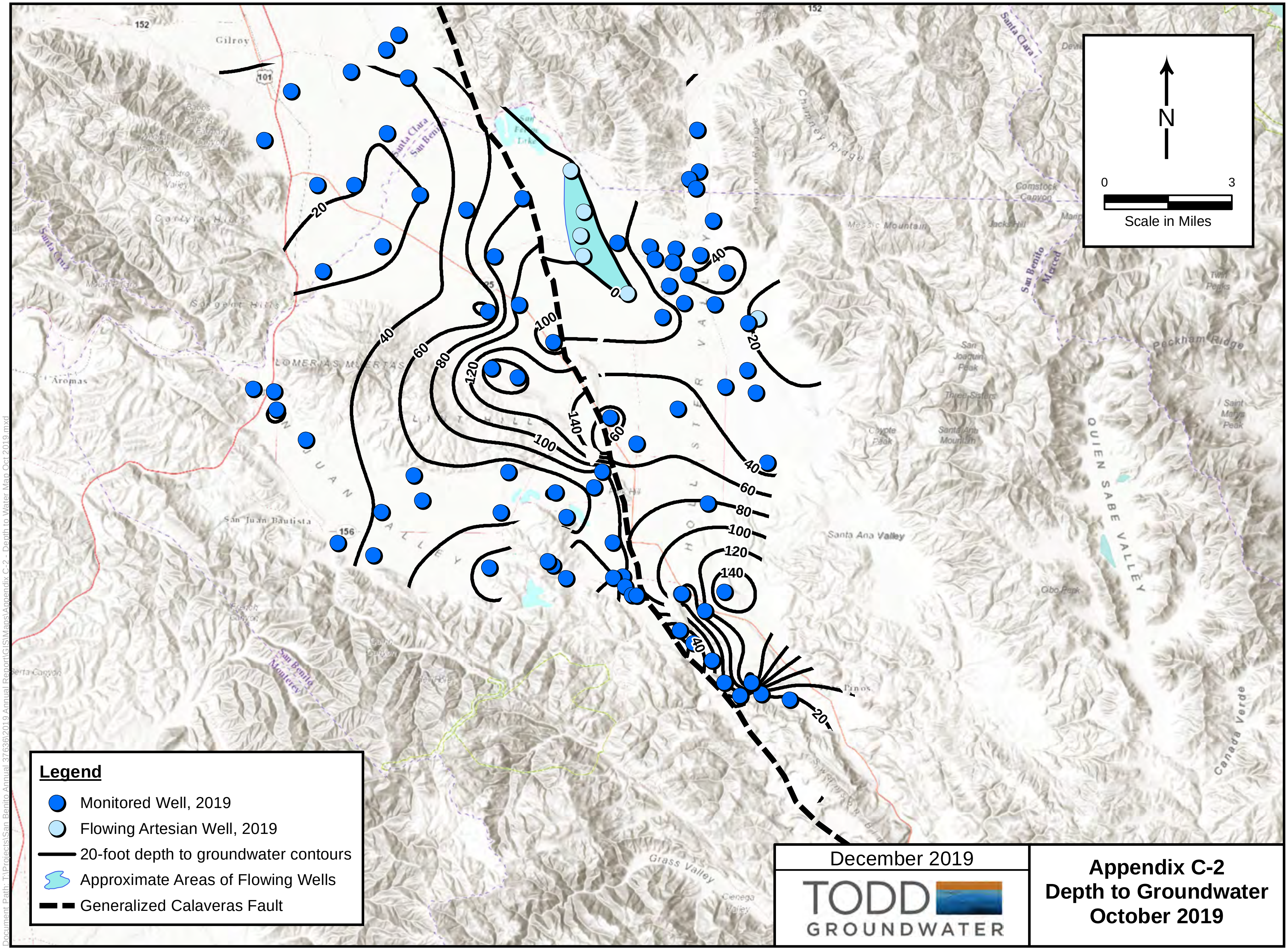
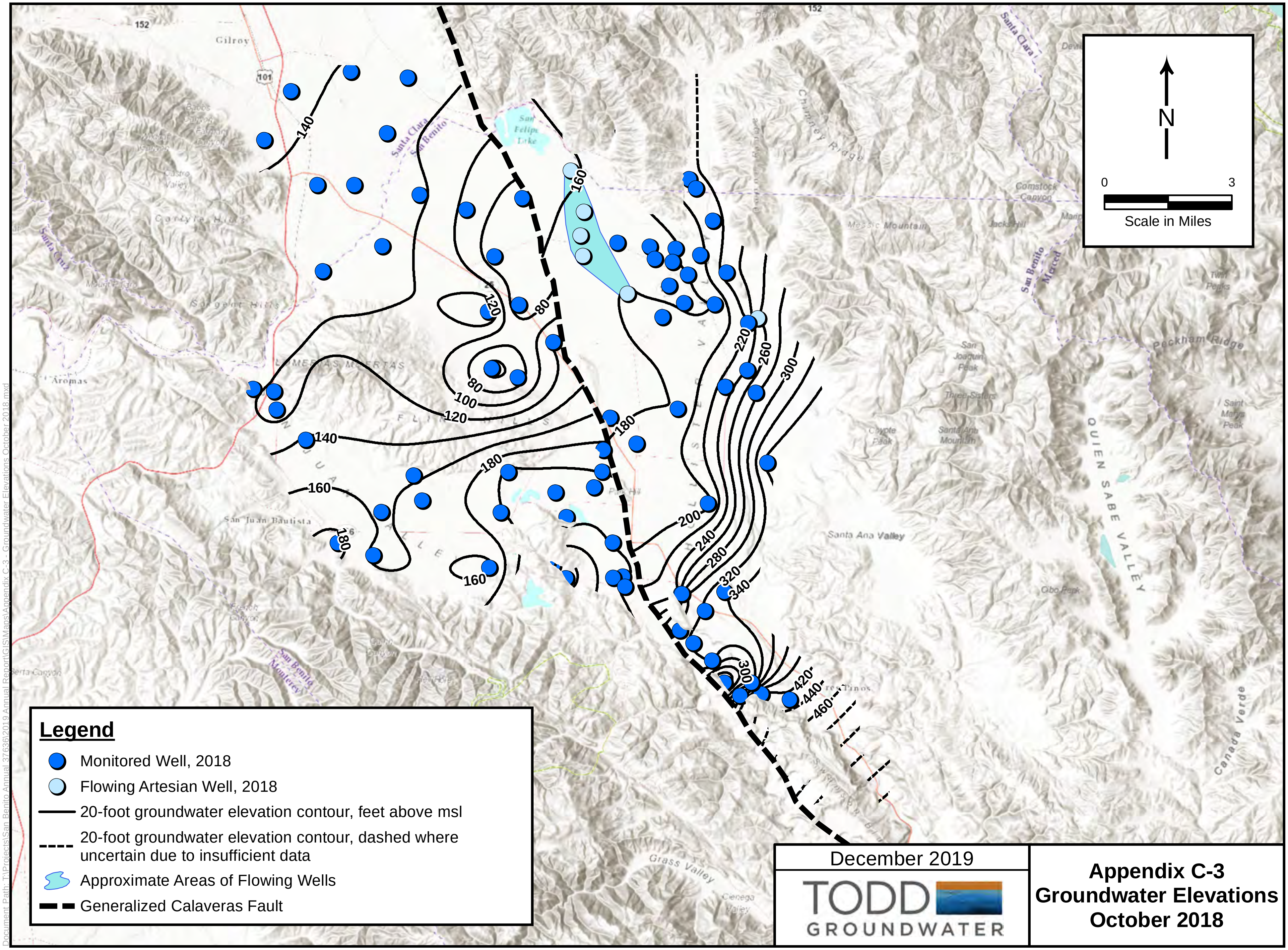
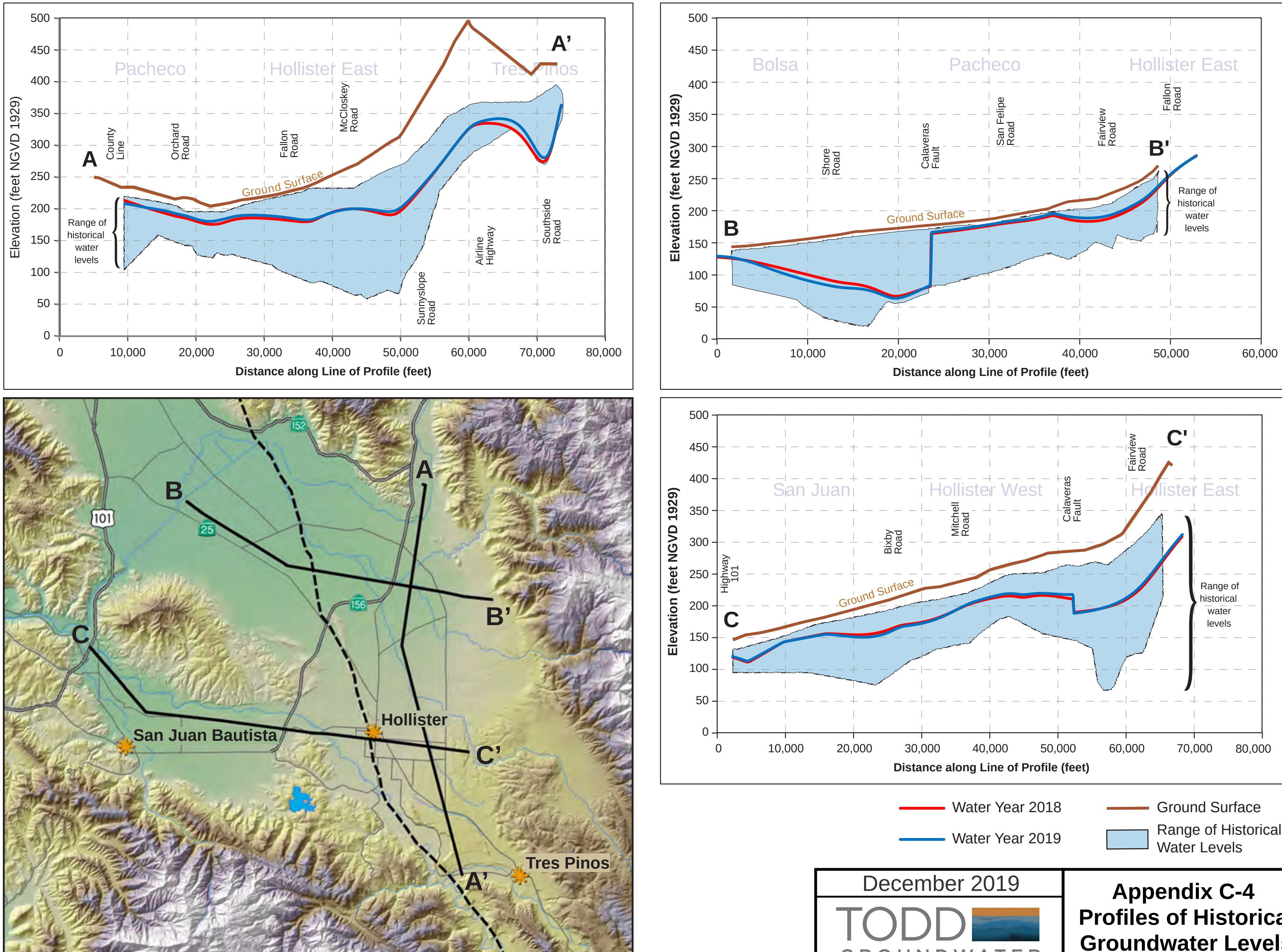
**Appendix C-1**
**Groundwater Basins in San Benito County**



Legend
Monitored Well, 2019
Flowing Artesian Well, 2019
20-foot depth to groundwater contours
Approximate Areas of Flowing Wells
Generalized Calaveras Fault
N
0
3
Scale in Miles
December 2019
TODD GROUNDWATER
Appendix C-2
Depth to Groundwater
October 2019
Gilroy
San Juan Bautista
Aromas
Santa Ana Valley
Quien Sabe Valley
Hollister Valley
San Juan Valley
Lomerias Muertas
Peckham Ridge
Chimney Ridge
Grass Valley



Legend
Monitored Well, 2018
Flowing Artesian Well, 2018
20-foot groundwater elevation contour, feet above msl
20-foot groundwater elevation contour, dashed where uncertain due to insufficient data
Approximate Areas of Flowing Wells
Generalized Calaveras Fault
N
0
3
Scale in Miles
December 2019
TODD GROUNDWATER
Appendix C-3
Groundwater Elevations
October 2018
Gilroy
San Felipe Lake
Aromas
San Juan Bautista
Santa Ana Valley
Quien Sabe Valley
Grass Valley
Chimney Ridge
Peckham Ridge
Lomerias Muertas
140
160
120
80
100
180
200
220
240
260
280
300
320
340
420
440
460
Document Path: T:\Projects\San Benito Annual 37636\2019 Annual Report\GIS\Maps\Appendix C-3 - Groundwater Elevations October 2018.mxd

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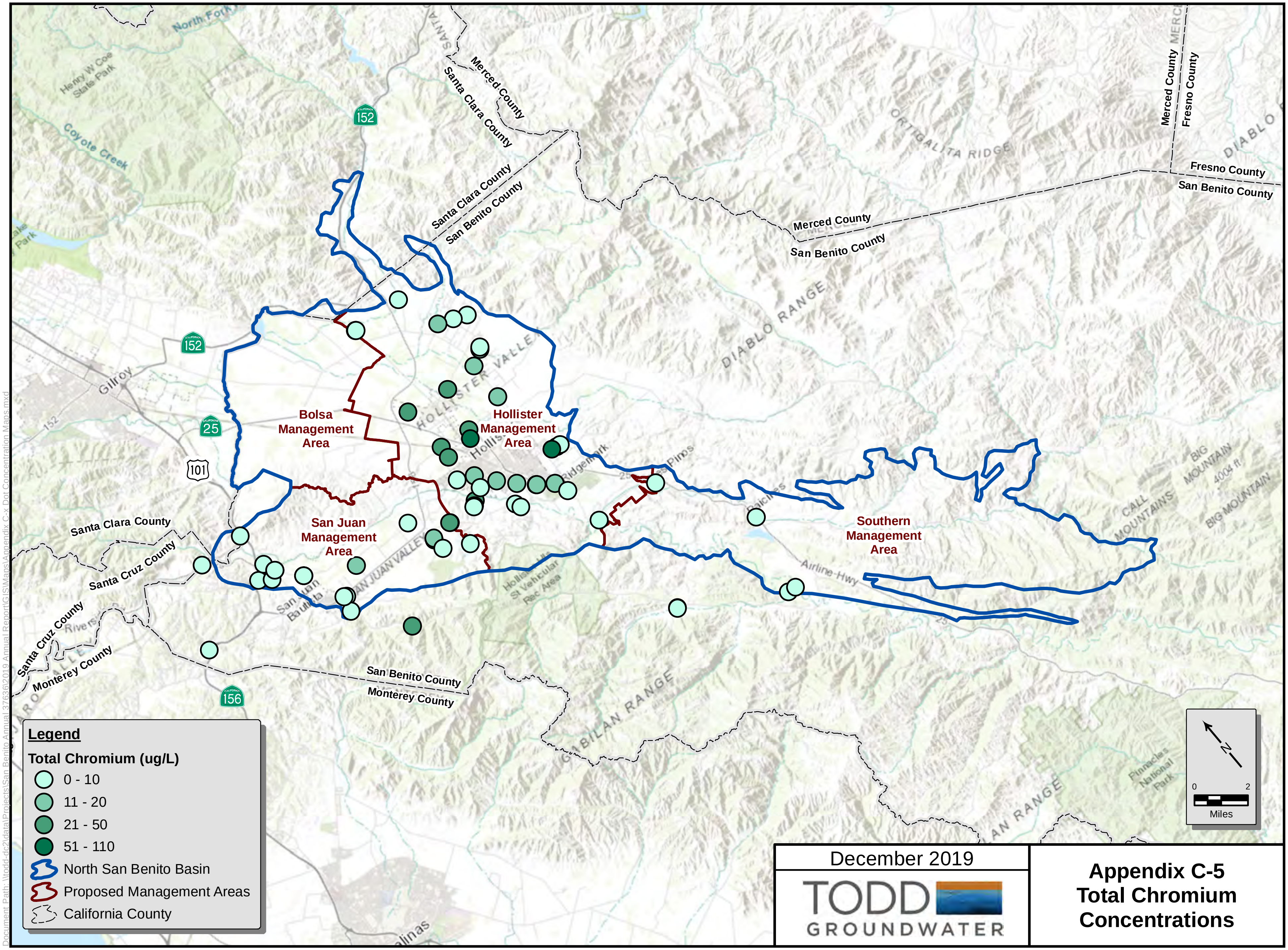
**Appendix C-4**
**Profiles of Historical Groundwater Levels**

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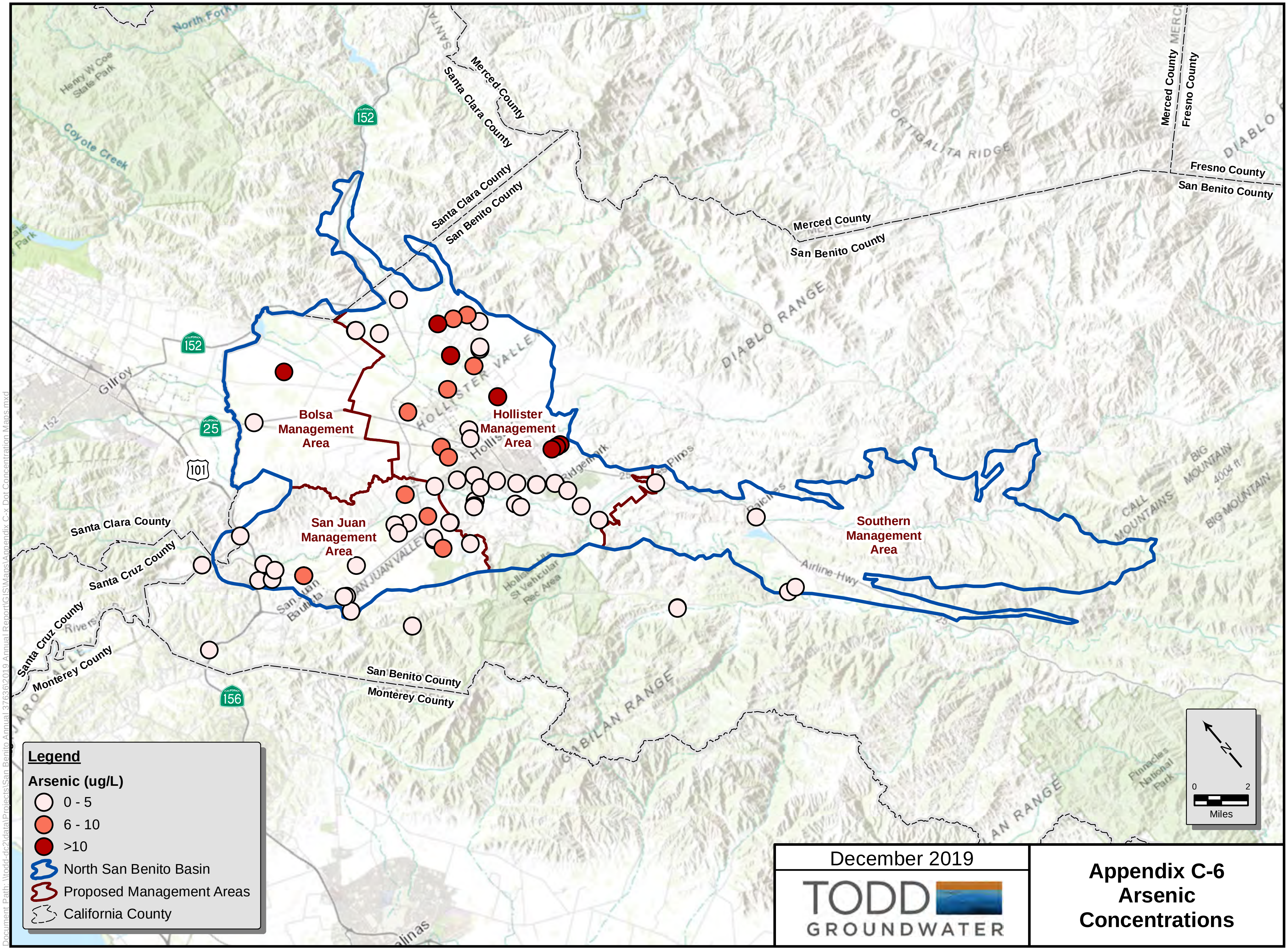
**Appendix C-5**
**Total Chromium Concentrations**

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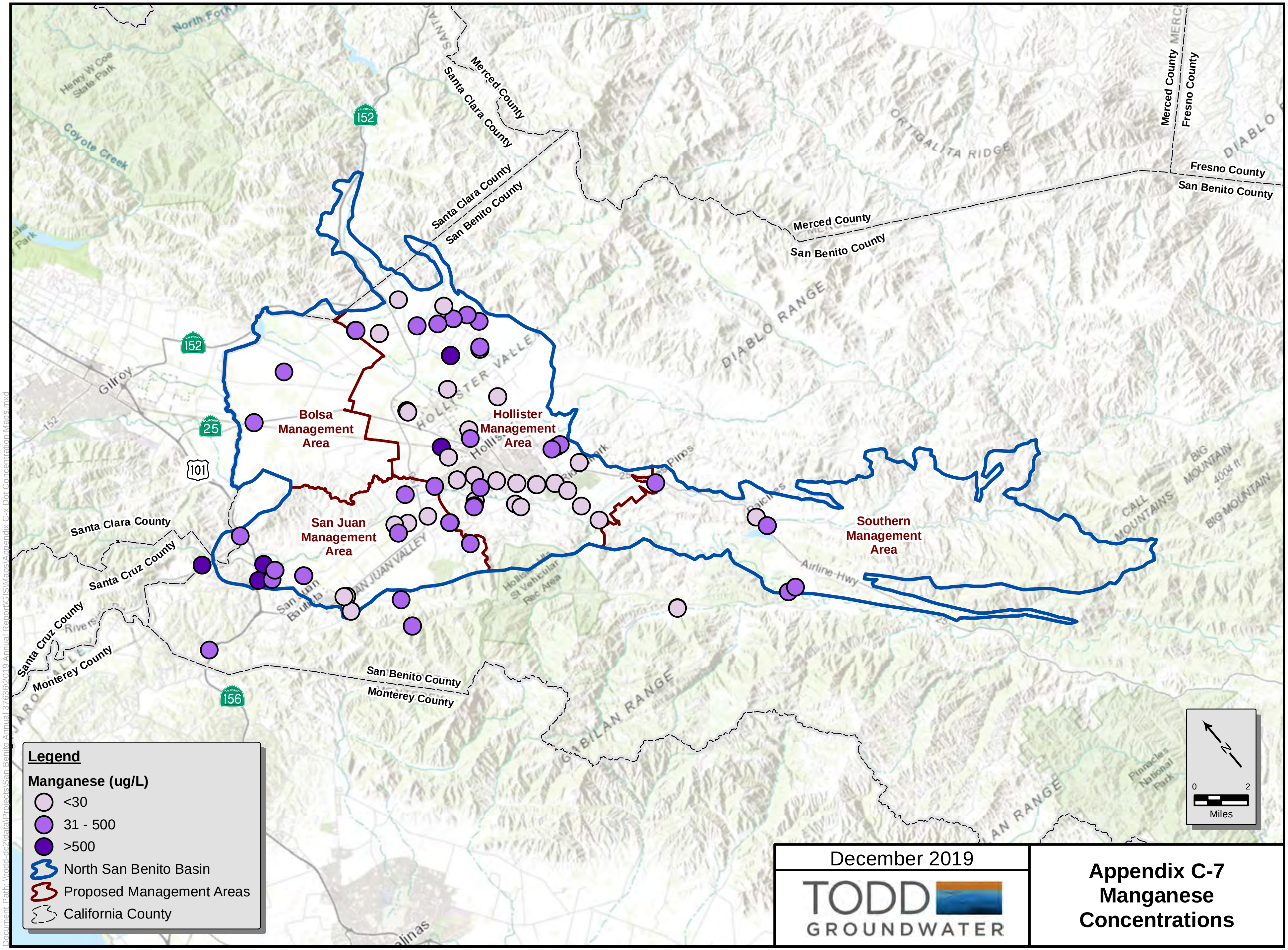
**Appendix C-6**
**Arsenic Concentrations**

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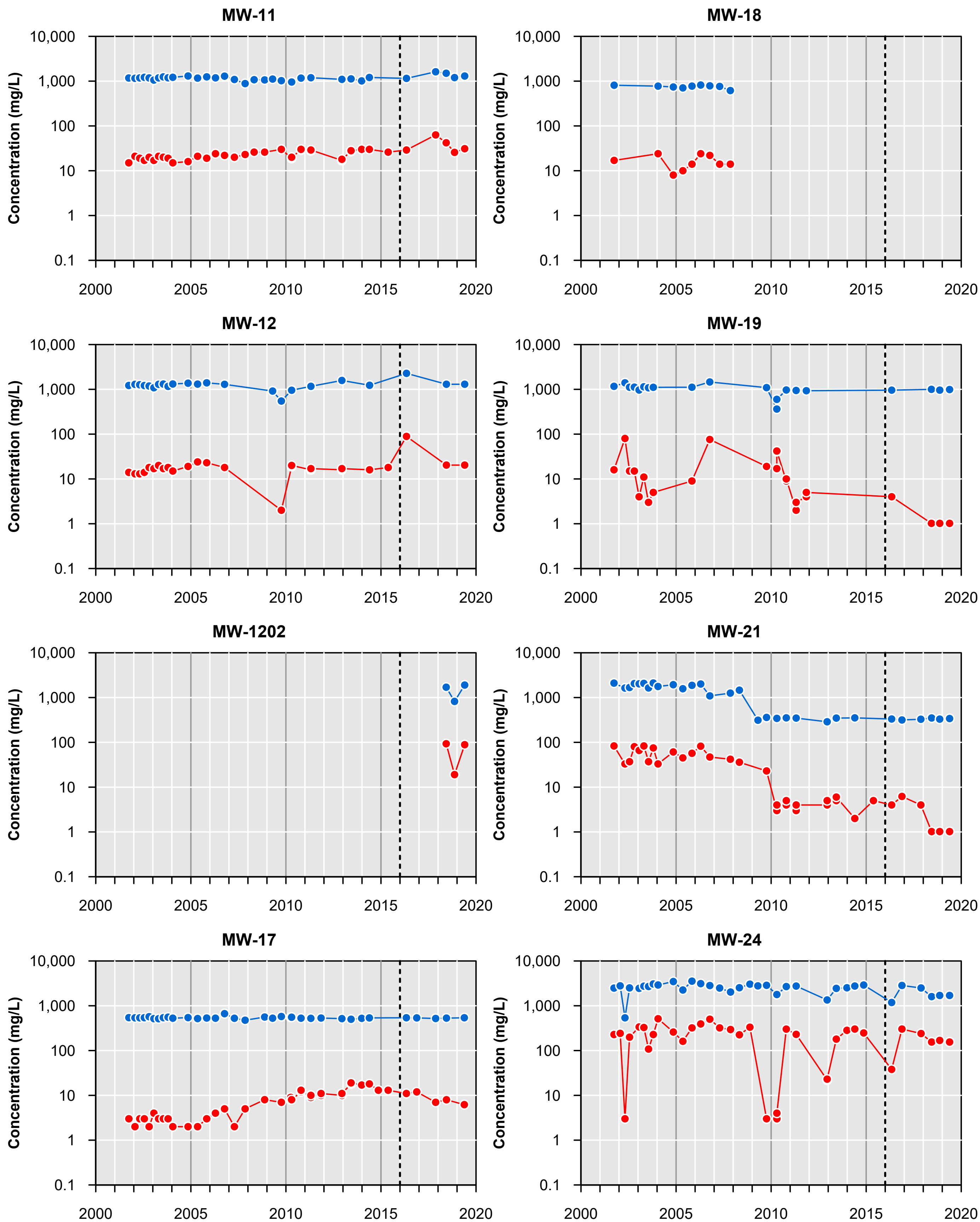
**Appendix C-7**
**Manganese Concentrations**




Nitrate (NO3)
Total Dissolved Solids (TDS)
Beginning of study period (2016)
'MW-' = Monitored Well

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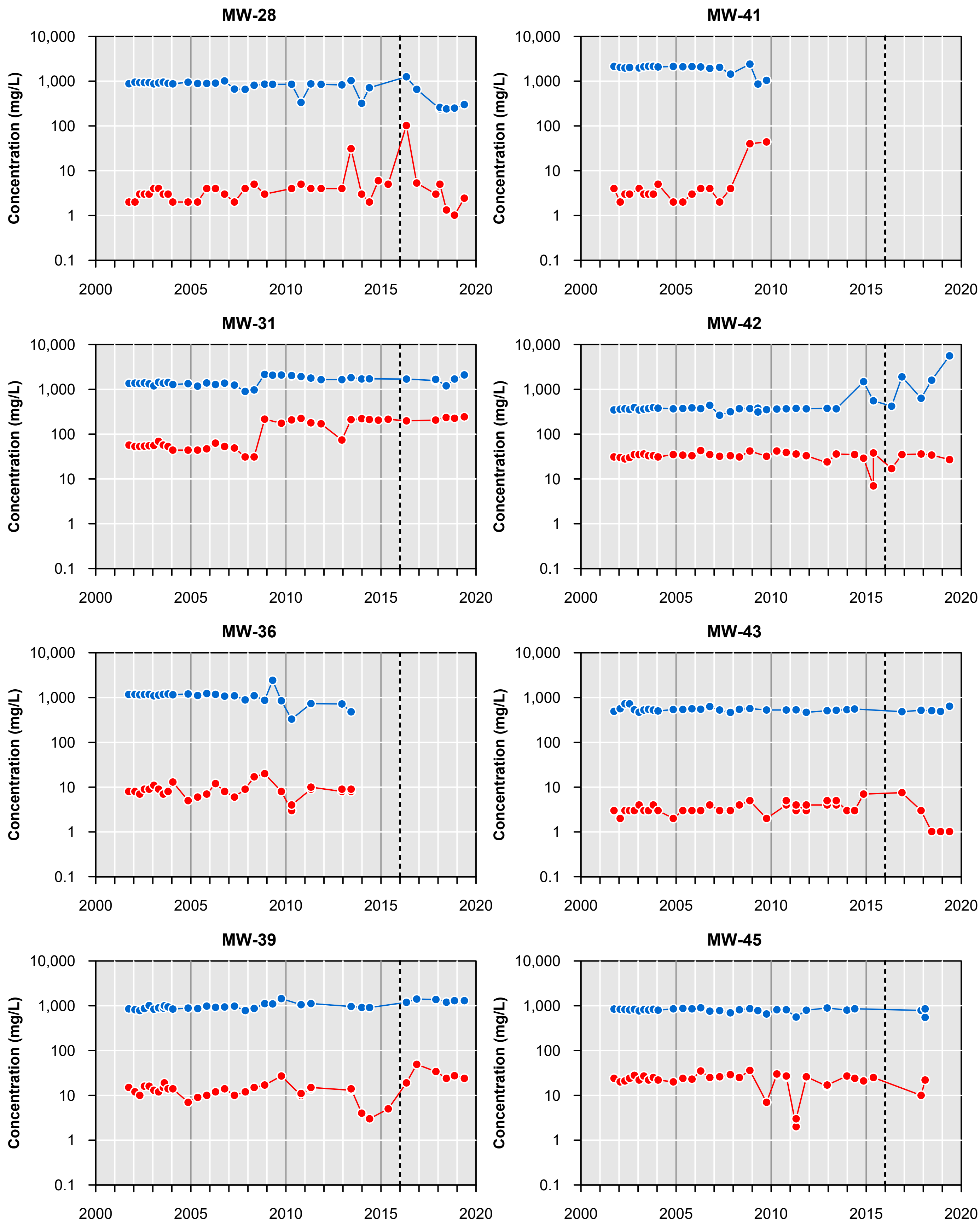
**Appendix C-8**
**NO3 and TDS Concentration (mg/L) Over Time**
**SBCWD Monitored Wells**




Nitrate (NO3)

Total Dissolved Solids (TDS)

Beginning of study period (2016)

'MW-' = Monitored Well

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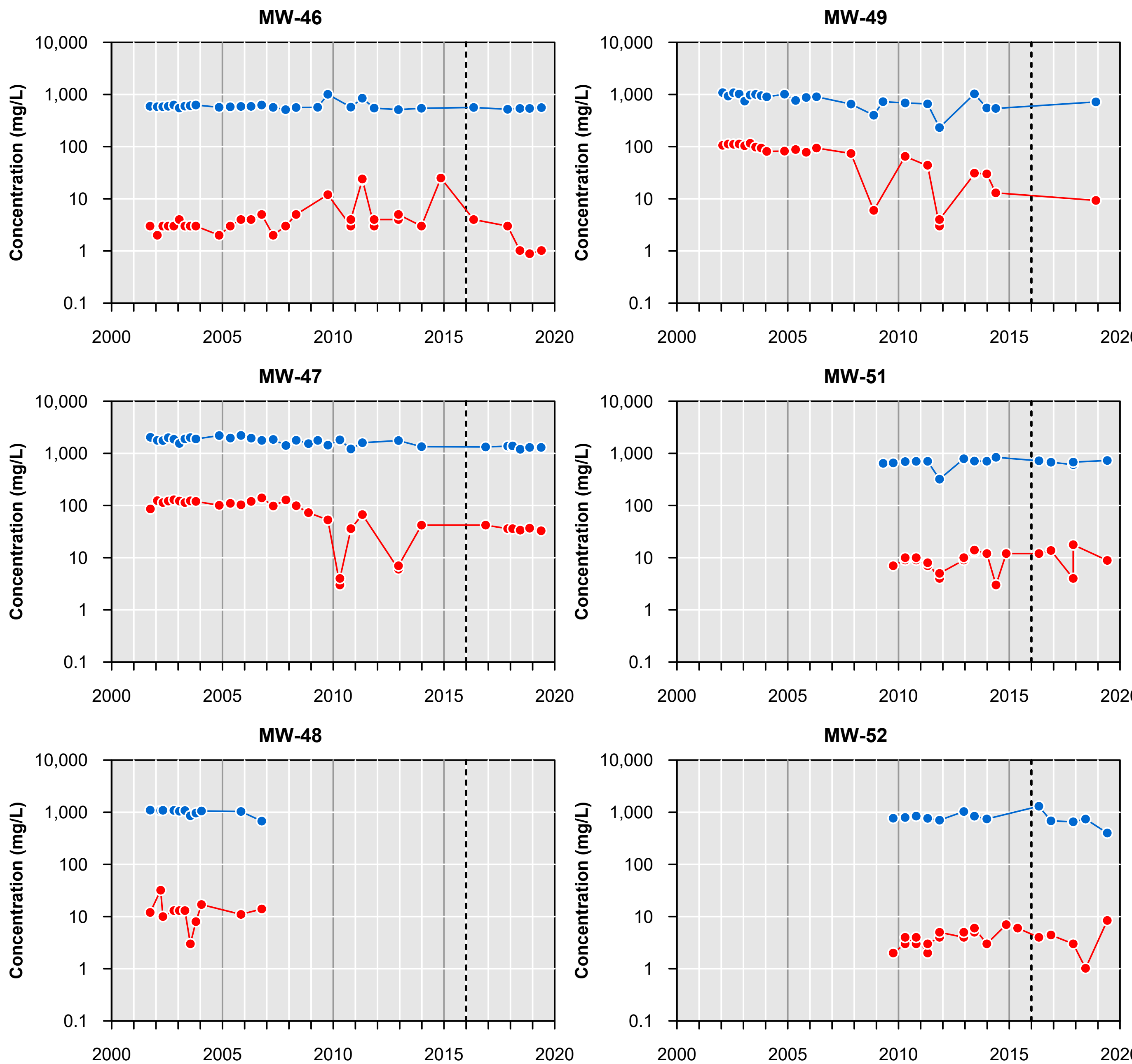
**Appendix C-9**
**NO3 and TDS Concentration (mg/L) Over Time**
**SBCWD Monitored Wells**




Nitrate (NO3)

Total Dissolved Solids (TDS)

Beginning of study period (2016)

'MW-' = Monitored Well

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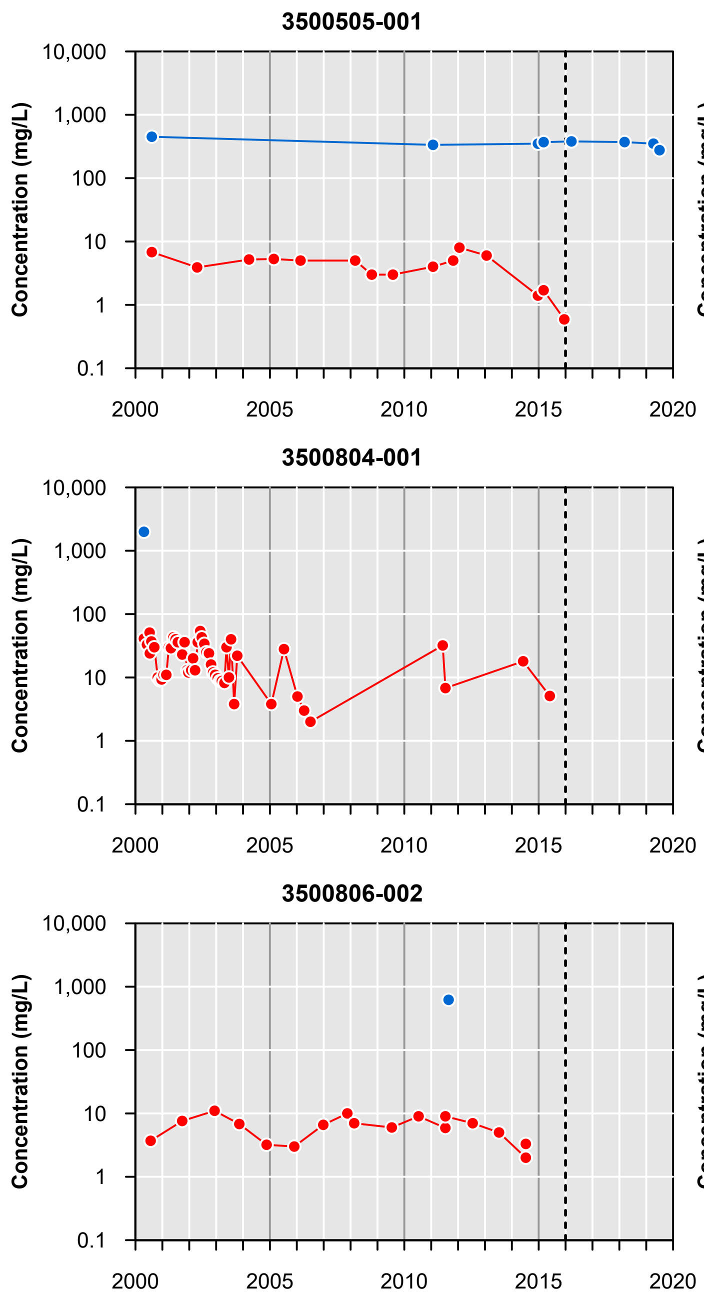
**Appendix C-10**
**NO3 and TDS Concentration (mg/L) Over Time**
**SBCWD Monitored Wells**




Nitrate (NO3)
Total Dissolved Solids (TDS)
Beginning of study period (2016)

December 2019

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**Appendix C-11**
**NO3 and TDS Concentration (mg/L) Over Time in Regulated Systems**

Path: T:\Projects\San Benito Annual 37636\GRAPHICS\2019 Annual Groundwater Report\AppendixC-11_r2.gpj

# APPENDIX D PERCOLATION DATA

## List of Tables and Figures

**Table D-1. Reservoir Water Budgets for Water Year 2019 (acre-feet)**

| | Hernandez | Paicines | San Justo | |
|---|---|---|---|---|
| **Observed Storage** | | | | |
| Starting Storage (Oct 2018) | 558 | 300 | 5,131 | |
| Ending Storage (Sept 2019) | 2,375 | 250 | 4,641 | |
| **Inflows** | | | | |
| Rainfall | 430 | 106 | 204 | |
| San Benito River | 18,175 | 1,162 | n.a. | |
| Hernandez-Paicines transfer | n.a. | 2,670 | n.a. | |
| San Felipe Project* | n.a. | n.a. | 21,411 | * |
| **Total Inflows** | **18,605** | **3,938** | **21,615** | |
| **Outflows** | | | | |
| Hernandez spills | 0 | n.a. | n.a. | |
| Hernandez-Paicines transfer | 2,670 | n.a. | n.a. | |
| Tres Pinos Creek percolation releases | n.a. | 2,045 | n.a. | |
| San Benito River percolation releases | 15,924 | n.a. | n.a. | |
| CVP Deliveries* | n.a. | n.a. | 21,501 | * |
| Evaporation and seepage | 906 | 2,898 | 1,197 | |
| **Total Outflows** | **19,500** | **4,942** | **22,698** | |
| **Change in Storage** | | | | |
| **Observed storage change (Ending - Starting)** | **1,817** | **-50** | **-490** | |
| **Calculated net storage change (Inflow - Outflows)** | **-896** | **-1,004** | **-1,083** | |
| **Unaccounted for Water (Observed - Calculated)**** | **2,712** | **954** | **593** | |
| | | | | |
| **Reservoir Information** | | | | |
| Reservoir capacity | 17,200 | 2,870 | 11,000 | |
| Maximum storage | 12,572 | 2,580 | 10,308 | |
| Minimum storage | 558 | 250 | 4,573 | |

* Reflects imported water for beneficial use, not all stored in reservoir

** Negative value is water shortage, positive value is water surplus

**Table D-2. Historical Reservoir Releases (AFY)**

| WY | Hernandez | Paicines | TOTAL |
|---|---|---|---|
| 1996 | 13,535 | 6,139 | 19,674 |
| 1997 | 3,573 | 2,269 | 5,842 |
| 1998 | 26,302 | 450 | 26,752 |
| 1999 | 12,084 | 1,293 | 13,377 |
| 2000 | 13,246 | 2,326 | 15,572 |
| 2001 | 12,919 | 3,583 | 16,502 |
| 2002 | 9,698 | 310 | 10,008 |
| 2003 | 5,434 | 0 | 5,434 |
| 2004 | 3,336 | 0 | 3,336 |
| 2005 | 19,914 | 677 | 20,591 |
| 2006 | 14,112 | 196 | 14,308 |
| 2007 | 12,022 | 1,254 | 13,276 |
| 2008 | 7,646 | 495 | 8,141 |
| 2009 | 4,883 | 0 | 4,883 |
| 2010 | 8,484 | 4,147 | 12,631 |
| 2011 | 9,757 | 2,397 | 12,154 |
| 2012 | 6,341 | 1,321 | 7,662 |
| 2013 | 3,963 | 677 | 4,640 |
| 2014 | 0 | 0 | 0 |
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 23,191 | 2,407 | 25,597 |
| 2018 | 6,054 | 384 | 6,438 |
| 2019 | 15,924 | 2,045 | 17,969 |
| **AVG** | **9,684** | **1,349** | **11,033** |

**Table D-3. Historical Percolation of CVP Water (AFY)**

| Water Year[1] | Pacheco Creek | Arroyo de las Viboras | | | Arroyo Dos Picachos | | | Santa Ana Creek | | | | Tres Pinos Creek (and Pond) | San Benito River (Union Road Pond) | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Road | Creek 1 (Frog Ponds) | Creek 2 | Fallon Road | Jarvis Lane | Creek | John Smith Road | Maranatha Road | Airline Highway | Ridgemark | | | |
| 1994 | 232 | 136 | 515 | 0 | 0 | 550 | 209 | 0 | 0 | 0 | 0 | 85 | 158 | 1,885 |
| 1995 | 444 | 238 | 770 | 2 | 0 | 654 | 622 | 73 | 0 | 0 | 0 | 809 | 2,734 | 6,345 |
| 1996 | 0 | 494 | 989 | 832 | 67 | 235 | 708 | 531 | 197 | 134 | 25 | 21 | 6,097 | 10,330 |
| 1997 | 0 | 447 | 601 | 1,981 | 77 | 0 | 200 | 17 | 353 | 286 | 29 | 1,477 | 5,619 | 11,087 |
| 1998 | 0 | 132 | 109 | 403 | 0 | 0 | 0 | 65 | 0 | 158 | 74 | 518 | 1,084 | 2,543 |
| 1999 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 256 | 48 | 141 | 10 | 452 | 413 | 1,322 |
| 2000 | 1 | 0 | 0 | 6 | 0 | 0 | 3 | 236 | 21 | 240 | 12 | 285 | 938 | 1,740 |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 161 | 17 | 186 | 1 | 703 | 1,041 | 2,110 |
| 2002 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 78 | 2 | 143 | 0 | 426 | 470 | 1,122 |
| 2003 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 119 | 9 | 172 | 0 | 163 | 605 | 1,074 |
| 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 83 | 0 | 0 | 0 | 1 | 882 | 1,018 |
| 2005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 527 | 527 |
| 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 156 | 0 | 0 | 0 | 1 | 451 | 614 |
| 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 216 | 304 |
| 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 6 |
| 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2014 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2015 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2,017 | 0 | 0 | 340 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,209 | 2,549 |
| 2,018 | 0 | 0 | 199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 867 | 1,899 | 2,965 |
| 2,019 | 0 | 0 | 335 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,775 | 2,932 | 5,043 |

1. 2017-2019 percolation occurred only to recharge basins adjacent to the listed streams.

**Table D-4. Percolation of Municipal Wastewater during Water Year 2019**

| | Pond Area[1] (acres) | Effluent Discharge (acre-feet) | Evaporation[2] (acre-feet) | Percolation (acre-feet) |
|---|---|---|---|---|
| Hollister - domestic | 93 | 2,088 | 266 | 1,822 |
| Hollister - industrial | 39 | 0 | 0 | 0 |
| Ridgemark Estates I & II | 7 | 170 | 21 | 149 |
| Tres Pinos | 2 | 21 | 5 | 16 |
| Total | 141 | 2,279 | 292 | 1,986 |

Notes:

1. Hollister pond areas are from Dickson and Kenneth D. Schmidt and Associates (1999) and include treatment ponds in addition to percolation ponds at the domestic wastewater treatment plant. Assumes 80% of total pond area in use at any time (Rose, pers. comm.). These areas should be updated as operations change.

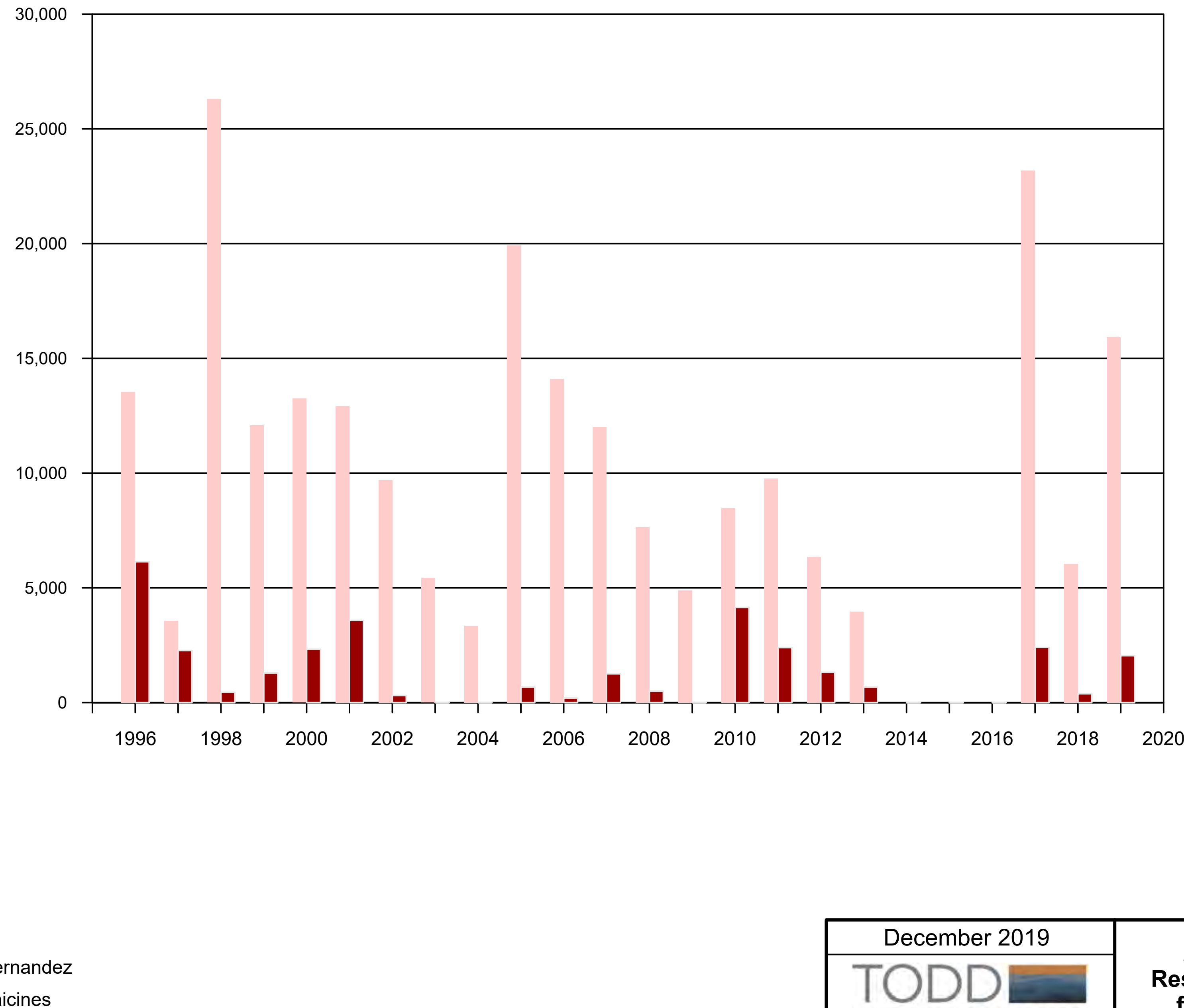
2. Average evaporation less precip = 43 inches (56 in/yr evaporation (DWR Bulletin 73-79) less 13 in/yr precip (CIMIS) The IWTP evaporation was adjusted to account only for when the ponds are in use.

The San Juan Bautista plant is not included because the unnamed tributary of San Juan Creek that receives its effluent usually gains flow along the affected reach and is on the southwest side of the San Andreas Fault. These conditions prevent the effluent from recharging the San Juan Subbasin.

**Table D-5. Historical Percolation of Municipal Wastewater (AFY)**

| | Hollister Reclamation Plant - Domestic | Hollister - industrial wastewater and stormwater | Ridgemark Estates I & II | Tres Pinos | TOTAL |
|---|---|---|---|---|---|
| 1994 | 1,775 | 665 | 155 | 5 | 2,600 |
| 1995 | 1,935 | 610 | 180 | 10 | 2,735 |
| 1996 | 2,020 | 689 | 207 | 14 | 2,930 |
| 1997 | 1,965 | 909 | 201 | 17 | 3,092 |
| 1998 | 2,490 | 518 | 231 | 17 | 3,256 |
| 1999 | 1,693 | 1,476 | 156 | 12 | 3,337 |
| 2000 | 2,110 | 1,136 | 293 | 24 | 3,563 |
| 2001 | 1,742 | 1,078 | 303 | 24 | 3,147 |
| 2002 | 1,884 | 1,545 | 283 | 24 | 3,736 |
| 2003 | 2,009 | 1,432 | 279 | 24 | 3,744 |
| 2004 | 1,787 | 1,536 | 268 | 21 | 3,612 |
| 2005 | 1,891 | 1,323 | 227 | 26 | 3,468 |
| 2006 | 1,797 | 1,211 | 216 | 33 | 3,257 |
| 2007 | 1,740 | 1,228 | 139 | 19 | 3,126 |
| 2008 | 1,580 | 1,257 | 139 | 19 | 2,996 |
| 2009 | 1,976 | 428 | 172 | 19 | 2,594 |
| 2010 | 1,922 | 37 | 172 | 19 | 2,150 |
| 2011 | 1,807 | 466 | 183 | 19 | 2,476 |
| 2012 | 1,740 | 605 | 177 | 19 | 2,541 |
| 2013* | 889 | 332 | 188 | 21 | 1,430 |
| 2014 | 1,552 | 86 | 179 | 21 | 1,838 |
| 2015 | 1,816 | 344 | 161 | 21 | 2,342 |
| 2016 | 1,923 | 305 | 154 | 21 | 2,402 |
| 2017 | 1,945 | 57 | 154 | 20 | 2,177 |
| 2018 | 1,365 | 57 | 150 | 15 | 1,587 |
| 2019 | 1,822 | 0 | 149 | 16 | 1,986 |

*Potential missing data

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**Appendix D-1**
**Reservoir Releases for Percolation**

# APPENDIX E WATER USE DATA FOR ZONE 6

## List of Tables and Figures

**Table E-1. Recent CVP Allocation and Use**

| Water Year | Municipal and Industrial (M&I) CVP | | | | Agricultural CVP | | | |
|---|---|---|---|---|---|---|---|---|
| | Percent of Contract Allocation[1] | Percent of Historic Average[2] | Contract Amount Used (AF) | Contract Amount Used (%) | Percent of Contract Allocation[3] | Percent of Contract and M&I Adjustment[2] | Contract Amount Used (AF)[4] | Contract Amount Used (%) |
| | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | |
| 2006 | 100% | | 3,152 | 38% | 100% | | 19,840 | 56% |
| 2007 | 100% | | 4,969 | 60% | 40% | | 18,865 | 53% |
| 2008 | 37% | 75% | 2,232 | 27% | 40% | 45% | 10,514 | 30% |
| 2009 | 29% | 60% | 1,978 | 24% | 10% | 11% | 6,439 | 18% |
| 2010 | 37% | 75% | 2,197 | 27% | 45% | 50% | 10,061 | 28% |
| 2011 | 100% | | 2,433 | 29% | 80% | | 16,234 | 46% |
| 2012 | 51% | 75% | 2,683 | 33% | 40% | 40% | 17,267 | 49% |
| 2013 | 47% | 70% | 2,652 | 32% | 20% | 22% | 12,914 | 36% |
| 2014 | 34% | 50% | 1,599 | 29% | 0% | 0% | 7,545 | 21% |
| 2015 | 25% | | 1,810 | 22% | 0% | | 3,697 | 10% |
| 2016 | 55% | | 1,914 | 23% | 5% | | 4,434 | 12% |
| 2017 | 100% | | 2,909 | 35% | 100% | | 15,837 | 45% |
| 2018 | 75% | | 5,679 | 69% | 50% | | 17,418 | 49% |
| 2019 | 100% | | 4,457 | 54% | 75% | | 16,774 | 47% |

Notes: 1 Total contract (100% allocation) M&I 8,250 AFY
2 Shortage Policy Adjustments
3 Total contract (100% allocation) Ag 35,550 AFY
4 Includes water percolated

**Table E-2. Historical Water Use by Subbasin and Water Source (AFY)**

| Subbasin | Pacheco | | Bolsa Southeast | | | San Juan | | Hollister West | | | Hollister East | | | Tres Pinos | | Total Zone 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source | GW | CVP | GW | CVP | RW | GW | CVP | GW | CVP | RW | GW | CVP | RW | GW | CVP | GW | CVP | RW |
| 1993 | 2,251 | 3,210 | 3,474 | 533 | | 9,278 | 4,300 | 7,213 | 90 | | 3,744 | 7,275 | | 5,658 | 224 | 31,618 | 15,633 | 0 |
| 1994 | 3,748 | 3,394 | 3,467 | 602 | | 10,859 | 3,836 | 7,327 | 87 | | 5,475 | 6,808 | | 5,294 | 263 | 36,169 | 14,990 | 0 |
| 1995 | 2,756 | 3,474 | 2,855 | 720 | | 9,328 | 4,554 | 7,092 | 460 | | 3,428 | 6,647 | | 4,475 | 275 | 29,935 | 16,130 | 0 |
| 1996 | 2,533 | 3,500 | 2,682 | 782 | | 8,726 | 5,187 | 5,717 | 679 | | 3,396 | 8,267 | | 3,695 | 408 | 26,748 | 18,823 | 0 |
| 1997 | 2,209 | 4,205 | 2,755 | 997 | | 9,587 | 6,191 | 7,602 | 907 | | 3,534 | 8,284 | | 4,620 | 466 | 30,307 | 21,048 | 0 |
| 1998 | 2,035 | 2,165 | 1,561 | 361 | | 6,963 | 4,099 | 4,991 | 591 | | 4,037 | 5,291 | | 3,751 | 289 | 23,338 | 12,796 | 0 |
| 1999 | 2,553 | 3,219 | 2,453 | 433 | | 9,312 | 5,990 | 7,013 | 726 | | 3,701 | 7,279 | | 4,199 | 391 | 29,231 | 18,038 | 0 |
| 2000 | 2,270 | 3,256 | 2,418 | 355 | | 8,681 | 6,372 | 7,590 | 869 | | 3,108 | 7,279 | | 4,006 | 542 | 28,073 | 18,673 | 0 |
| 2001 | 1,848 | 3,443 | 2,126 | 411 | | 7,977 | 7,232 | 7,377 | 685 | | 2,213 | 7,010 | | 3,599 | 621 | 25,140 | 19,402 | 0 |
| 2002 | 2,322 | 3,840 | 2,193 | 497 | | 7,571 | 7,242 | 6,577 | 706 | | 2,588 | 7,390 | | 3,994 | 737 | 25,244 | 20,411 | 0 |
| 2003 | 2,425 | 3,277 | 2,175 | 493 | | 7,434 | 7,127 | 6,222 | 720 | | 1,897 | 9,329 | | 2,805 | 788 | 22,958 | 21,734 | 0 |
| 2004 | 2,461 | 3,607 | 2,405 | 740 | | 8,121 | 7,357 | 4,971 | 614 | | 2,321 | 10,726 | | 3,204 | 966 | 23,484 | 24,010 | 0 |
| 2005 | 1,320 | 3,106 | 1,849 | 514 | | 6,608 | 6,245 | 5,084 | 680 | | 2,586 | 9,198 | | 2,378 | 642 | 19,825 | 20,384 | 0 |
| 2006 | 1,208 | 3,495 | 1,864 | 661 | | 6,741 | 7,200 | 4,633 | 579 | | 2,555 | 10,253 | | 2,537 | 803 | 19,538 | 22,992 | 0 |
| 2007 | 1,034 | 3,832 | 2,005 | 572 | | 7,658 | 6,160 | 5,118 | 553 | | 3,867 | 10,194 | | 2,908 | 804 | 22,590 | 22,115 | 0 |
| 2008 | 1,900 | 1,568 | 2,014 | 333 | | 7,796 | 3,160 | 4,375 | 399 | | 3,962 | 6,792 | | 2,743 | 493 | 22,789 | 12,745 | 0 |
| 2009 | 3,370 | 1,257 | 2,082 | 179 | | 11,956 | 1,605 | 4,186 | 19 | | 4,733 | 4,697 | | 2,871 | 447 | 29,199 | 8,204 | 0 |
| 2010 | 2,553 | 1,771 | 1,897 | 207 | | 9,561 | 3,452 | 4,081 | 10 | 151 | 4,460 | 6,056 | | 1,686 | 488 | 24,238 | 11,984 | 151 |
| 2011 | 1,992 | 2,420 | 2,781 | 229 | | 4,987 | 5,623 | 3,940 | 394 | 183 | 1,947 | 9,575 | | 2,454 | 427 | 18,102 | 18,667 | 183 |
| 2012 | 3,723 | 2,652 | 1,556 | 288 | | 5,782 | 5,976 | 4,298 | 549 | 230 | 2,004 | 9,917 | | 2,492 | 568 | 19,855 | 19,949 | 230 |
| 2013 | 4,157 | 1,976 | 2,348 | 292 | | 11,044 | 4,134 | 5,656 | 374 | 357 | 5,430 | 8,224 | | 2,452 | 565 | 31,087 | 15,566 | 357 |
| 2014 | 3,303 | 1,020 | 2,157 | 32 | | 10,018 | 1,984 | 7,227 | 233 | 262 | 4,872 | 5,490 | | 3,014 | 384 | 30,592 | 9,144 | 262 |
| 2015 | 4,279 | 555 | 2,401 | 20 | | 12,739 | 975 | 4,730 | 148 | 101 | 7,230 | 3,568 | | 2,948 | 241 | 34,327 | 5,507 | 101 |
| 2016 | 4,386 | 420 | 2,558 | 30 | 38 | 13,581 | 819 | 4,031 | 162 | 253 | 6,383 | 4,810 | 207 | 2,223 | 106 | 33,162 | 6,347 | 499 |
| 2017 | 2,949 | 2,097 | 1,414 | 365 | 66 | 7,542 | 5,853 | 3,255 | 217 | 108 | 2,209 | 7,488 | 192 | 2,447 | 177 | 19,815 | 16,197 | 366 |
| 2018 | 4,375 | 1,529 | 3,063 | 291 | 3 | 8,932 | 6,383 | 3,922 | 2,054 | 468 | 3,699 | 9,686 | 0 | 1,865 | 188 | 25,856 | 20,131 | 471 |
| 2019[1] | 2,780 | 2,162 | 2,568 | 318 | 2 | 6,648 | 3,990 | 2,093 | 273 | 567 | 2,802 | 0 | 0 | 1,193 | 184 | 18,083 | 16,188 | 569 |
| AVG 93-19 | 2,694 | 2,609 | 2,338 | 417 | 27 | 8,720 | 4,928 | 5,419 | 510 | 268 | 3,636 | 7,316 | 100 | 3,167 | 462 | 25,974 | 16,586 | 118 |

GW = groundwater, CVP = Central Valley Project, RW = recycled water

1. Hollister East includes 2,524 AF of CVP water delivered to the West Hills Treatment Plant in San Juan but supplied to Hollister East customers.

**Table E-3a. Recent Water Use by Subbasin and User Type, Includes Recycled Water (AFY) - Agriculture**

| Management Area | Subbasin | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Agriculture | | | | | | | |
| Hollister | Bolsa SE | 2,352 | 2,517 | 2,570 | 2,334 | 2,252 | 2,103 | 3,004 | 1,837 | 2,635 | 2,180 | 2,417 | 2,601 | 1,831 | 3,315 | 2,889 |
| | Hollister East | 8,543 | 9,526 | 10,685 | 8,012 | 6,860 | 8,315 | 9,067 | 9,453 | 10,832 | 8,151 | 8,464 | 8,784 | 7,756 | 9,594 | 7,673 |
| | Hollister West | 2,128 | 1,936 | 2,145 | 1,509 | 1,708 | 1,888 | 2,190 | 2,228 | 3,324 | 2,584 | 2,750 | 2,192 | 1,338 | 2,337 | 1,807 |
| | Pacheco | 4,190 | 4,469 | 4,573 | 3,220 | 4,304 | 4,242 | 4,279 | 6,148 | 5,990 | 4,121 | 4,658 | 4,616 | 4,964 | 5,663 | 4,838 |
| | Tres Pinos | 800 | 1,004 | 954 | 655 | 670 | 640 | 471 | 641 | 652 | 514 | 1,513 | 572 | 468 | 448 | 276 |
| San Juan | San Juan | 11,496 | 12,622 | 12,185 | 9,581 | 12,397 | 11,960 | 10,009 | 10,964 | 14,376 | 11,183 | 13,123 | 13,826 | 11,916 | 14,568 | 10,134 |
| | **TOTAL** | **29,509** | **32,074** | **33,112** | **25,310** | **28,192** | **29,148** | **29,020** | **30,980** | **37,810** | **28,734** | **32,926** | **32,591** | **28,273** | **35,925** | **27,616** |

**Table E-3b. Recent Water Use by Subbasin and User Type, Includes Recycled Water (AFY) - M&I**

| Management Area | Subbasin | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | M&I | | | | | | | |
| Hollister | Bolsa SE | 12 | 8 | 7 | 13 | 9 | 0 | 6 | 6 | 4 | 9 | 5 | 25 | 14 | 43 | 0 |
| | Hollister East[1] | 3,241 | 3,280 | 3,203 | 2,742 | 2,570 | 2,307 | 2,594 | 2,608 | 2,961 | 2,277 | 2,334 | 2,617 | 2,132 | 3,790 | 4,389 |
| | Hollister West | 3,636 | 3,168 | 3,361 | 3,265 | 2,710 | 2,555 | 2,235 | 2,710 | 2,796 | 5,072 | 2,229 | 2,254 | 2,242 | 4,106 | 1,126 |
| | Pacheco | 235 | 234 | 293 | 248 | 323 | 83 | 133 | 227 | 144 | 203 | 176 | 191 | 81 | 241 | 104 |
| | Tres Pinos | 2,220 | 2,336 | 2,748 | 2,581 | 2,648 | 1,534 | 2,410 | 2,710 | 2,365 | 2,884 | 1,676 | 1,757 | 2,156 | 1,606 | 1,101 |
| San Juan | San Juan | 1,356 | 1,320 | 1,640 | 1,375 | 1,164 | 1,053 | 601 | 793 | 803 | 820 | 590 | 574 | 1,479 | 747 | 504 |
| | **TOTAL** | **10,700** | **10,345** | **11,252** | **10,225** | **9,424** | **7,532** | **7,979** | **9,055** | **9,073** | **11,263** | **7,010** | **7,417** | **8,105** | **10,533** | **7,225** |

1. Hollister East includes 2,524 AF of CVP water delivered to the West Hills Treatment Plant in San Juan but supplied to Hollister East customers.

**Table E-4. Historical Water Use by User Type in Zone 6 - Includes Recycled Water (AFY)**

| WY | Agricultural | Municipal, and Industrial | Total | % Ag |
|---|---|---|---|---|
| 1988 | 46,366 | 5,152 | 51,518 | 90% |
| 1989 | 32,387 | 6,047 | 38,434 | 84% |
| 1990 | 49,663 | 5,725 | 55,388 | 90% |
| 1991 | 46,640 | 7,631 | 54,271 | 86% |
| 1992 | 32,210 | 6,912 | 39,122 | 82% |
| 1993 | 38,878 | 5,066 | 43,944 | 88% |
| 1994 | 41,854 | 7,186 | 49,040 | 85% |
| 1995 | 36,399 | 8,272 | 44,671 | 81% |
| 1996 | 39,845 | 8,131 | 47,976 | 83% |
| 1997 | 41,482 | 11,068 | 52,550 | 79% |
| 1998 | 27,526 | 8,605 | 36,131 | 76% |
| 1999 | 37,203 | 10,066 | 47,269 | 79% |
| 2000 | 36,062 | 10,764 | 46,826 | 77% |
| 2001 | 34,035 | 10,640 | 44,675 | 76% |
| 2002 | 34,354 | 11,300 | 45,654 | 75% |
| 2003 | 33,533 | 11,159 | 44,692 | 75% |
| 2004 | 35,597 | 11,898 | 47,495 | 75% |
| 2005 | 29,510 | 10,699 | 40,209 | 73% |
| 2006 | 32,074 | 10,456 | 42,530 | 75% |
| 2007 | 33,112 | 13,311 | 46,424 | 71% |
| 2008 | 25,310 | 10,225 | 35,535 | 71% |
| 2009 | 28,192 | 9,424 | 37,616 | 75% |
| 2010 | 29,148 | 7,531 | 36,679 | 79% |
| 2011 | 29,020 | 7,932 | 36,952 | 79% |
| 2012 | 30,980 | 9,055 | 40,095 | 77% |
| 2013 | 37,810 | 9,073 | 46,653 | 81% |
| 2014 | 28,734 | 11,226 | 39,960 | 72% |
| 2015 | 32,926 | 7,161 | 39,935 | 82% |
| 2016 | 32,591 | 7,417 | 40,008 | 81% |
| 2017 | 28,273 | 8,105 | 36,012 | 79% |
| 2018 | 35,925 | 10,533 | 46,458 | 77% |
| 2019 | 27,616 | 7,225 | 34,841 | 79% |
| AVERAGE | 34,539 | 8,906 | 43,424 | 79% |

**Table E-5. Municipal Water Use by Major Purveyor for Water Year 2019 (AF)**

| | WY 2019 | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Groundwater** | | | | | | | | | | | | | |
| Sunnyslope CWD | **565** | 72 | 44 | 27 | 18 | 22 | 12 | 20 | 64 | 60 | 72 | 71 | 84 |
| City of Hollister | **588** | 32 | 25 | 14 | 19 | 10 | 20 | 54 | 29 | 89 | 96 | 105 | 97 |
| City of Hollister - Cienega Wells | **283** | 10 | 3 | 8 | 9 | 8 | 10 | 9 | 54 | 78 | 78 | 8 | 8 |
| San Juan Bautista | **257** | 17 | 16 | 20 | 25 | 10 | 9 | 17 | 36 | 17 | 21 | 46 | 23 |
| Tres Pinos CWD | **33** | 3 | 3 | 2 | 2 | 1 | 2 | 2 | 3 | 4 | 4 | 4 | 4 |
| **Groundwater Subtotal** | **1,728** | **133** | **90** | **71** | **73** | **51** | **53** | **102** | **186** | **247** | **271** | **235** | **215** |
| **CVP Imported Water** | | | | | | | | | | | | | |
| Lessalt Treatment Plant | **1,660** | 160 | 173 | 130 | 95 | 70 | 91 | 114 | 134 | 166 | 173 | 158 | 194 |
| West Hills Treatment Plant | **2,524** | 209 | 214 | 190 | 195 | 150 | 177 | 180 | 249 | 197 | 277 | 258 | 229 |
| **Imported Water Subtotal** | **4,184** | **369** | **387** | **320** | **290** | **221** | **269** | **293** | **383** | **363** | **449** | **416** | **423** |
| **Municipal Total** | | | | | | | | | | | | | |
| **TOTAL Municipal Water Supply** | **5,912** | **502** | **477** | **391** | **363** | **272** | **322** | **396** | **569** | **610** | **720** | **651** | **638** |

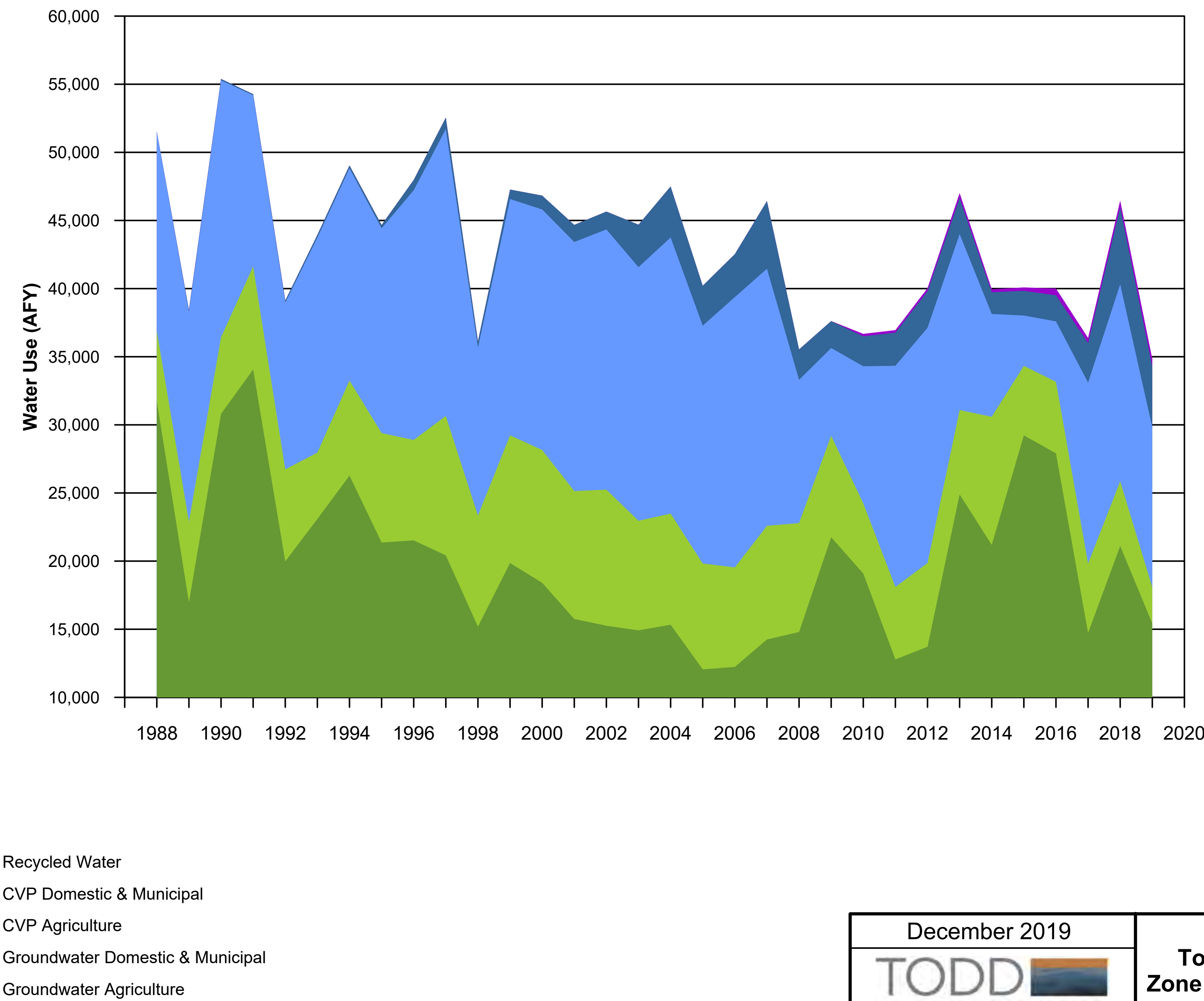
**Table E-6. Historical Municipal Water Use by Major Purveyor (AFY)**

| WY | Sunnyslope CWD - GW | City of Hollister - GW | City of Hollister - Cienega Wells[1] | San Juan Bautista | Tres Pinos CWD | Lessalt Treatment Plant | West Hills Treatment Plant | Undivided Total | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 1988 | | | | | | 0 | | 5,152 | 5,152 |
| 1989 | | | | | | 0 | | 6,047 | 6,047 |
| 1990 | | | | | | 0 | | 5,725 | 5,725 |
| 1991 | | | | | | 0 | | 7,631 | 7,631 |
| 1992 | | | | | | 0 | | 6,912 | 6,912 |
| 1993 | | | | | | 0 | | 5,066 | 5,066 |
| 1994 | | | | | | 0 | | 7,186 | 7,186 |
| 1995 | 2,167 | 2,446 | | | | 0 | | | 4,613 |
| 1996 | 2,139 | 3,386 | | | | 0 | | | 5,525 |
| 1997 | 2,638 | 3,848 | | | | 0 | | | 6,486 |
| 1998 | 2,357 | 3,441 | | | | 0 | | | 5,798 |
| 1999 | 2,820 | 3,558 | | | | 0 | | | 6,378 |
| 2000 | 3,214 | 4,021 | | | | 0 | | | 7,235 |
| 2001 | 3,290 | 3,851 | | | | 0 | | | 7,141 |
| 2002 | 3,256 | 4,120 | | | | 21 | | | 7,398 |
| 2003 | 2,053 | 2,754 | | | | 2,494 | | | 7,302 |
| 2004 | 2,426 | 2,828 | | | | 2,101 | | | 7,356 |
| 2005 | 1,959 | 3,147 | 123 | 247 | 49 | 1,843 | | | 7,368 |
| 2006 | 1,907 | 2,801 | 123 | 150 | 49 | 1,900 | | | 6,930 |
| 2007 | 2,413 | 2,758 | 123 | 47 | 49 | 1,719 | | | 7,108 |
| 2008 | 2,294 | 2,746 | 123 | 417 | 47 | 1,323 | | | 6,949 |
| 2009 | 2,251 | 2,503 | 123 | 373 | 47 | 1,212 | | | 6,509 |
| 2010 | 1,861 | 2,194 | 108 | 308 | 47 | 1,344 | | | 5,861 |
| 2011 | 2,225 | 1,651 | 80 | 292 | 47 | 1,593 | | | 5,887 |
| 2012 | 2,360 | 1,761 | 130 | 267 | 45 | 1,657 | | | 6,219 |
| 2013 | 1,655 | 2,655 | 120 | 281 | 46 | 1,648 | | | 6,405 |
| 2014 | 2,134 | 2,646 | 114 | 285 | 49 | 979 | | | 6,207 |
| 2015 | 1,348 | 1,960 | 114 | 225 | 49 | 1,364 | | | 5,060 |
| 2016 | 1,331 | 1,615 | 105 | 232 | 49 | 1,682 | | | 5,014 |
| 2017 | 1,449 | 1,543 | 79 | 249 | 32 | 1,940 | 51 | | 5,344 |
| 2018 | 978 | 1,217 | 121 | 184 | 34 | 1,596 | 1,990 | | 6,119 |
| 2019 | 565 | 588 | 283 | 257 | 33 | 1,660 | 2,524 | | 5,912 |

1. Data from Hollister Cienega Wells for 2005-2008 was estimated to be the same as WY 2009

Cells with no data indicate that the information is unavailable, while years with no use are shown explicitly as 0's.

Todd Groundwater 12/9/2019

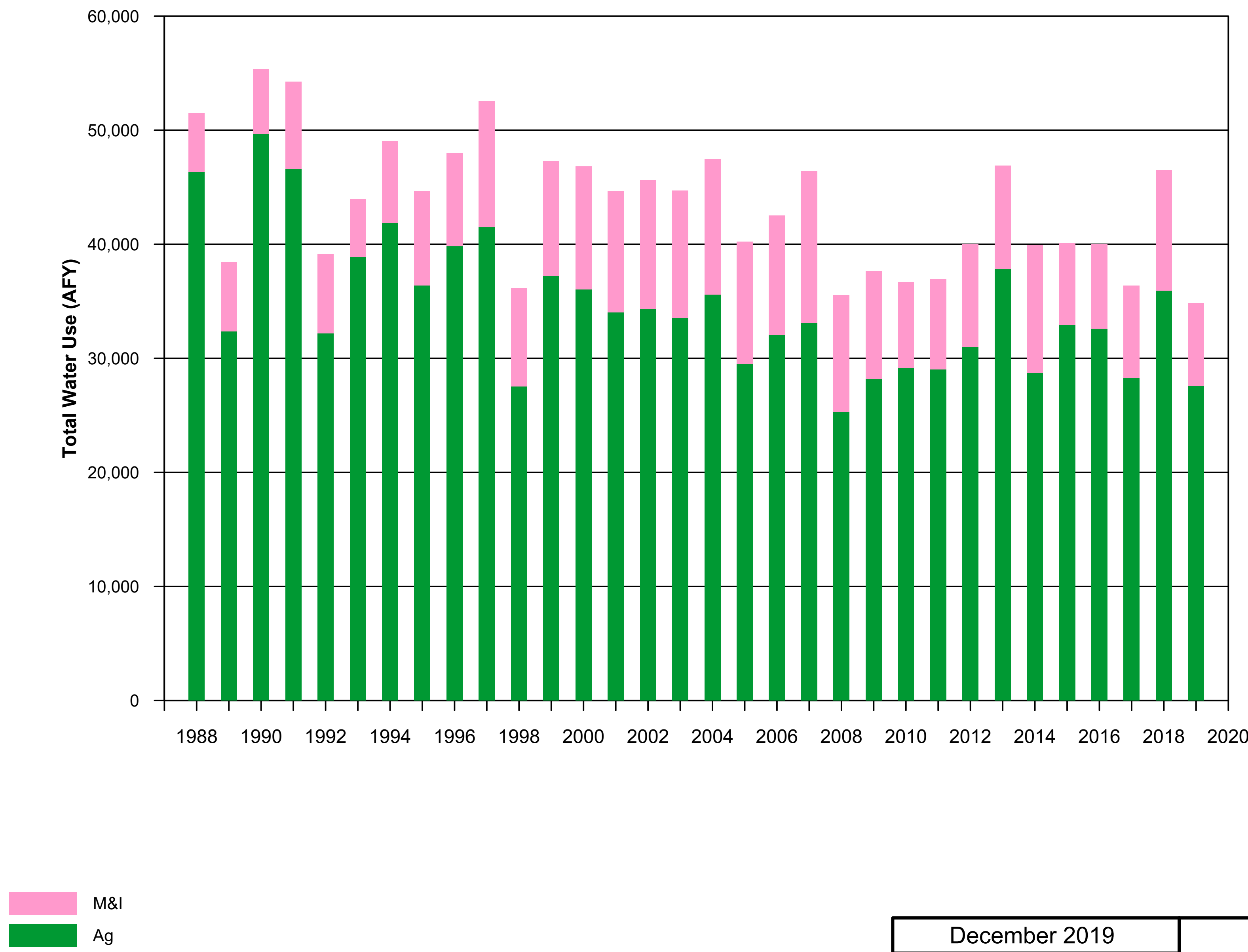



December 2019

TODD GROUNDWATER

**Appendix E-1**
**Total Water Use in Zone 6 by Water Source and User Category**

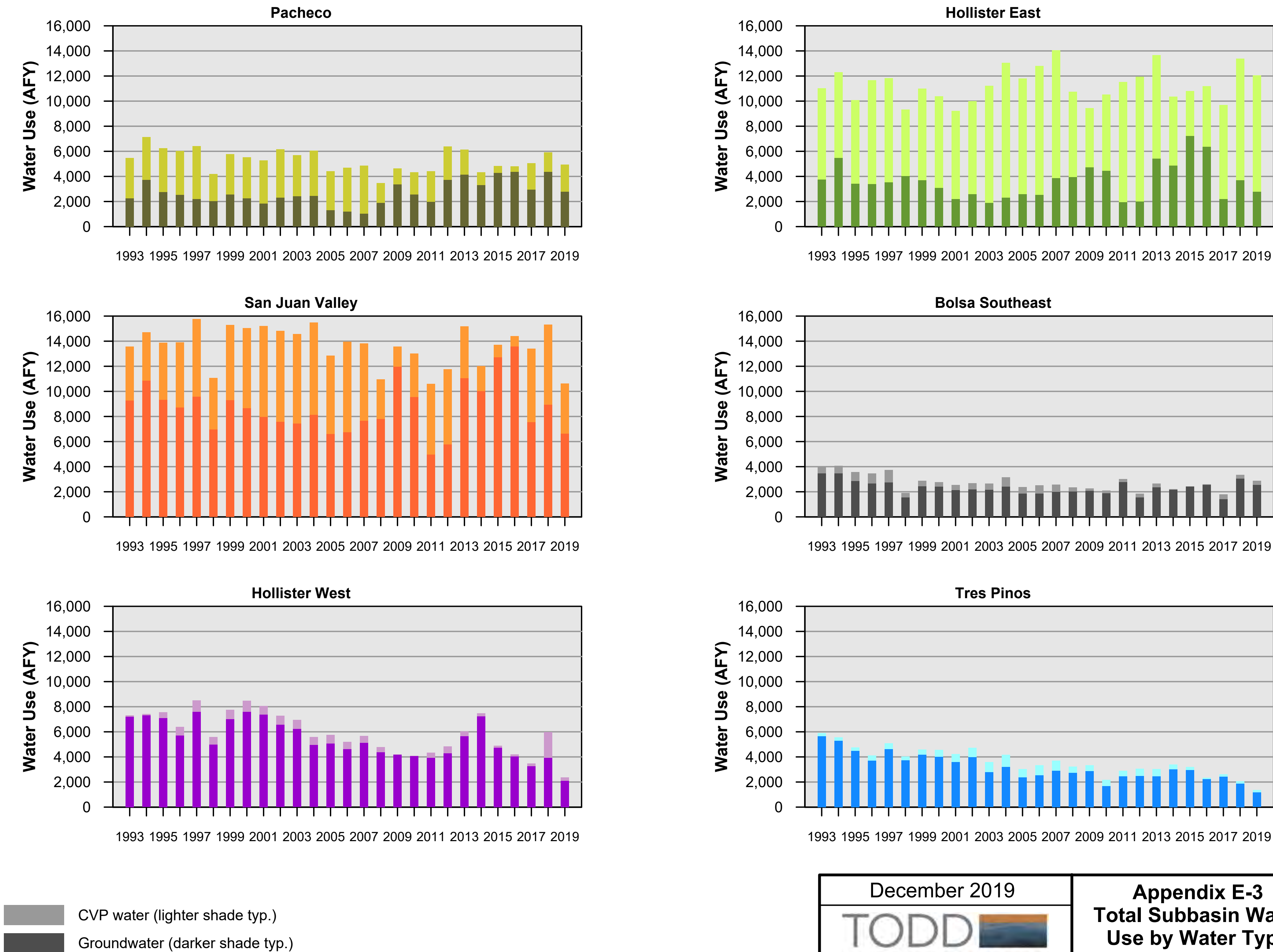
Path: T:\Projects\San Benito Annual 37636\GRAPHICS\2019 Annual Groundwater Report\AppendixE-1.gpj




December 2019

TODD GROUNDWATER

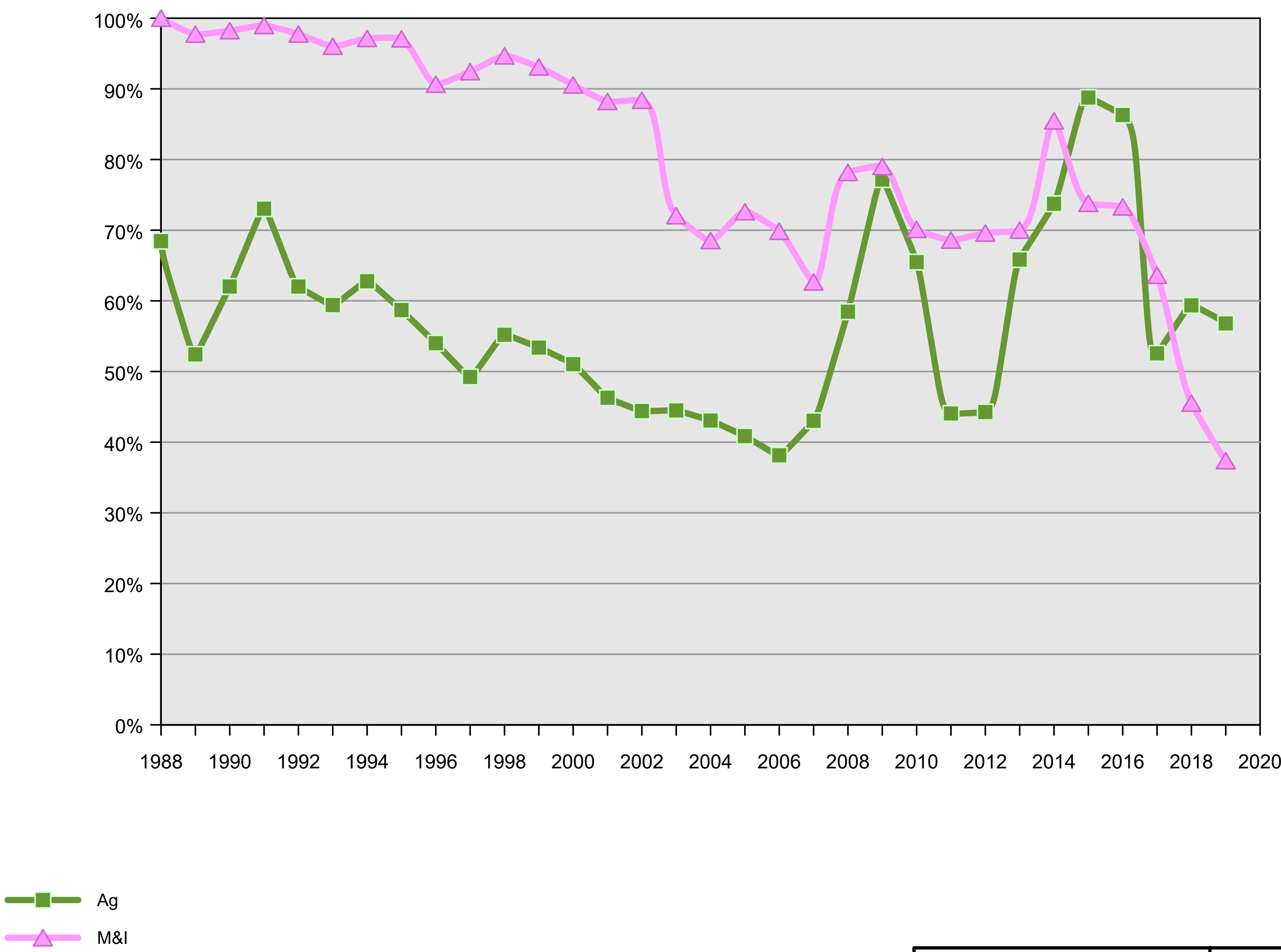
**Appendix E-2**
**Water Use in Zone 6**
**by User Category**




December 2019

TODD GROUNDWATER

**Appendix E-3**
**Total Subbasin Water Use by Water Type**
**Zone 6**

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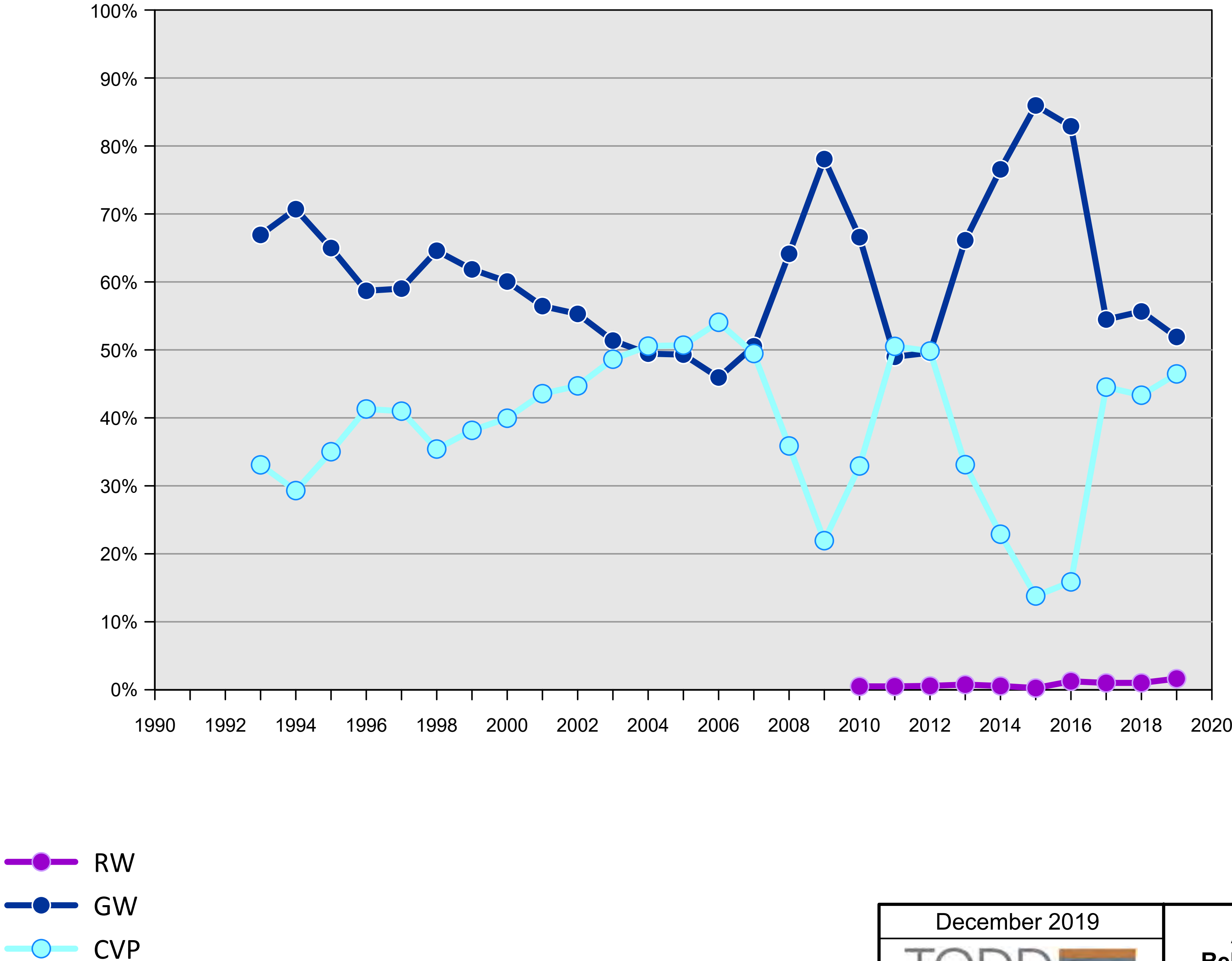
December 2019

TODD GROUNDWATER

**Appendix E-4**
**Portion of Ag and M&I Supply Satisfied by Groundwater**




December 2019

TODD GROUNDWATER

**Appendix E-5**
**Relative Water Use by Supply Source**

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# APPENDIX F RATES AND CHARGES

## List of Tables and Figures

**Table F-1. 2019 Recommended Groundwater Revenue Requirement/Charges**

**San Benito County Water District**
**Groundwater Rates**
**Water Year**
**2019-2020, 2020-2021, 2021-2022**
**Zone 6**

| REVENUE REQUIREMENTS | | | | Rates[2] | |
|---|---|---|---|---|---|
| **Component** | **Rate ($/AF)** | **Quantity (A/F)[1]** | **Amount** | **Ag** (per A/F) | **M & I** (per A/F) |
| **SOURCE OF SUPPLY O&M** | | | | | |
| AG | $ 18.68 | 23,974 | $ 447,851 | $ 18.68 | |
| M&I | $ 18.68 | 4,877 | $ 91,110 | | $ 18.68 |
| **PERCOLATION COSTS** | | | | | |
| **Cost of Water** | | | | | |
| AG Cost of Water[3] | $ 53.51 | 2,105 | $ 112,612 | $ 4.70 | |
| M&I Cost of Water[3] | $ 163.58 | 428 | $ 70,036 | | $ 14.36 |
| **Power Costs** | | | | | |
| AG Power Charge for percolation | $ 58.83 | 2,105 | 123,812 | $ 5.16 | |
| M&I Power Charge for percolation | $ 58.83 | 428 | 25,188 | | $ 5.16 |
| **TOTAL** | | | | $ 28.54 | $ 38.21 |
| Current Groundwater Charge[4] (per acre foot) | | | | $ 7.95 | $ 24.25 |
| **RECOMMENDED Rate Basis (per acre foot)** | | | | | |
| Water Year 2019-2020 | | | | **$ 12.74** | **$ 38.21** |
| Water Year 2020-2021 | | | | **$ 13.12** | **$ 39.36** |
| Water Year 2021-2022 | | | | **$ 13.51** | 40.54 |
| **RECOMMENDED CHARGES (per acre foot)** | | | | | |
| Water Year 2019-2020 | | | | **$ 12.75** | 38.25 |
| Water Year 2020-2021 | | | | **$ 13.15** | 39.40 |
| Water Year 2021-2022 | | | | **$ 13.55** | 40.55 |

Notes:

1 Assumed Volumes
Groundwater usage (based on average of past 4 years)

| | |
|---|---|
| Ag usage | 23,974 |
| M&I usage | 4,877 |
| Total | 28,851 |

2 Rates=Revenue Requirements/projected groundwater usage

3 Cost of Water:
AG: USBR and SLDMWA O&M
M&I: USBR and SLDMWA O&M, USBR Out-of-Basin Interest

4 Groundwater charge adopted by San Benito County Water District Board of Directors in January 2017 (Ag) and January 2016 (M&I)

5 Assumed volumes for percolation (based on 3 year average)

| | | |
|---|---|---|
| Ag | 83% | 2105 |
| M&I | 17% | 428 |
| Total | 100% | 2533 |

6 Annual escalation rate 3%

7 Rates charged will be rounded up to nearest $.05

Note: Section 70-7.8 (a) of the District Act states that the agricultural rate shall not exceed one-third of the rates for all water other than agricultural water.

**Table F-2. Historical and Current San Benito County Water District CVP (Blue Valve) Water Rates (dollars/af)**

| USBR Water Year | Standby & Availability Charge (dollars/acre) | Water Charge | | Power Charge | | | | | Groundwater Charge (dollars/af) | | | Recycled Water (per AF) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agricultural | Municipal & Industrial | Distribution Subsystem | | | | | Agricultural | Municipal & Industrial | | Agricultural | Power Charge |
| | | | | 2 | 6H | 9L | 9H | Others | | | | | |
| 1987 | $8.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | | | |
| 1988 | $2.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | | | |
| 1991 | $4.00 | $38.00 | $110.00 | | | | | | $6.25 | $22.00 | | | |
| 1992 | $4.00 | $45.00 | $120.00 | | | | | | $2.00 | $10.00 | | | |
| 1994 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $5.00 | | | |
| 1995 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $15.75 | First 100 af | | |
| | | | | | | | | | | $36.70 | Next 500 af | | |
| | | | | | | | | | | $54.60 | Over 600 af | | |
| 1996 | $6.00 | $75.00 | $150.00 | | | | | | $1.50 | $33.00 | | | |
| 1997 | $6.00 | $75.00 | $157.00 | | | | | | $1.50 | $33.00 | | | |
| 1998 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $33.00 | | | |
| 2000 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $11.50 | | | |
| 2001 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $25.00 | | | |
| 2004 | $6.00 | $75.00 | $150.00 | $24.30 | $46.75 | $25.05 | $53.70 | $15.25 | $1.50 | $10.00 | | | |
| 2005 | $6.00 | $80.00 | $150.00 | $26.15 | $49.40 | $35.00 | $66.90 | $17.10 | $1.50 | $21.50 | | | |
| 2006 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | | | |
| 2007 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | | | |
| 2008 | $6.00 | $100.00 | $170.00 | $17.25 | $19.40 | $32.60 | $62.75 | $14.85 | $1.50 | $21.50 | | | |
| 2009 | $6.00 | $115.00 | $180.00 | $17.50 | $20.25 | $42.55 | $74.85 | $16.30 | $2.50 | $22.50 | | | |
| 2010 | $6.00 | $135.00 | $200.00 | $22.00 | $27.30 | $49.75 | $84.35 | $21.75 | $2.50 | $22.50 | | | |
| 2011 | $6.00 | $155.00 | $220.00 | $22.70 | $28.15 | $51.25 | $86.90 | $22.40 | $2.50 | $22.50 | | | |
| 2012 | $6.00 | $170.00 | $235.00 | $23.35 | $29.00 | $52.80 | $89.50 | $23.10 | $2.50 | $22.50 | | | |
| 2013 | $6.00 | $170.00 | $235.00 | $40.30 | $29.25 | $43.05 | $91.55 | $22.40 | $3.25 | $23.25 | | | |
| 2014 | $6.00 | $170.00 | $238.00 | $41.55 | $30.15 | $44.35 | $94.30 | $23.10 | $3.60 | $23.25 | | | |
| 2015 | $6.00 | $179.00 | $247.00 | $42.75 | $31.05 | $45.70 | $97.15 | $23.80 | $3.95 | $23.25 | | | |
| 2016 | $6.00 | $272.00 | $363.00 | $123.10 | $75.65 | $109.95 | $162.55 | $66.05 | $4.95 | $24.25 | | $182.55 | $57.70 |
| 2017 | $6.00 | $191.00 | $363.00 | $126.80 | $77.90 | $113.25 | $167.45 | $68.05 | $6.45 | $24.25 | | $183.45 | $59.45 |
| 2018 | $6.00 | $209.00 | $363.00 | $130.60 | $80.25 | $116.25 | $172.45 | $70.10 | $7.95 | $24.25 | | $183.45 | $59.45 |
| 2019 | $6.00 | $254.00 | $404.00 | $80.45 | $39.30 | $88.15 | $130.30 | $33.70 | $12.75 | $38.25 | | $183.45 | $59.45 |

Notes:
af = acre-feet.
n.c. = no classification.
n.i. = not implemented
All rates effective March 1 through following February.

**Table F-3. Recent US Bureau of Reclamation Charges per Acre-Foot for CVP Water**

| User Category and Cost Item | Irrigation[1] | | | | | | Municipal & Industrial | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cost of service (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] | Cost of service[2] (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] |
| 1994 | $71.68 | $6.20 | n.a. | | $77.88 | $17.21 | $165.67 | $12.40 | n.a. | | $178.07 | $85.86 |
| 1995 | $66.47 | $6.35 | n.a. | | $72.82 | $17.21 | $132.90 | $12.69 | n.a. | | $145.59 | $85.86 |
| 1996 | $65.63 | $6.53 | n.a. | | $72.16 | $27.46 | $127.40 | $13.06 | n.a. | | $140.46 | $85.86 |
| 1997 | $69.57 | $6.70 | n.a. | | $76.27 | $27.46 | $143.27 | $13.39 | n.a. | | $156.66 | $85.86 |
| 1998 | $61.58 | $6.88 | $5.00 | | $73.46 | $27.46 | $130.88 | $13.76 | $5.00 | | $149.64 | $85.86 |
| 1999 | $60.30 | $6.98 | $2.73 | | $70.01 | $27.46 | $127.91 | $13.96 | $2.73 | | $144.60 | $85.86 |
| 2000 | $64.24 | $7.10 | $6.43 | | $77.77 | $27.46 | $129.59 | $14.20 | $6.43 | | $150.22 | $85.86 |
| 2001 | $69.50 | $7.28 | $2.65 | | $79.43 | $27.46 | $129.40 | $14.56 | $4.15 | | $148.11 | $85.86 |
| 2002 | $68.71 | $7.54 | $6.61 | | $82.86 | $24.30 | $130.32 | $15.08 | $6.61 | | $152.01 | $79.13 |
| 2003 | $72.20 | $7.69 | $5.46 | | $85.35 | $24.30 | $129.07 | $15.38 | $5.46 | | $149.91 | $79.13 |
| 2004 | $74.52 | $7.82 | $6.61 | | $88.95 | $24.30 | $134.86 | $15.64 | $6.61 | | $157.11 | $79.13 |
| 2005 | $77.10 | $7.93 | $7.99 | | $93.02 | $24.30 | $132.01 | $15.87 | $7.99 | | $155.87 | $79.13 |
| 2006 | $91.13 | $8.24 | $9.31 | | $108.68 | $30.93 | $214.41 | $16.49 | $9.31 | | $240.21 | $77.12 |
| 2007 | $93.53 | $8.58 | $9.99 | $0.11 | $112.21 | $30.93 | $215.32 | $17.15 | $9.99 | $0.11 | $242.46 | $80.08 |
| 2008[6] | $28.12 | $8.79 | $10.95 | $0.07 | $47.93 | $30.93 | $33.34 | $17.57 | $10.95 | $0.07 | $61.68 | $33.34 |
| 2009 | $30.20 | $9.06 | $11.49 | $0.07 | $50.82 | $30.20 | $32.77 | $18.12 | $11.49 | $0.07 | $62.45 | $32.77 |
| 2010 | $33.27 | $9.11 | $11.91 | $0.11 | $54.40 | $33.27 | $36.11 | $18.23 | $11.91 | $0.11 | $66.36 | $36.11 |
| 2011 | $38.92 | $9.29 | $9.51 | $0.05 | $57.77 | $38.92 | $42.58 | $18.59 | $9.51 | $0.05 | $70.73 | $42.58 |
| 2012 | $39.71 | $9.39 | $15.20 | $0.05 | $64.35 | $39.71 | $37.95 | $18.78 | $15.20 | $0.05 | $71.98 | $37.95 |
| 2013 | $40.39 | $9.79 | $17.29 | $0.05 | $67.52 | $39.91 | $38.71 | $19.58 | $17.29 | $0.05 | $75.63 | $40.92 |
| 2014 | $46.87 | $9.99 | $28.81 | $0.23 | $85.90 | $46.87 | $29.70 | $19.98 | $28.81 | $0.23 | $78.72 | $29.70 |
| 2015 | $53.82 | $10.07 | $30.66 | $0.23 | $94.78 | $53.82 | $34.74 | $20.14 | $30.66 | $0.23 | $85.77 | $34.74 |
| 2016 | $85.12 | $10.21 | $30.66 | $0.30 | $126.29 | $38.28 | $61.24 | $20.41 | $30.66 | $0.30 | $112.61 | $23.42 |
| 2017 | $66.17 | $10.23 | $14.15 | $0.30 | $90.85 | $39.90 | $49.50 | $20.45 | $14.15 | $0.30 | $84.40 | $22.85 |
| 2018 | $79.09 | $10.47 | $20.39 | $0.30 | $110.25 | $48.35 | $43.74 | $20.94 | $20.39 | $0.30 | $85.37 | $17.45 |
| 2019 | $67.32 | $10.63 | $20.26 | $0.30 | $98.51 | $40.14 | $37.54 | $21.26 | $20.26 | $0.30 | $79.36 | $17.98 |

Notes:

(1) Total USBR rate given for non-full cost users only, as they represent the majority of water users.

(2) Cost-of-service for agricultural and municipal and industrial users includes a capital repayment rate and an operation and maintenance (O&M) rate. For municipal and industrial customers, cost-of-service also includes a deficit charge, which includes interest on unpaid O&M and interest on capital and on unpaid deficit.

(3) Restoration fund charges apply October 1 through September 30. All other rates effective March 1 through following February.

(4) Beginning in 1998, the San Luis-Delta Mendota Water Authority instituted this charge to "self-fund" costs associated with maintaining the Delta-Mendota Canal and certain other facilities, which were formerly funded directly by the Bureau of Reclamation. SLDMWA issues preliminary rates in December for the upcoming contract year (March-February). These rates are used for rate-setting purposes; actual rates may vary.

(5) The contract rate is the minimum rate CVP contractors are allowed to pay. To the extent that the contract rate does not cover interest plus actual operation and maintenance costs, a contractor deficit is accumulated that is charged interest at the current-year treasury borrowing rate.

(6) Per the amendatory contract with the USBR "out of basin" capital costs that were previously included in the cost of service are now under a separate repayment contract.

(7) Cost of service rates are inclusive of USBR direct pumping and Project Use Energy costs.

# APPENDIX G LIST OF ACRONYMS

## List of Acronyms

| | |
|---|---|
| AF or A/F | acre-foot |
| AFY | acre-foot per year |
| AG | agriculture |
| BMP | Best Management Practices |
| CASGEM | California Statewide Groundwater Elevation Monitoring |
| CEQA | California Environmental Quality Act |
| cfs | cubic feet per second |
| CIMIS | California Irrigation Management Information System |
| COC | Constituent of Concern |
| CVP | Central Valley Project |
| District or SBCWD | San Benito County Water District |
| CWD | County Water District |
| DDW | Division of Drinking Water |
| DWR | California Department of Water Resources |
| DWTP | Domestic Wastewater Treatment Plant |
| ET | evapotranspiration |
| ft | feet |
| GAMA | Groundwater Ambient Monitoring and Assessment |
| GICIMA | Groundwater Information Center Interactive Map |
| GPBO | General Basin Plan Objective |
| gpd | gallons per day |
| GSA | Groundwater Sustainability Agency |
| GSP | Groundwater Sustainability Plan |
| GW | groundwater |
| HUA | Hollister Urban Area |
| IRWMP | Integrated Regional Water Management Plan |
| ITRC | Irrigation Training and Research Center, California Polytechnic State University |
| IWTP | Industrial Wastewater Treatment Plant |
| M&I | Municipal and Industrial |
| MA | Management Area |
| MCL | Maximum Contaminant Level |
| MGD | million gallons per day |
| msl | mean sea level |
| MW | Monitored well |
| NGVD | National Geodetic Vertical Datum |
| pdf | Adobe Acrobat Portable Document Format |
| PPWD | Pacheco Pass Water District |
| PVWMA | Pajaro Valley Water Management Agency |
| RW | recycled water |
| RWQCB | Regional Water Quality Control Board |

## List of Acronyms (cont.)

| | |
|---|---|
| SCVWD | Santa Clara Valley Water District |
| SEIR | Supplemental Environmental Impact Report |
| SGMA | Sustainable Groundwater Management Act |
| SLDMWA | San Luis & Delta-Mendota Water Authority |
| SMCL | Secondary Maximum Contaminant Levels |
| SSCWD | Sunnyslope County Water District |
| USBR | U.S. Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| WRA | Water Resources Association of San Benito County |
| WTP | Water Treatment Plant |
| WWTP | Wastewater Treatment Plant |
| WY | water year |

# 2020

SAN BENITO COUNTY WATER DISTRICT
ESTABLISHED NOV. 8, 1953
HOLLISTER, CA

# Annual Groundwater Report

TODD GROUNDWATER

# ANNUAL GROUNDWATER REPORT 2020

December 2020

TODD GROUNDWATER

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Alameda, CA 94501
510.747.6920
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# SIGNATURE PAGE

Iris Priestaf, PhD

President



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## Appendices (following text)

# EXECUTIVE SUMMARY

This Annual Groundwater Report for San Benito County Water District (District) describes groundwater conditions in the San Benito County portions of the North San Benito Subbasin of the Gilroy-Hollister Basin. Consistent with past reports, this Annual Report focuses on the District's Zone 6, the zone of benefit for importation of Central Valley Project (CVP) water supply. The Report is prepared at the request of the District Board of Directors and is consistent with the special act of the State that established the District. It documents water sources and uses, groundwater elevations and storage, and management activities for Water Year 2020 and it provides recommendations. Water Year 2020 was characterized by below average rainfall, below average CVP allocations, and stable to slightly decreased groundwater storage in parts of the basin.

This Water Year, the District has continued to develop their Groundwater Sustainability Plan (GSP) in compliance with the Sustainable Groundwater Management Act (SGMA). The area of the plan is the North San Benito Groundwater Subbasin, a Subbasin approved by the Department of Water Resources (DWR) in 2019 that includes the former Hollister, San Juan, and Bolsa subbasins as well as Tres Pinos Valley Basin. The District, as Groundwater Sustainability Agency (GSA) is leading preparation of the Groundwater Sustainability Plan (GSP) in cooperation with the Santa Clara Valley Water District (SCVWD) GSA. Upon adoption by the District and SCVWD boards, the GSP will provide the information and tools for continued groundwater management.

After completion of the GSP, expected late 2021, the District will be required to submit Annual GSP Reports to DWR. This 2020 Annual Groundwater Report continues a transition to an annual groundwater report that meets the requirements of the District Act and satisfies SGMA requirements. This includes expanding the report coverage to address the entire North San Benito Subbasin. The requirements of an Annual Report under SGMA are similar to the current Annual Groundwater Report but will require submittal of the Report to the DWR web portal along with completed data tables with information on water levels and water use. The Annual Groundwater Report for Water Year 2020 includes a detailed list of requirements for a SGMA Annual Report including data uploads and a description of progress towards GSP implementation.

The District has effectively managed water resources in San Benito County for decades. Working collaboratively with other agencies, the District has eliminated historical overdraft, developed and managed multiple sources of supply, established an effective water conservation program, protected water quality, and provided annual reporting. Water Year 2020 witnessed a continuation of these collaborative efforts and significant progress in developing the GSP. The continued partnership of the Hollister Urban Area (including the District, City of Hollister, and Sunnyslope County Water District (SSCWD)) resulted in increased water treatment capacity that significantly enhances opportunities for conjunctive use of CVP and groundwater and improves delivered water quality for municipal costumers. The District's continued public outreach—including preparation of Annual Groundwater Reports—has been an asset to the GSP process and is a foundation for future groundwater management.

# 1-INTRODUCTION

The San Benito County Water District (District or SBCWD) was formed in 1953 by a special act (District Act) of the State with responsibility and authority to manage groundwater. The District Act authorizes the Board of Directors, at its discretion, to direct staff to prepare an annual investigation and report on groundwater conditions of the District and its zones of benefit, such as Zone 6, the area for distribution of Central Valley Project (CVP) water. As documented in **Appendix A,** the District Act specifies the minimum content of the report should the District choose to prepare one. Annual Reports have been prepared historically to analyze the status of the groundwater basin, to evaluate conditions in the next year, and to provide management recommendations.

With passage of the Sustainable Groundwater Management Act (SGMA) in 2014, the State has created a new framework for groundwater basin management, monitoring, and reporting by local agencies. The District has responded proactively. The District is the exclusive Groundwater Sustainability Agency (GSA) for the North San Benito Groundwater Basin in San Benito County shown on Figure 1-1. This basin was formerly defined as three separate subbasins of the Gilroy-Hollister basin and the Tres Pinos Valley basin. The District is currently preparing a Groundwater Sustainability Plan (GSP) for the North San Benito Basin in cooperation with Santa Clara Valley Water District (SCVWD), which is the GSA for the small portions of the basin within Santa Clara County.

As presented in the GSP, the North San Benito Groundwater Basin has been divided into four management areas, shown in **Figure 1-2**. These management areas are designed to facilitate implementation of the GSP. As of November 2020, the District and Todd Groundwater have completed and made publicly available six draft sections of the plan, participated in three public workshops, and thirteen Technical Advisory Committee meetings. After the GSP is approved and submitted to DWR, the District GSA is responsible for preparing SGMA Annual Reports. The SGMA requirements are similar to the District Act requirements but diverge in the specific data sets that must be included; these specifics are discussed further in Section 6. A notable difference between the requirements is the deadline for submittal. While the Annual Report according to the District Act must be submitted to the board by the second week of December after the end of the water year, the SGMA Annual Report must be submitted by April 1 after the end of the water year. The Annual Groundwater Report for Water Year 2020 follows the District Act. Next year, SGMA requires submittal of an Annual Groundwater Report for Water Year 2021 by April 1; it is recommended that the report submittal schedule be shifted to the April 1 deadline.

Consistent with the District Act and prepared at the request of the Board, this Annual Report documents water supply sources and use, groundwater elevations and storage, and District management activities from October 2019 through September 2020. It fulfills the minimum content for a District Annual Report and presents an overview of the state of the groundwater basin with recommendations for management. It conveys considerable information, including tables and figures, which are provided largely in **Appendices B through E**. **Appendix F** provides information on water rates and charges and **Appendix G** contains a list of acronyms.

The 2020 Annual Groundwater Report strives to maintain consistency with past Annual Reports while also providing a path to fulfill future requirements for SGMA Annual Reports. Water Year 2020 is the last annual report focused on Zone 6, as described in the District Act. Beginning with Water Year 2021, the Annual Groundwater Report will become a SGMA Annual Report and will comply with SGMA regulations and will satisfy the monitoring and reporting requirements in the District Act.

## Acknowledgments

This report was prepared by Iris Priestaf, PhD, Maureen Reilly, PE, Arden Wells, and Chad Taylor, PG, CHG of Todd Groundwater. We appreciate the assistance of San Benito County Water District staff, particularly Jeff Cattaneo, Sara Singleton, Garrett Haertel, and David Macdonald.

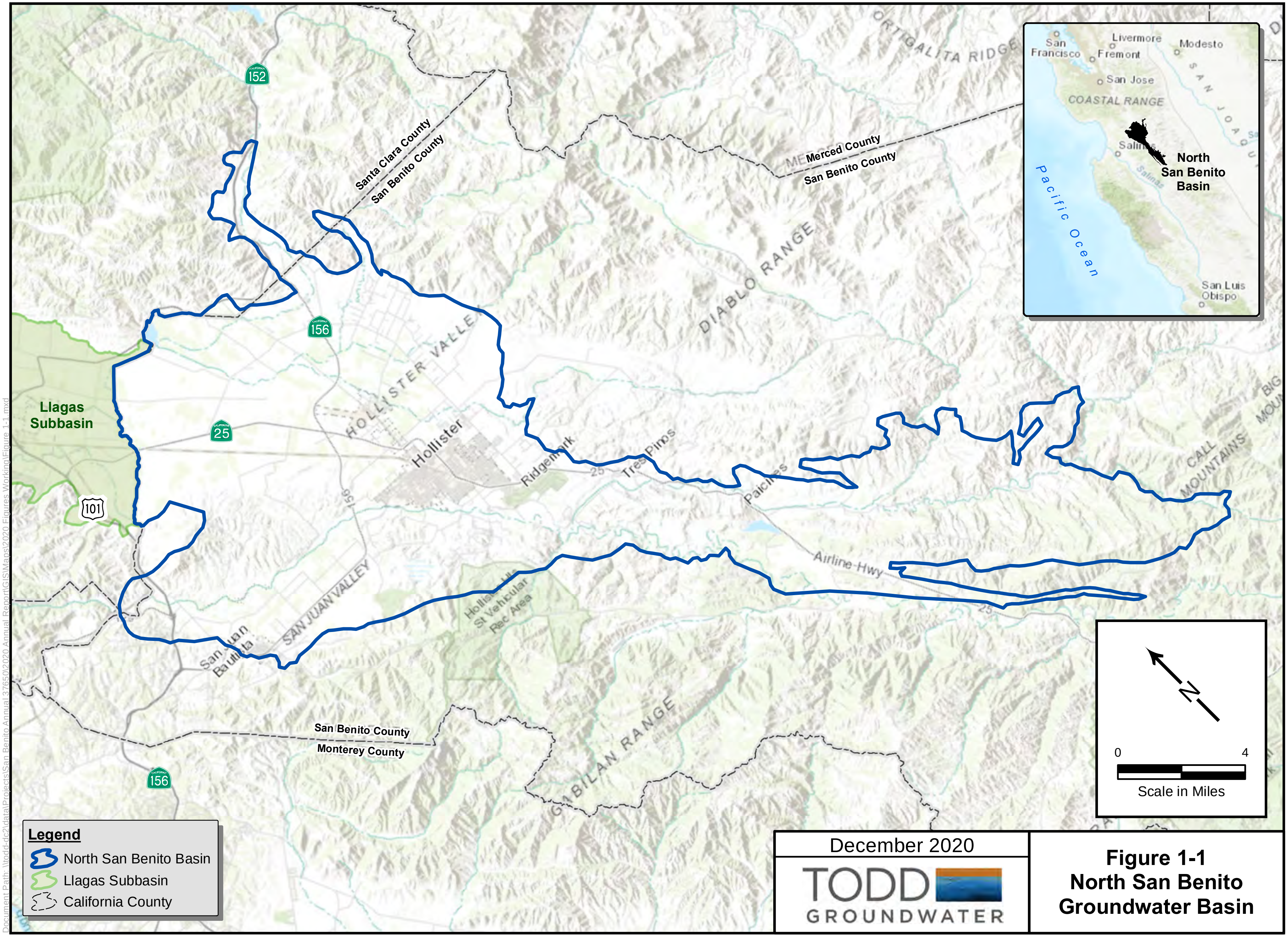



**Figure 1-1**
**North San Benito Groundwater Basin**

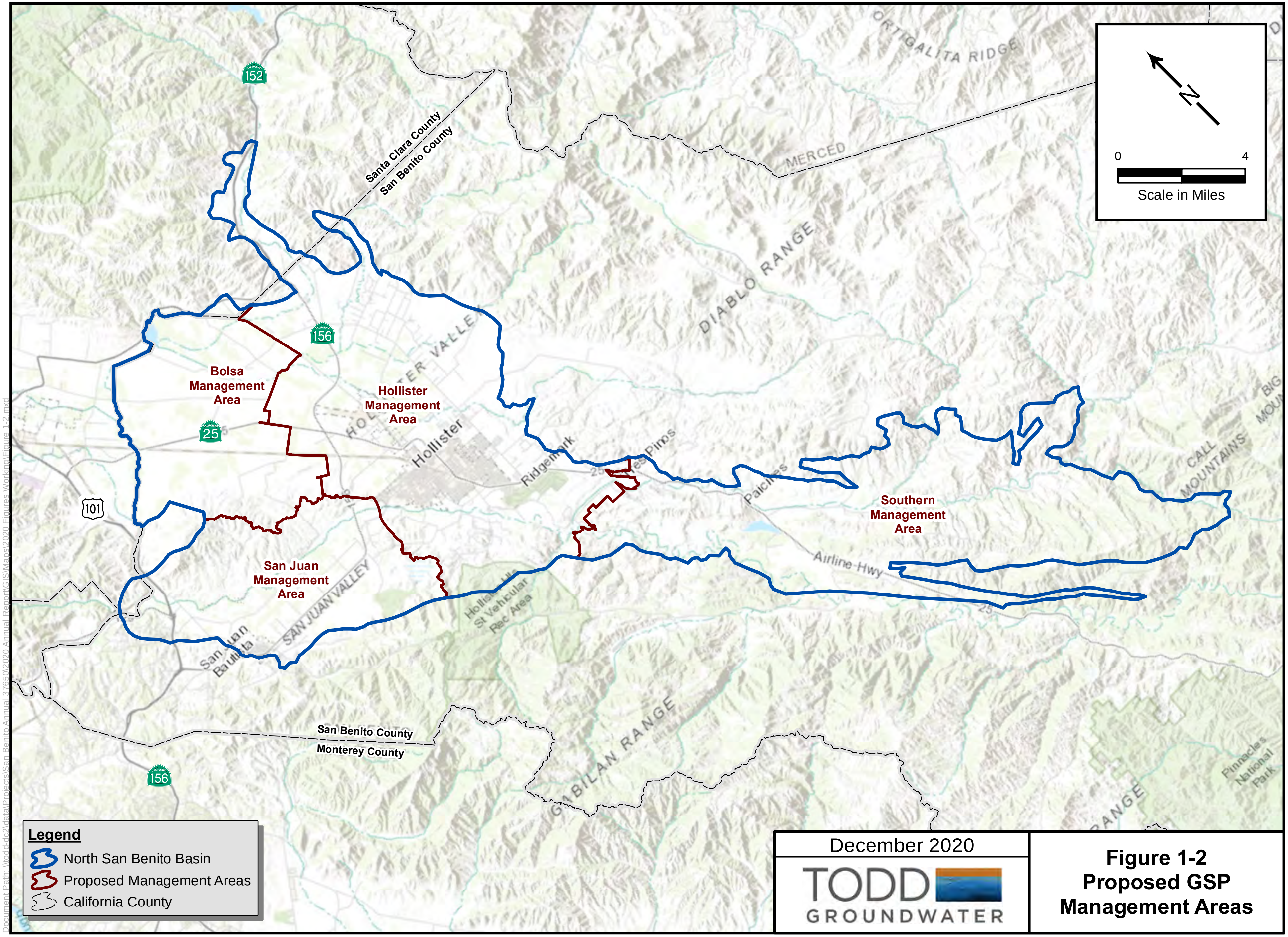



**Figure 1-2**
**Proposed GSP Management Areas**

# 2 – GEOGRAPHIC AREA

The geographic area and boundaries of local groundwater basins have been defined differently by the District and by the California Department of Water Resources (DWR) for their specific purposes. Like previous annual reports, this Annual Report has a focus on the San Benito County portions of the Gilroy-Hollister Groundwater Basin, including the previously defined Bolsa, Hollister, and northern San Juan Bautista subbasins. Nonetheless, it is recognized that the North San Benito Basin (Basin)[1] includes portions in Santa Clara County and that it extends farther to the south; the entire basin is the subject of the GSP. To support a transition to SGMA, the monitoring program is being improved and expanded.

## District-Defined Subbasins

For the past 25 years, the Annual Reports have focused on subbasins delineated in 1996 and based on hydrogeologic and other local factors (e.g., Zone 6 boundaries). These subbasins are shown in **Figure 2-1** in light blue. Six of these subbasins are defined within Zone 6, including Bolsa Southeast (SE), Pacheco, Hollister East (North and South), Tres Pinos, Hollister West, and San Juan subbasins. The seventh is the Bolsa subbasin; of the subbasins shown on the map, only the Bolsa subbasin receives no direct CVP deliveries and relies on local groundwater.

## DWR-Defined Basin

As the District proceeds with SGMA planning and implementation, its area of focus is changing from the 1996-defined subbasins and Zone 6 to the North San Benito Basin and GSP area outlined in **Figure 1-1**, in dark blue. All groundwater basins defined by DWR as wholly or partially in San Benito County are shown in **Figure C-1** in **Appendix C.**

Next year, the SGMA Annual Report will report data only on the management areas, shown in red on **Figure 1-2,** not on the District-defined subbasins. The four proposed Management Areas (MAs) have been defined as part of the GSP process to facilitate implementation. A major factor in defining MAs is availability of water sources (e.g., CVP) and Zone 6. While recognizing that water supply availability (in terms of sources, infrastructure, and institutional arrangements) can change in the future, current availability is a reasonable starting point. SBCWD provides local surface water from Hernandez and Paicines reservoirs to a local zone of benefit, Zone 3, and provides imported Central Valley Project (CVP) water to Zone 6. The District-defined subbasins also relied on Zone 6 as a boundary and thus the District-defined subbasins generally fall within the boundaries of the MAs.

---

[1] The official nomenclature is North San Benito Subbasin of the Gilroy Hollister Basin; it has been assigned DWR Basin Number 3-003.05. For the purposes of this report, it is referred to as North San Benito Basin to clearly differentiate it from previous DWR-defined subbasins and from previous SBCWD-defined subbasins.

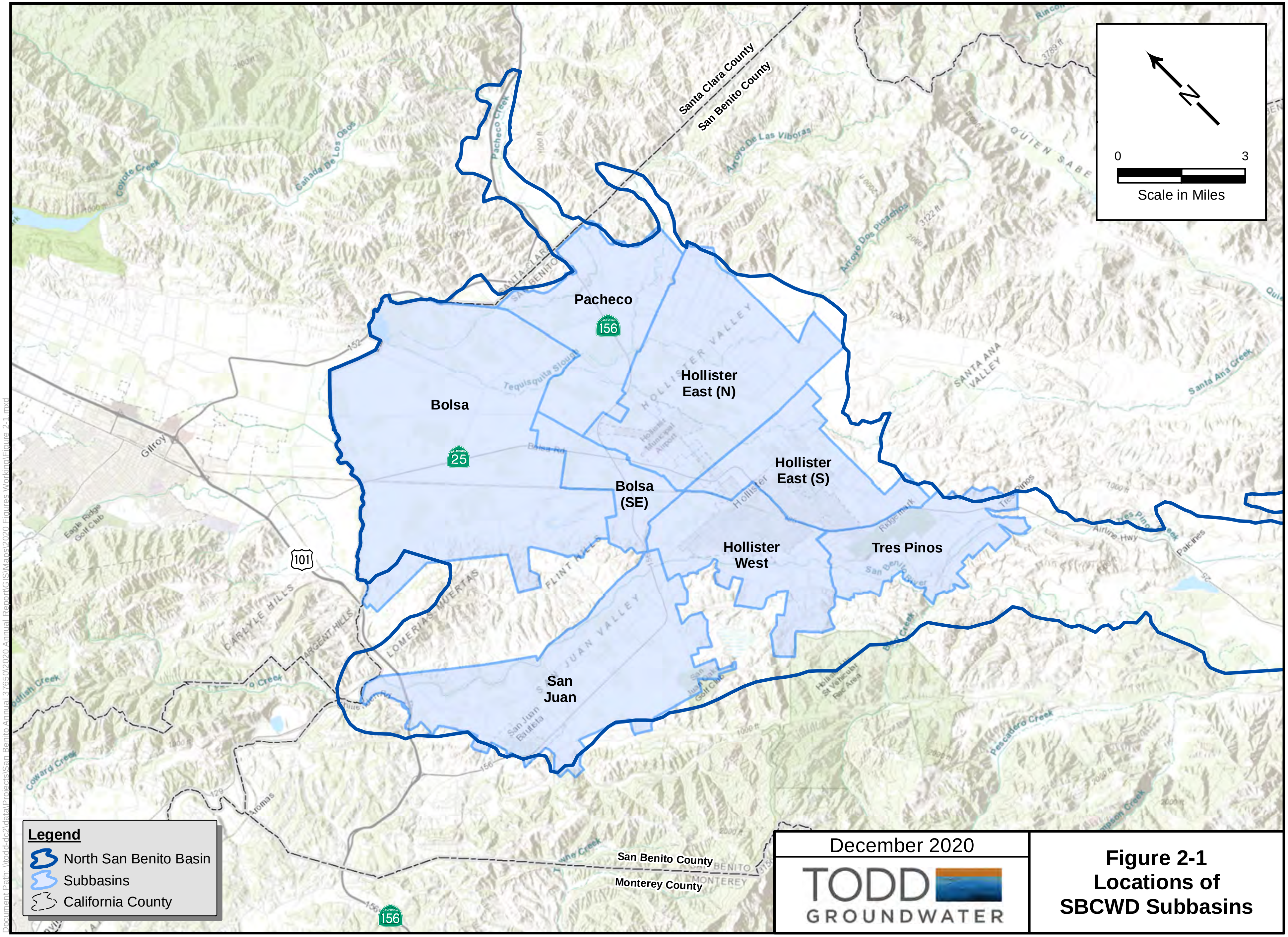



Figure 2-1
Locations of
SBCWD Subbasins

# 2 – GEOGRAPHIC AREA

The four Management Areas (MAs) are listed below with the District-defined subbasins that they generally encompass:

- Southern MA
- Hollister MA (includes Tres Pinos, Hollister East and West, Bolsa SE, Pacheco subbasins)
- San Juan MA (includes almost all District-defined San Juan subbasin)
- Bolsa MA (includes almost all District-defined Bolsa subbasin)

Hollister and San Juan MAs include portions of Zone 6; Southern and Bolsa MAs do not.

## Ongoing District Monitoring Programs

Data from monitoring programs undertaken by local, state, and federal agencies are summarized below as currently incorporated in the Annual Report. The District data compilation and monitoring programs will be expanded and revised in the future as data needs are identified in the GSP, for example to address topics such as potential groundwater dependent ecosystems, and to represent the entire North San Benito Basin.

**Climate.** Climate data are regularly compiled from DWR's California Irrigation Management Information System (CIMIS) and include: total solar radiation, soil temperature, air temperature/relative humidity, wind direction, wind speed, and precipitation. Additional precipitation data are available from the WRCC station at Hollister from 1934-2020 (WRCC 2020). For the Annual Groundwater Reports, historical annual precipitation has been compiled and reported using the Hollister rain gage for the long-term precipitation and the CIMIS San Benito station for recent monthly precipitation. Monthly precipitation and evapotranspiration for the Hollister #126 CIMIS station are tabulated in **Appendix B**.

**Groundwater levels.** SBCWD has had a semi-annual groundwater level monitoring program since Water Year (WY) 1977; groundwater level data gathered by USGS and other agencies are available as early as 1913 (Clark, 1924). The Annual Groundwater Reports provide quarterly groundwater level data in **Appendix C** for each year. The data are the basis for groundwater level contour maps, change maps, hydrographs, and storage change computations presented in the Annual Reports. The SBCWD monitoring program includes wells in the Pacheco Valley in Santa Clara County. SCVWD's monitoring program provides data for the southern Llagas Subbasin; these shared data are used in the SBCWD annual groundwater level maps.

SBCWD is the designated CASGEM monitoring agency for the GSP Area; CASGEM data are available from DWR's online Groundwater Information Center Interactive Map (GICIMA).

**Water quality**. In 1997, SBCWD initiated a program for monitoring nitrate and electrical conductivity (EC) in wells. In 2004, SBCWD established a comprehensive water quality database with records from all water systems and regulated facilities. The database is updated triennially as part of the Annual Report update. Monitoring for the Salt and Nutrient Management Plan is closely coordinated with ongoing monitoring and Annual Report updates. State-wide sources of groundwater quality data include the Water Data Library (WDL), Geotracker/GAMA program, and the State Water Resources Control Board's

Division of Drinking Water. These are accessed for the triennial update of the SBCWD Water Quality Database; the next update is planned for the Annual Report Water Year 2022.

**Reservoirs.** The Annual Report summarizes reservoir water budget information for Hernandez, Paicines, and San Justo reservoirs and provides annual total releases from Hernandez and Paicines reservoirs from Water Year 1996 to present. Reservoir storage and release data are available in **Appendix D**.

**Surface water flows and percolation.** Surface water monitoring and percolation are summarized in **Appendix D** of the Annual Groundwater Reports. For Water Year 1994 to present, percolation of imported CVP water is documented in **Table D-3** and percolation of wastewater is shown in **Tables D-4 and D-5**. The District temporarily suspended its surface water monitoring network but plans to relaunch surface water monitoring at selected sites as part of SGMA implementation. This water year, the District continues to expand their off-stream percolation locations for CVP recharge, including the addition of the Hollister percolation ponds located off stream along the San Benito River.

**Wells and groundwater pumping.** SBCWD monitors groundwater pumping in Zone 6 using electrical meters. Pumping amounts are calculated semiannually by metering the number of hours of pump operation and multiplying by the average discharge rate. This monitoring program began in about 1990 (soon after CVP imports started) and was based on recognition that CVP imports resulted in reduced pumping, increased recharge, and sustainable groundwater storage with regional benefits to groundwater users. Irrigation pumping beyond Zone 6 is not monitored but has been estimated for regular water budget updates based on land use information and water use factors. This method of estimating groundwater pumping will be replaced as part of SGMA implementation. The District is currently developing a new water use monitoring program that will address the entire GSA area and will be documented in future SGMA Annual Reports. Groundwater pumping estimates using the existing method for Zone 6 are summarized by major use category and subbasin in **Appendix E**, which also provides information on CVP use in Zone 6.

**Units and accuracy**. Throughout this report, water volumes and changes in storage are shown to the nearest acre-foot (AF). These values are accurate to one to three significant digits (depending on the measurement). All digits are retained in the text to maintain as much accuracy as possible during subsequent calculations, but results should be rounded appropriately.

# 3-GROUNDWATER CONDITIONS

The Annual Report summarizes basin conditions including climate, groundwater elevations, groundwater storage, and groundwater level trends. Overall, Water Year 2020 was a below-average hydrologic year, and while the above-average CVP allocations of the last USBR year carried over to this water year, new allocations were also below average.

## Climate

Assessment of climatic conditions begins with collection of climate data (rainfall and evapotranspiration), which are summarized in **Appendix B**. Local rainfall amounts are compiled on a monthly basis and reviewed as an increasingly variable factor that affects basin inflows (e.g., deep percolation) and outflows (groundwater pumping). Recognizing that drought often is extensive across California, local dry years also may be indicative of regional drought and reduced CVP allocations. Dry years often are characterized by increased groundwater pumping for agricultural irrigation to offset lack of rainfall and reduced CVP allocations.

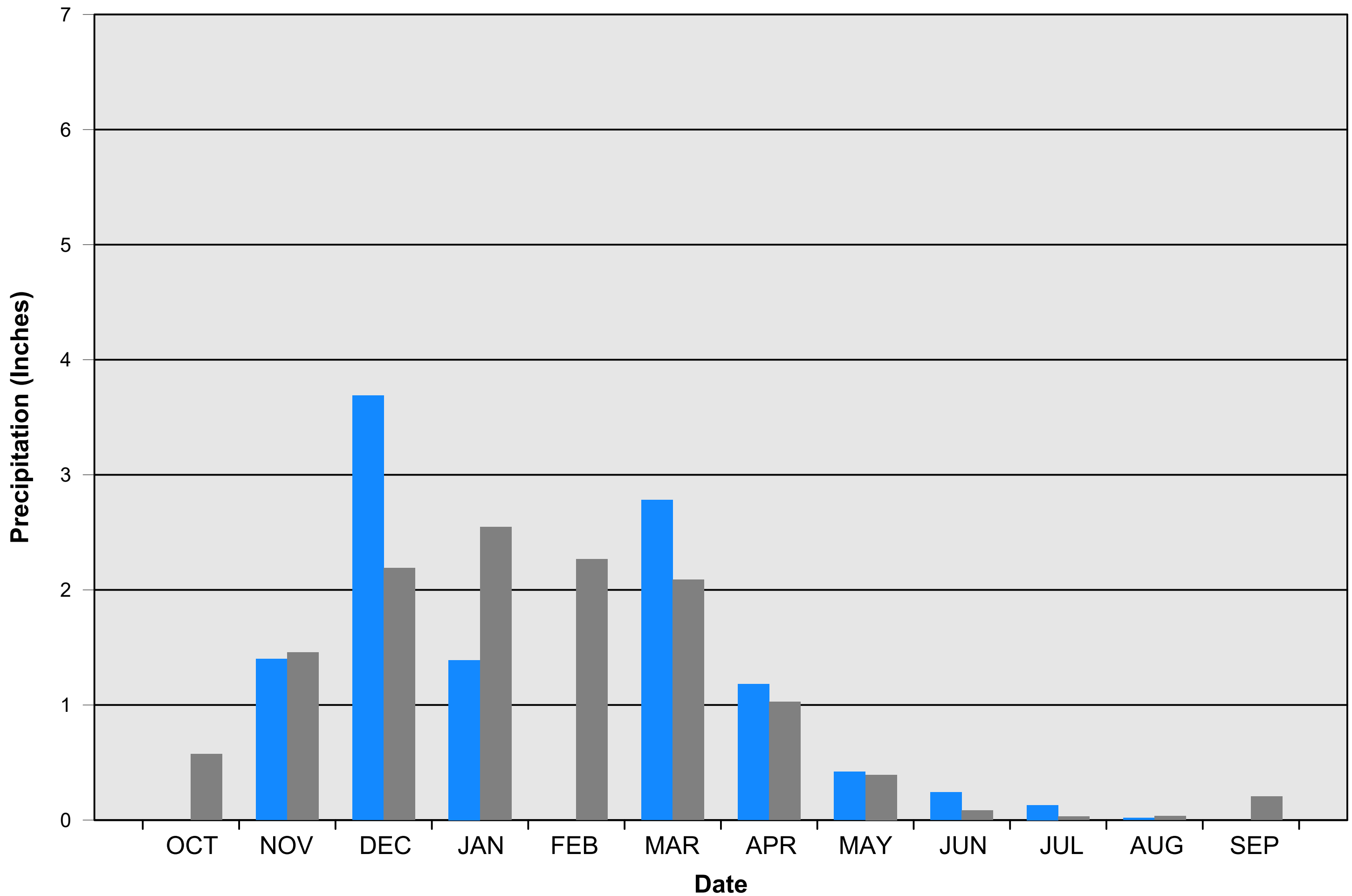
In 2020, overall precipitation was 11.25 inches; monthly totals are shown in **Figure 3-1.** December and March received higher than normal precipitation, but January and February were relatively dry. Monthly rainfall and evapotranspiration data can be found in **Appendix B**. Water year 2020 was below normal with only 87 percent of the long term average, as illustrated in **Figure 3-2**, which shows annual precipitation and water year type from 1976 through 2020. NOAA's weather forecast for the winter 2020-2021 predicts a 33 to 50 percent chance of less than average rainfall for the central coast region (NOAA 2020).

The Annual Report has relied on CIMIS station #126 since Water Year 1995. The station, located in Hollister, is hosted by the District and maintained by DWR. In recent years, precipitation data have been affected by periodic irrigation overspray that has been recorded on the sensors.

## Groundwater Elevations

In October 2020, the District collected groundwater elevations in 91 wells from their existing network and 9 additional wells from Santa Clara Valley Water District. **Figure 3-3** shows the well locations in the current monitoring network and **Figure 3-4** shows the groundwater elevation contours for October 2020. The maps do not include the southernmost portions of the North San Benito Basin where no groundwater level monitoring wells currently are located.

Over 2020, groundwater elevations declined slightly throughout most the basin. For the past three years, the basin had been recovering from the most recent drought (2013-2016). This year's decline in groundwater storage signals a pause to that recovery; groundwater levels may decline further with the reduced CVP allocations for this year and with a relatively dry winter. More information is in **Appendix C.**



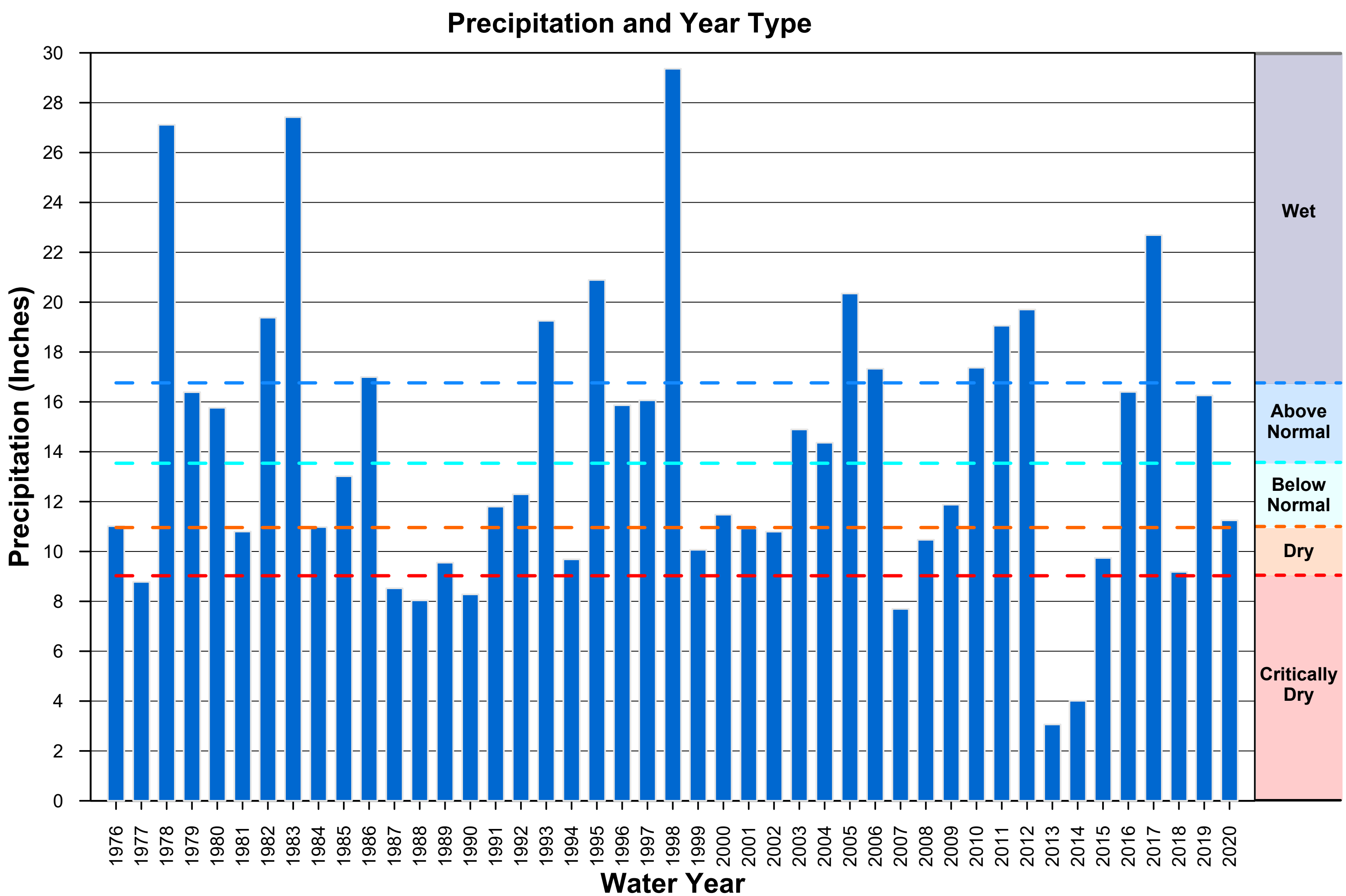

2020 - (11.25 in)
Average - (12.9 in)

Source: CIMIS

December 2020

TODD GROUNDWATER

**Figure 3-1**
**Water Year 2020**
**Precipitation**



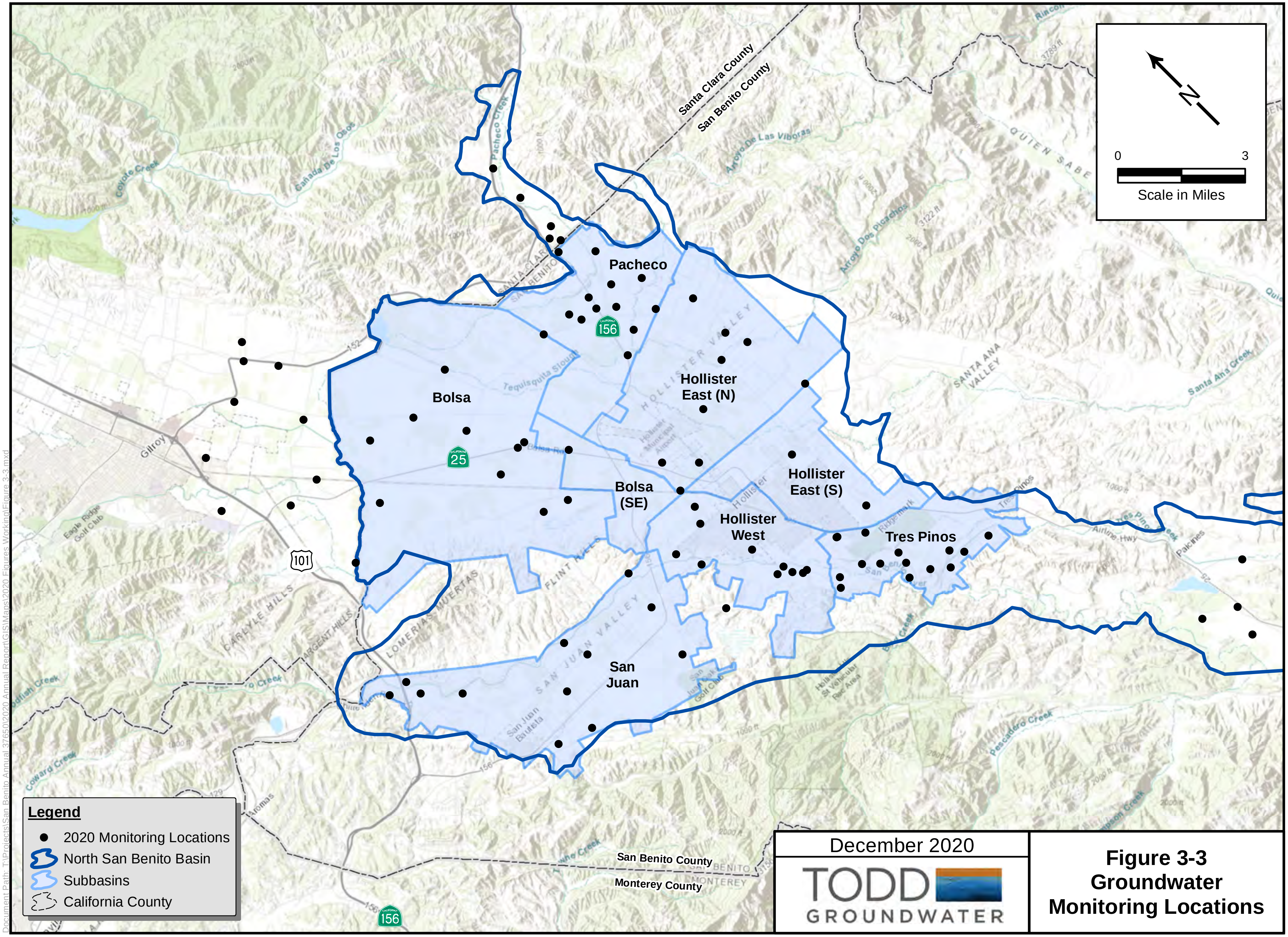

Source: WRCC Hollister 1 and Hollister 2 Stations



December 2020

TODD GROUNDWATER

**Figure 3-2**
**Annual Precipitation**
**1976-2020**




December 2020

TODD GROUNDWATER

**Figure 3-3**
**Groundwater Monitoring Locations**

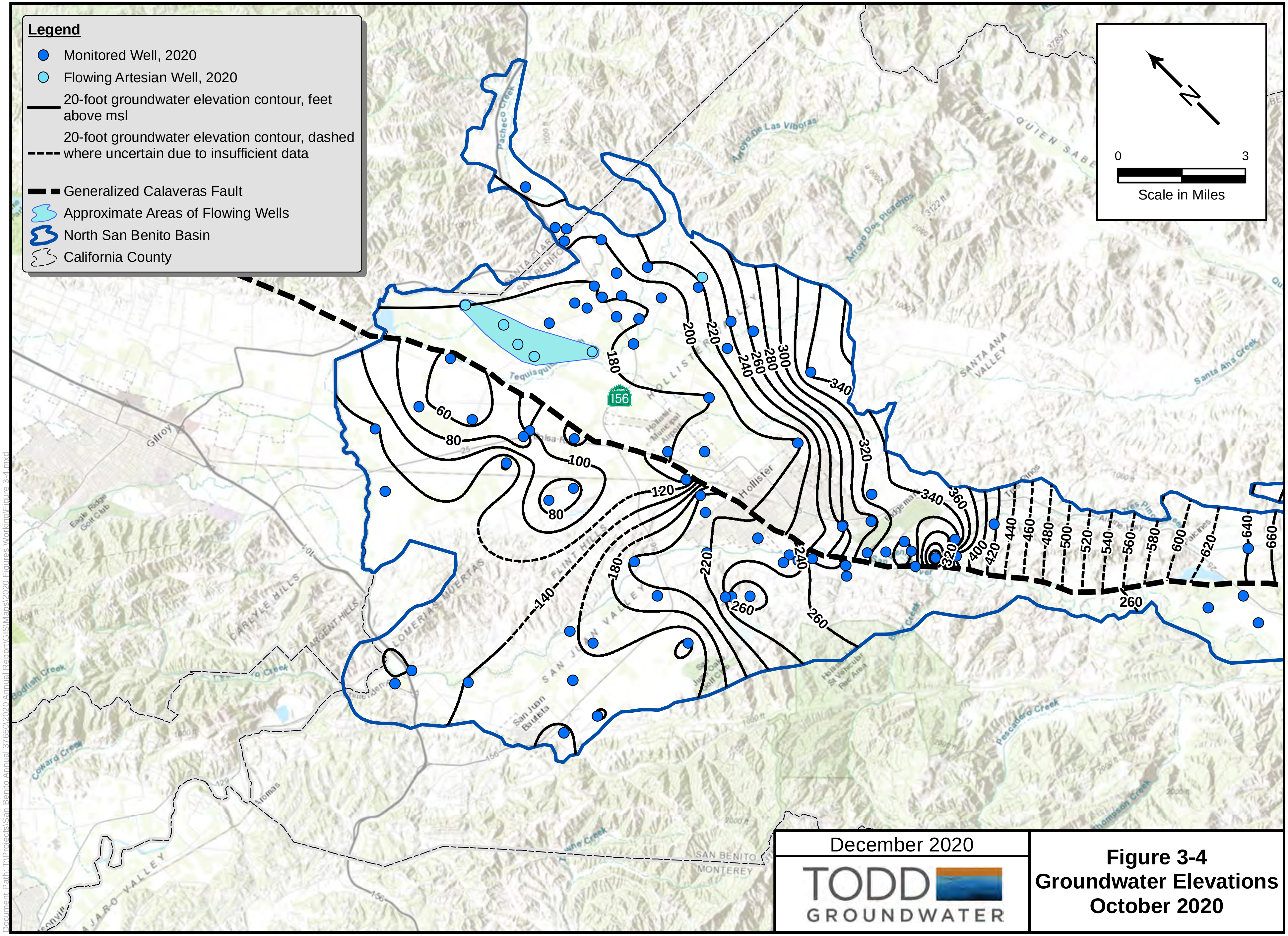



**Figure 3-4**
**Groundwater Elevations**
**October 2020**

## Change in Storage

Change in groundwater in storage was calculated using the groundwater elevation changes from October 2019 to October 2020. In **Figure 3-5**, change is displayed spatially with a color ramp (see legend), ranging from red (that would indicate as much as a 65-foot decline in groundwater levels) to blue (that indicates a 65-foot or more increase in levels). Relative to 2019 most areas have shown slight decreases (less than 20 feet). The apparent large groundwater level decrease (more that 50 feet) in the southern area is mostly due to missing measurements from a well that was inaccessible in 2020. In Zone 6, the negative change in storage this water year (5,820 AFY) is similar to the positive change in storage observed last year from 2018 to 2019 (6,123 AFY). **Figure 3-6** is a stacked bar graph that shows the change in storage by subbasin from 2006 to 2020.

Change in storage is the net volume of water added to or removed from the basin over the water year. The change in storage was determined by first calculating the total bulk change in volume by multiplying the change in groundwater elevations (feet) and by the total area (acres). This bulk change in volume was then multiplied by the average storativity of the subbasin, namely the amount of water produced from a given volume of the aquifer. The storativity values for each subbasin were derived from previous numerical models of the basin, and these values have been used in all previous Annual Reports. **Table 3-1** documents the change in groundwater storage; as in previous Annual Reports, change in storage is reported on the basis of the 1996 District-defined subbasins, Zone 6, and the total of these subbasins.

As part of SGMA implementation, future groundwater storage change will be calculated by the numerical model. The new numerical model developed for the GSP can calculate storage change volumetrically (inflow-outflow) instead of by groundwater elevation change, so its estimate may vary from storage changes calculated for the Annual Reports. For Water 2021, the SGMA annual report will include an update of the model inflows and outflows. The simulated change in storage will be presented in the Water Year 2021 Annual Report.

**Table 3-1. 2020 Change in Groundwater Storage**

| 1996-defined Subbasin | Subbasin Area (Acres) | Average Change in Groundwater Level (feet) | Average Storativity | Change in Storage (Acre-Feet) |
|---|---|---|---|---|
| San Juan | 11,708 | (5.78) | 0.05 | (3,383) |
| Hollister West | 6,050 | 2.26 | 0.05 | 684 |
| Tres Pinos | 4,725 | (7.63) | 0.05 | (1,803) |
| Pacheco | 6,743 | (3.23) | 0.03 | (654) |
| Northern Hollister East | 10,686 | (1.61) | 0.03 | (516) |
| Southern Hollister East | 5,175 | (1.19) | 0.03 | (185) |
| Bolsa SE | 2,691 | 0.17 | 0.08 | 37 |
| **TOTAL ZONE 6** | | | | **(5,820)** |
| Bolsa | 20,003 | (3.29) | 0.01 | (658) |
| **TOTAL All Subbasins** | | | | **(6,478)** |

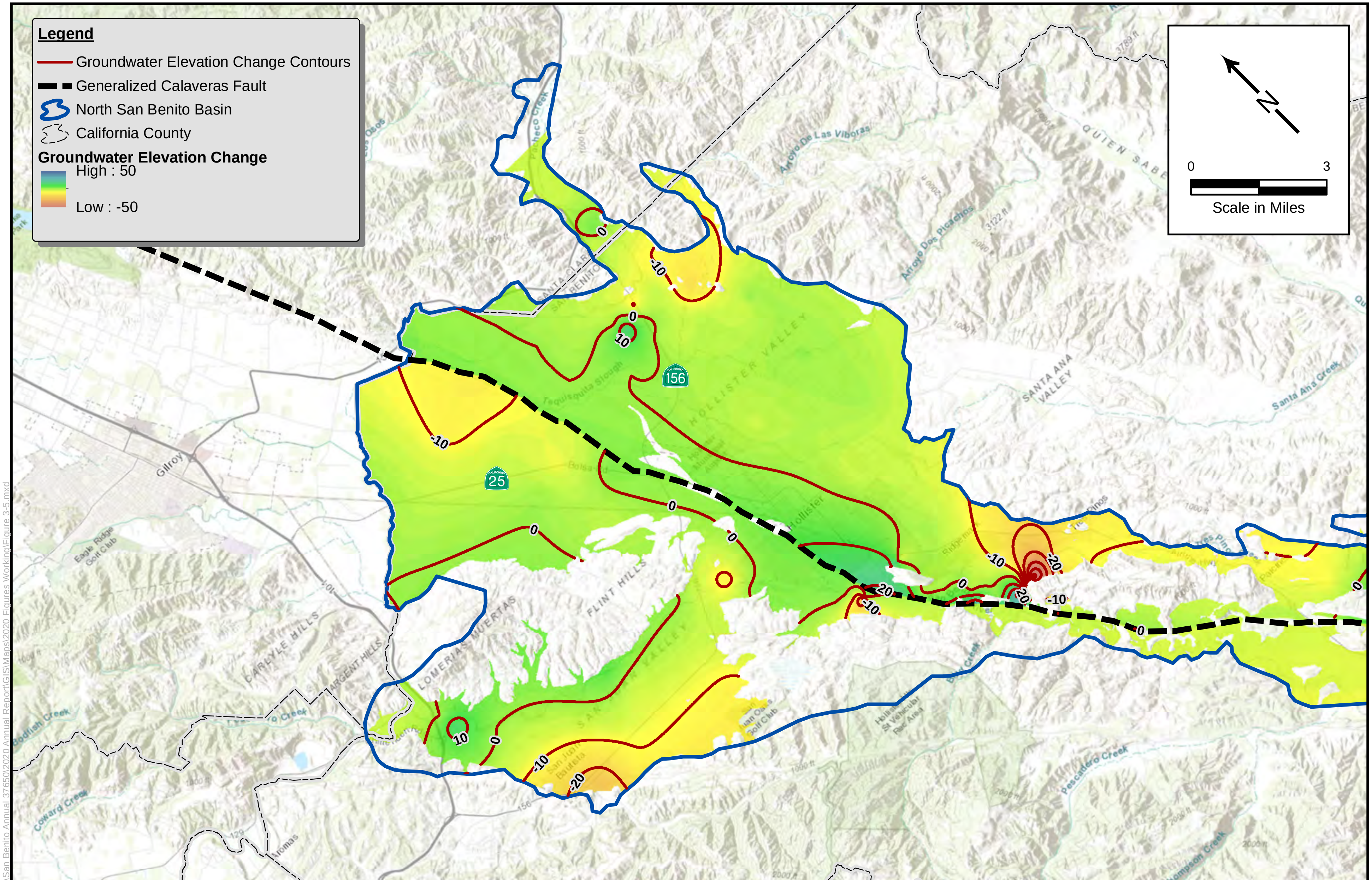
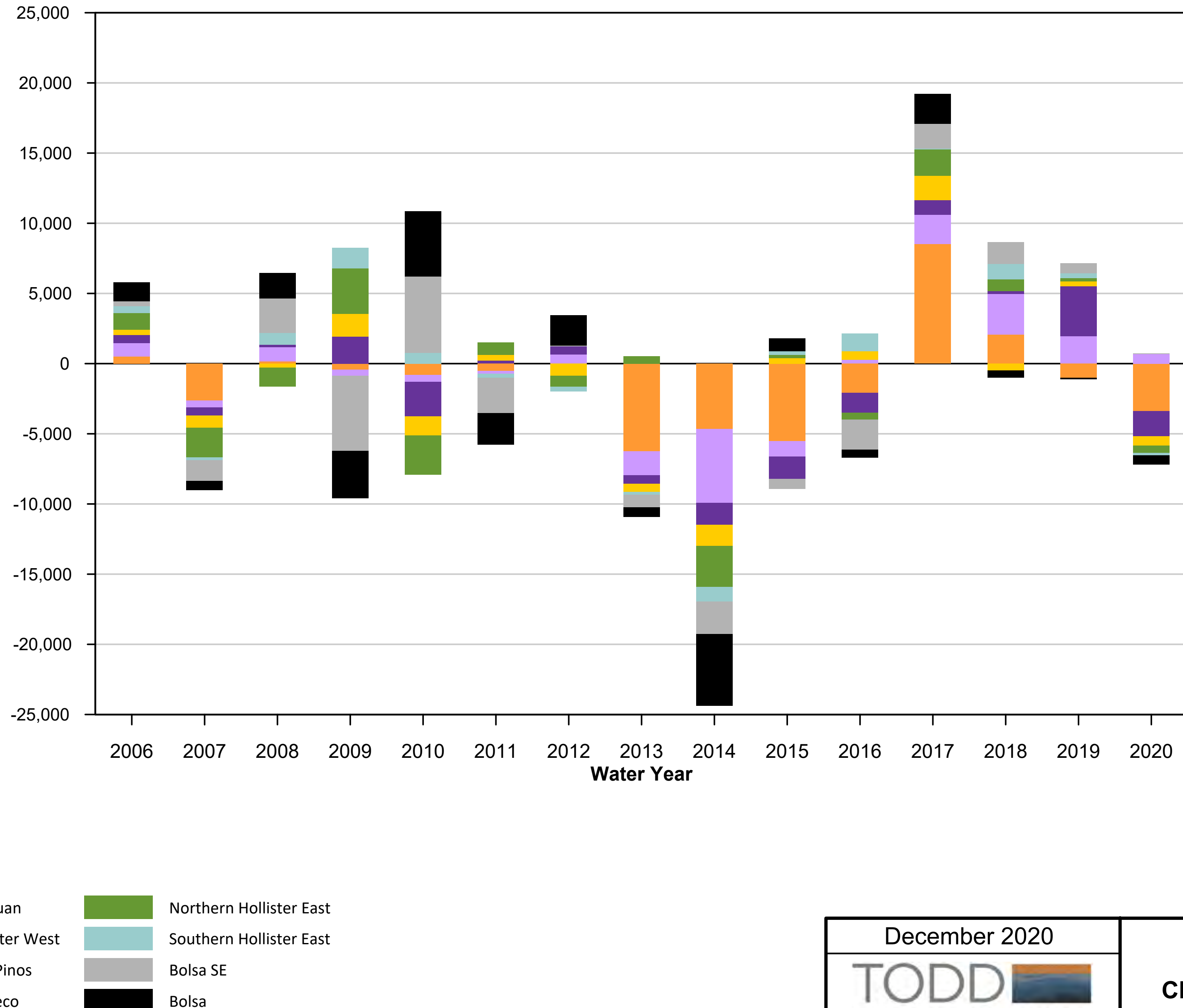



Figure 3-5
Change in Groundwater Elevations, 2019-2020






December 2020

TODD GROUNDWATER

**Figure 3-6**
**Change In Storage**

## Groundwater Trends

**Figure 3-7** shows hydrographs of key wells, illustrating long term groundwater elevation changes throughout the basin. These wells and other representative wells were selected because of their long monitoring records, recent monitoring, and trends that illustrate regional observed patterns.

**Southern Management Area.** Although the District has monitored selected wells in the Southern MA since 2001, elevation data remain limited throughout the MA. Due to topography and groundwater flow direction, water levels in the Southern MA are about 400 ft higher than those in the Hollister MA, about nine miles away. Well 14-7-20K shows that water levels reached a local maximum during 2006, decreased to a local minimum during the drought in 2013-2015, and recovered through 2019. In 2020 groundwater levels decreased slightly, but the decrease is within the range of normal fluctuations for this well. In general, the water level trend observed in 14-7-20K is similar to that of other MAs.

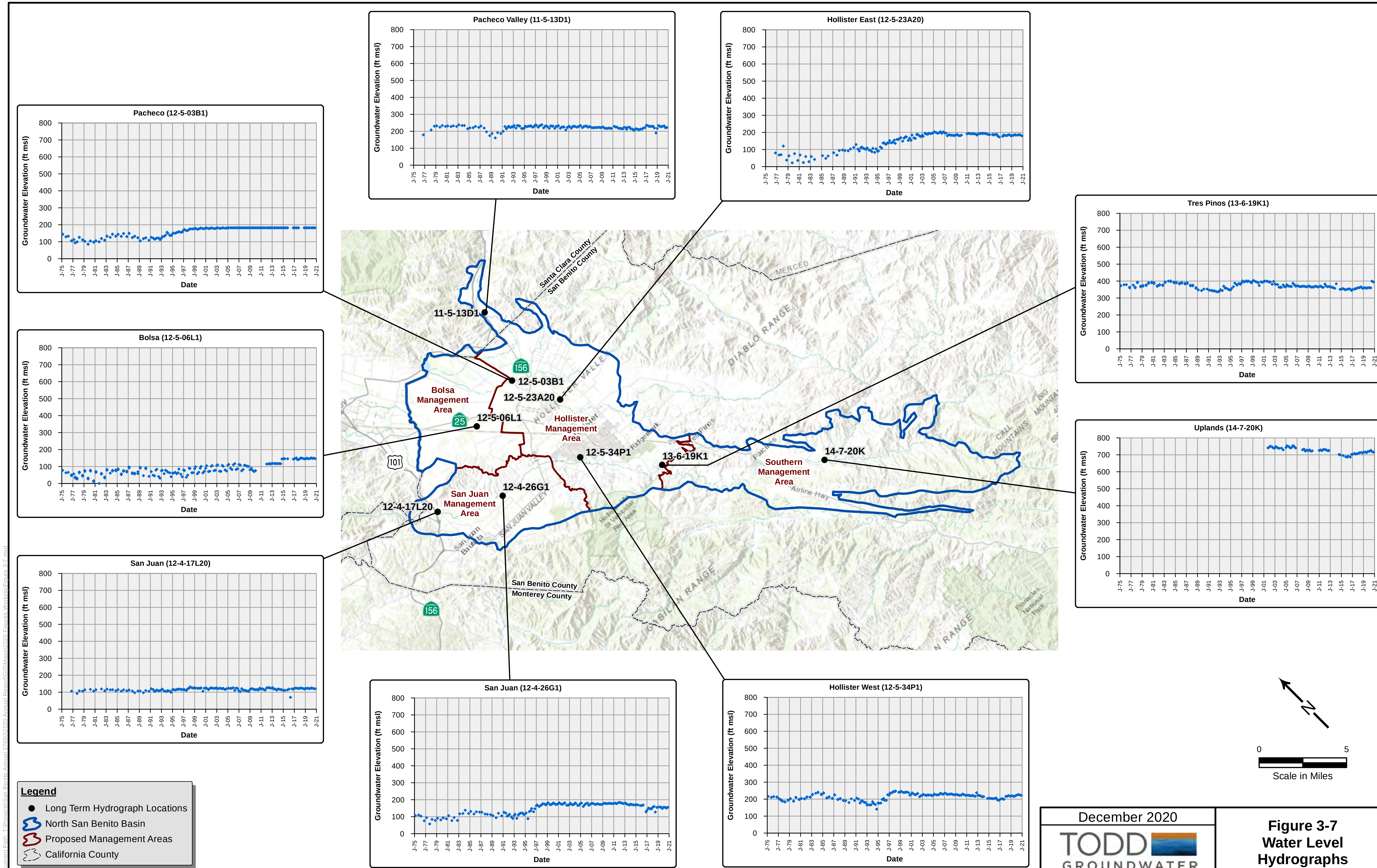
**Hollister Management Area**. The hydrograph for well 12-5-23A20 exemplifies the general groundwater level trend in the Hollister MA. This well showed relatively low groundwater levels during the 1970s (before CVP), followed by a steady increase to local high elevations in 2006. Water elevations have remained somewhat steady since that time. A small decrease was observed during the most recent drought (2013-2015). Water levels in 2020 have maintained this generally steady trend. Well 13-6-19K1 in Tres Pinos subbasin shows a similar but more muted pattern of recovery. Groundwater elevations have remained fairly consistent, increasing and decreasing slightly with respective wet and dry years. Due to its location, this well is influenced more by inflow from upgradient groundwater than by local pumping.

**San Juan Management Area.** Groundwater elevations have remained steady in the two key wells in the San Juan MA. Groundwater levels in well 12-4-26G1, in the north-central part of the basin, remained steady from 2019 to 2020. Water levels in this well decreased slightly in the most recent drought (2013-2015). While not shown in a hydrograph, groundwater levels in the southwestern San Juan MA decreased from 2019 to 2020 (see Figure 3-5). Well 12-4-17L20, near the outflow of the basin, has maintained relatively steady groundwater levels for the past 40 years.

**Bolsa Management Area.** The Bolsa MA includes artesian wells like 12-5-03B1. These artesian conditions are likely due to local confined conditions created by local clay layers in the northern Bolsa and Hollister MAs. Groundwater elevations increased from 1992 until about 1998, which they pressurized to above ground surface. While the groundwater pressure head above the ground surface elevation may vary in artesian wells, artesian groundwater levels are challenging to measure. Consequently, all artesian wells in the San Benito are recorded as having a groundwater elevation at ground surface elevation.

# 3-GROUNDWATER CONDITIONS

The District Act (see **Appendix A**) requires presentation of estimates of annual overdraft for the current water year and ensuing water year. Consistent with previous Annual Reports, this would be represented by long-term groundwater level declines with accounting for rainfall conditions and CVP imports. As of 2020, groundwater elevation trends do not indicate overdraft. Recovery following the drought indicates that overdraft is not anticipated for 2020. For future SGMA Annual Reports, groundwater elevation maps showing the seasonal high and lows for the water year will be required. A spring map showing contours in April will be added to the Annual Report and will be compared to the October maps usually included. In addition, hydrographs showing groundwater elevations and water year type are required. While the data are presented here in separate charts, the information will be combined for future reports.




December 2020

**Figure 3-7**
**Water Level Hydrographs**

# 4-WATER SUPPLY AND USE IN ZONE 6

## Water Supply Sources

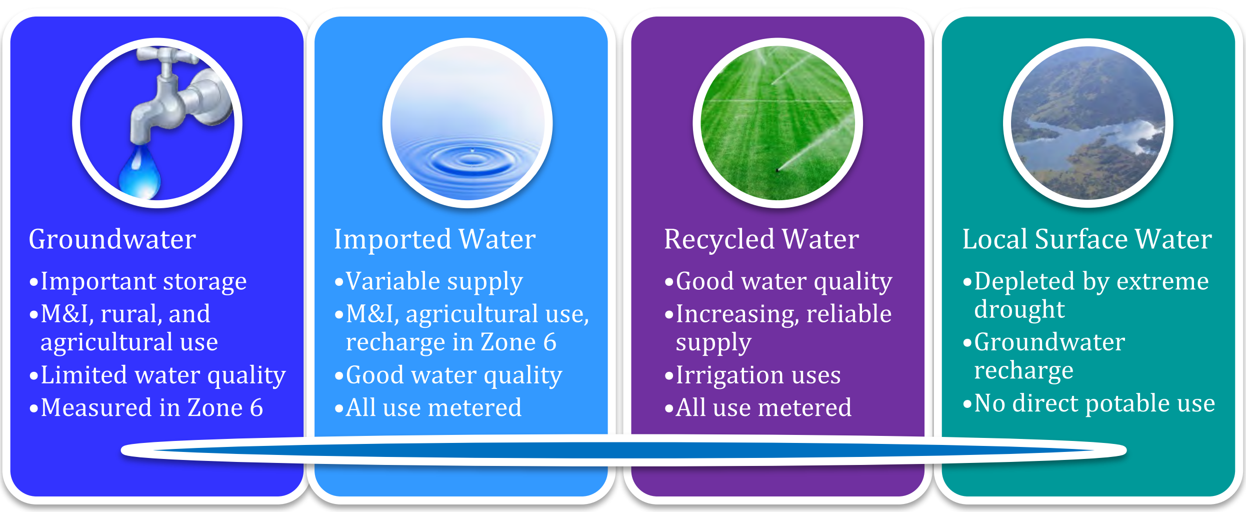
Four major sources of water supply are available for municipal, rural, and agricultural water demands in Zone 6. These are summarized below; for more data and graphs, see **Appendix E.**

**Local Groundwater.** Groundwater is pumped by private irrigation and domestic wells and by public water supply retailers. The District does not directly produce or sell groundwater but has the responsibility and authority to manage groundwater throughout San Benito County.

**Imported Water.** The District purchases Central Valley Project (CVP) water from the U.S. Bureau of Reclamation (USBR) and distributes to customers in Zone 6. Some CVP water has also been released for groundwater recharge. The District has a 40-year contract (extending to 2027 and renewable thereafter) for a maximum of 8,250 AFY of municipal and industrial (M&I) water and 35,550 AFY of agricultural water.

**Recycled Water.** Water recycling began in 2010 with landscape irrigation at Riverside Park. The system was expanded in 2014, including infrastructure and treatment capability for the purpose of agricultural irrigation. Recycled water currently is provided to approximately 865 acres for agricultural production and landscape irrigation. This source is reliable during drought and helps secure a sustainable water supply.

**Local Surface Water.** Surface water is not used directly for potable or irrigation use in the basin, but creek percolation is a significant source of groundwater recharge. In 2020, releases from the District's Hernandez and Paicines reservoirs were slightly above and slightly below average, respectively , contributing to recharge of the groundwater basin. Stormwater capture currently is limited to some diversion by the City of Hollister to the Hollister Industrial WWTP (via a combined sewer system) with subsequent treatment and discharge to percolation and evaporation ponds.



## Available Imported Water

The District distributes CVP water to agricultural and M&I customers in Zone 6. The allocation of the contract for each year is variable and contingent on total available supply of the CVP system. In dry years, the allocation may be zero and in wet years, it may be 100 percent of the contract amount. The USBR contract years are March through February, so Water Year 2020 (Oct 2019-Sept 2020) overlapped two contract years. The above-average hydrological conditions of last year resulted in increased allocations for the March 2019-February 2020 contract year but the below-average hydrological conditions of the current water resulted in relatively low allocations. **Table 4-1** shows the contract entitlements and recent allocations for both USBR contract years that overlap Water Year 2020 (SLDMWA 2020).

As shown in **Table 4-1**, USBR contract year 2019 (March 2019 - February 2020) allocations were 75 percent and 100 percent for agricultural users and M&I users respectively. For USBR contract year 2020 (March 2020 - February 2021), allocations were 20 percent and 70 percent for agricultural users and M&I users, respectively. While both years were above the average allocations for municipal users, the current water year was less than the average allocation of agricultural uses; for the last ten years (2011-2020), the average allocations were 39 percent and 66 percent for agricultural users and M&I users respectively.

**Table 4-1. Allocation for USBR Water Years 2019-2020**

March 2019 - February 2020

| | Contract | % Allocation | Allocation Volume (AF) |
|---|---|---|---|
| Agriculture | 35,550 | 75% | 26,663 |
| M&I | 8,250 | 100% | 8,250 |
| TOTAL | 43,800 | | 34,913 |

March 2020 - February 2021

| | Contract | % Allocation | Allocation Volume (AF) |
|---|---|---|---|
| Agriculture | 35,550 | 20% | 7,110 |
| M&I | 8,250 | 70% | 5,775 |
| TOTAL | 43,800 | | 12,885 |

## Reported Water Use

**Table 4-2** shows the total reported water use in Zone 6 by source and user type for Water Years 2019 and 2020. Municipal use is metered. Agricultural CVP water use is recorded and agricultural groundwater use in Zone 6 is estimated using power meters. Independent estimates of total groundwater pumping based on crop type and irrigation rates generally indicate more groundwater use than is reported by the meters. At this time, the Annual Groundwater Report continues to use the reported water use to allow for consistency of analysis from year to year. The District is currently developing a program that will accurately estimate groundwater use over the entire basin area. Future SGMA annual reports will provide an assessment of pumping in Zone 6 and throughout the basin.

In Water Year 2020, total water use increased slightly (10 percent) from 2019, consistent with the five-year average. Reported water use increased for all user types and most water sources. However, recycled water use decreased 8 percent, slowing the growth of this new water source that has been occurring over the last four years.

**Figure 4-1** shows Zone 6 reported water use by source since 1988. Overall, the graph indicates that water use since 2008 has remained steady with the exception of higher than normal water use in 2013 and 2018. The average total water use from 2008 to 2020 was 39,000 AFY; in the preceding period of the same length 1995-2007, the average water use was 45,000 AFY, reflecting 15 percent less water use in recent times. The reduction in water use may be the result of a combination of reduced supply of CVP imported during dry conditions, changes in crops and irrigation practices, and/or improved water conservation. Water conservation efforts that began during the 2013-2016 drought continue to moderate water use in the basin. The graph also shows the general balance between CVP and groundwater use; groundwater represented a large portion of the supply during the drought and following year when CVP water was curtailed.  Since 2000, CVP supply has represented 14 to 54 percent of supply largely controlled by the allocation for agricultural users; allocations have ranged from 0 to 100 percent of contract over this period. In Water Year 2020, groundwater was 54 percent of the total reported water use, CVP represented 45 percent of supply, and recycled water was 1 percent.

**Figure 4-2** illustrates the use of groundwater and CVP supply by user type in Zone 6. Groundwater use is shown in green. The darker green represents agricultural water use and the lighter green represents domestic and municipal use. Similarly, CVP use is shown in blue – where light blue is agricultural use and dark blue is domestic and municipal. While total water use has remained fairly stable, the portion served by groundwater varies based on CVP allocations. On **Figure 4-2,** this can be seen during the 2013-2016 period when CVP allocations were minimal and groundwater use increased. In recent years, municipal demand has transitioned. Historically municipal demand was satisfied totally by groundwater and currently more than half is served by CVP; this is due to expansion of treatment capacity for CVP municipal use with the Lessalt and West Hills Treatment Plants. In Water Year 2020, 58 percent of municipal supply was served by CVP imports.

**Table 4-2. Total Water Use in Zone 6 by User and Water Source 2019-2020**

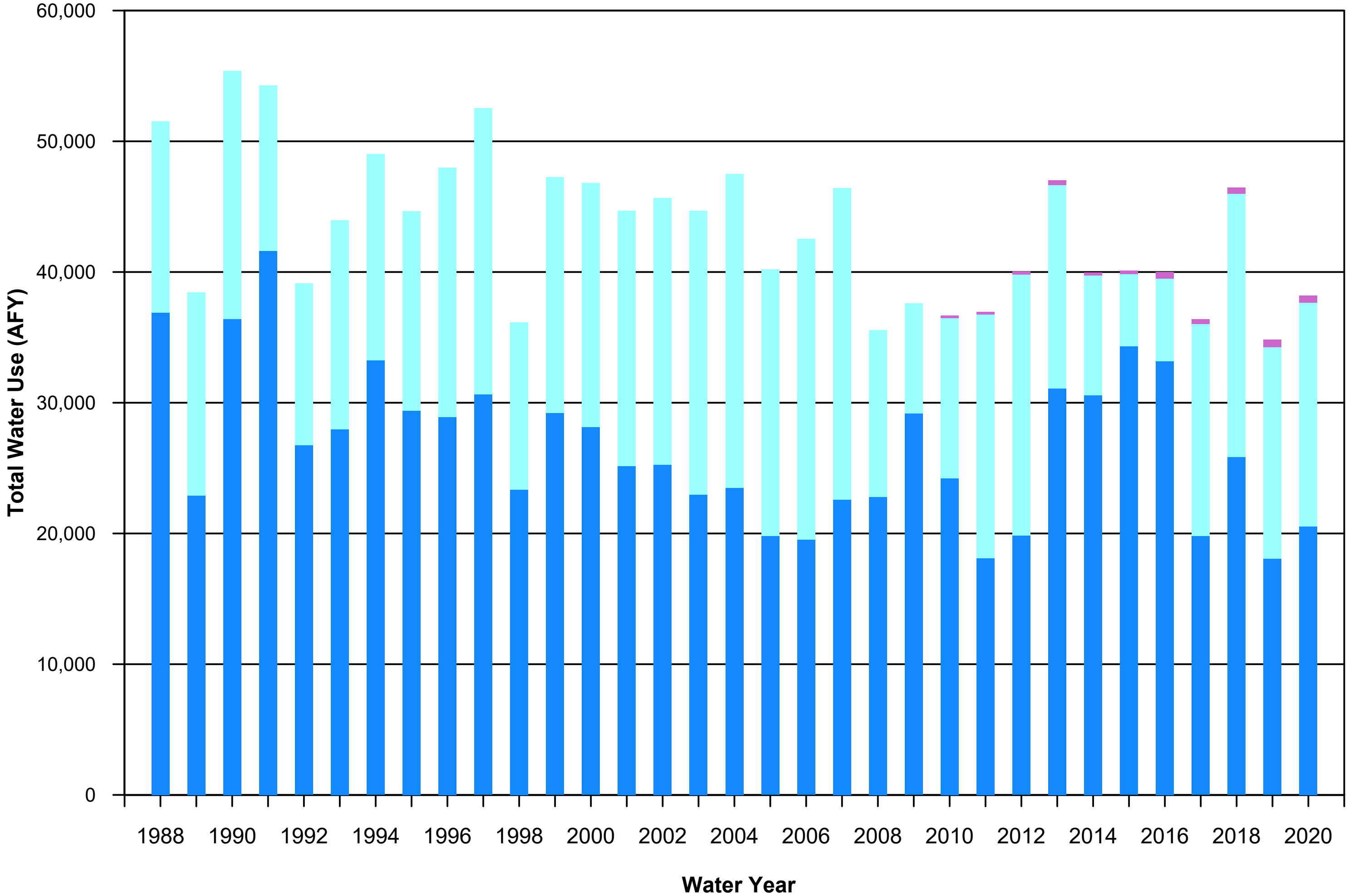
| | CVP | | GW | | RW | | Total | |
|---|---|---|---|---|---|---|---|---|
| | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 | 2019 | 2020 |
| Agriculture | 11,731 | 12,166 | 15,423 | 17,021 | 461 | 428 | 27,616 | 29,616 |
| M&I | 4,457 | 4,953 | 2,660 | 3,514 | 108 | 97 | 7,225 | 8,565 |
| **TOTAL** | **16,188** | **17,119** | **18,083** | **20,536** | **569** | **526** | **34,841** | **38,181** |

**Table 4-3** shows the breakdown of total water use by each subbasin (and management area) in Zone 6. Consistent with past patterns, San Juan is the largest producer of groundwater and the second largest user of CVP supplies, mainly for agricultural irrigation. Hollister East is the largest user of CVP for both agricultural users and municipal uses, reflecting extensive agriculture and the expanded municipal water treatment capacity.

**Table 4-3. Zone 6 Water Use by User and Water Source 2019-2020**

| Management Area | Subbasin | CVP Water | | Groundwater | | Recycled Water | |
|---|---|---|---|---|---|---|---|
| | | Agriculture | Domestic & Municipal | Agriculture | Domestic & Municipal | Agriculture | Domestic & Municipal |
| Hollister | Bolsa South East | 391 | 0 | 2,083 | 9 | 21 | 0 |
| | Hollister East[1] | 5,924 | 3,766 | 3,527 | 475 | 0 | 0 |
| | Hollister West | 263 | 24 | 1,475 | 965 | 407 | 97 |
| | Tres Pinos | 121 | 91 | 249 | 1,147 | 0 | 0 |
| | Pacheco | 1,867 | 56 | 2,725 | 425 | 0 | 0 |
| San Juan | San Juan | 3,602 | 1,017 | 6961 | 493 | 0 | 0 |
| **TOTAL** | | **12,166** | **4,953** | **17,021** | **3,514** | **428** | **97** |

1. Hollister East includes 1,990 AF of CVP water delivered to the West Hills Treatment Plant in San Juan but supplied to Hollister East customers.




Recycled Water
CVP
Groundwater

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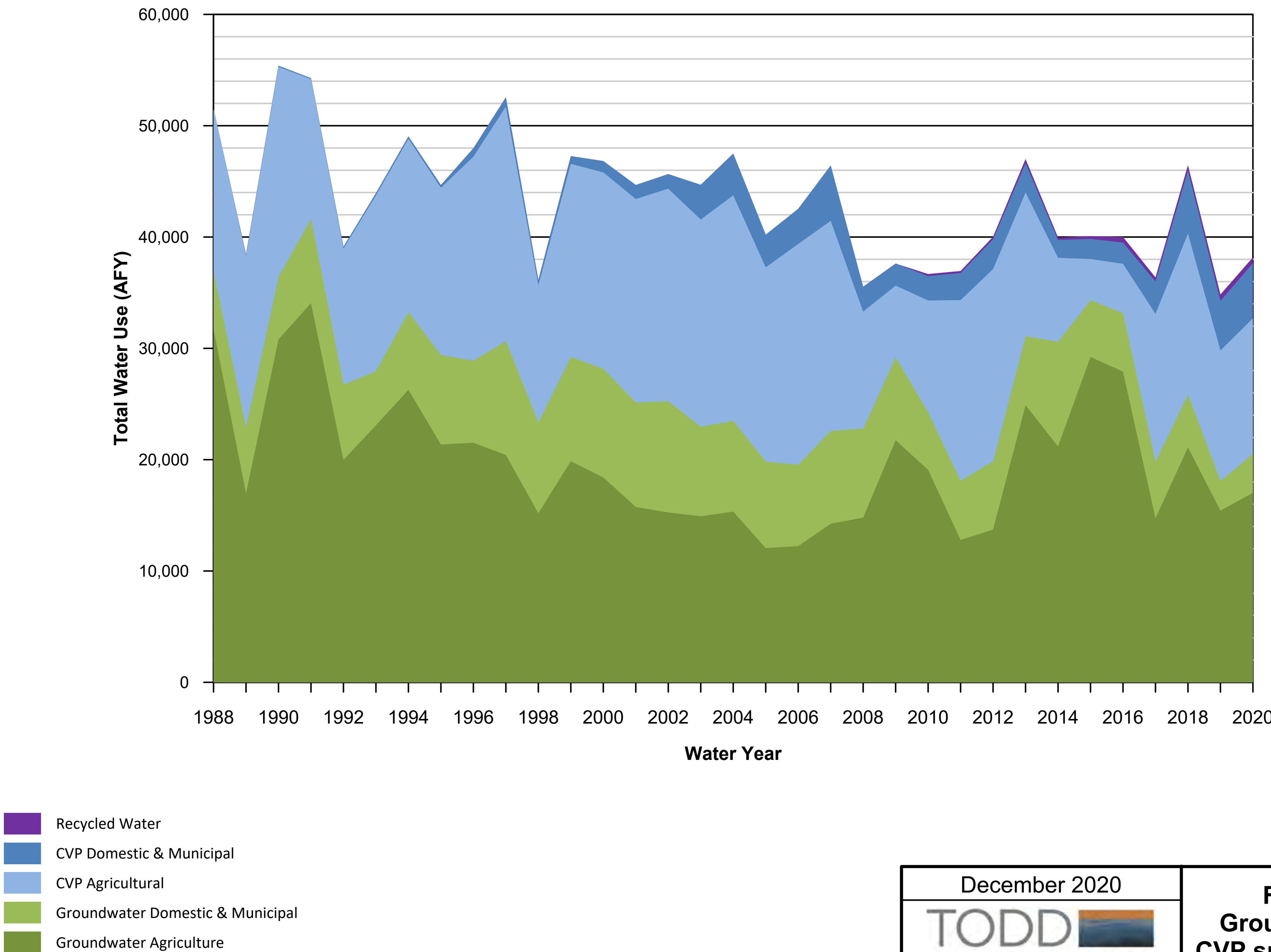
TODD GROUNDWATER

**Figure 4-1**
**Total Water Use by Source and Use 1988-2020 (AFY)**



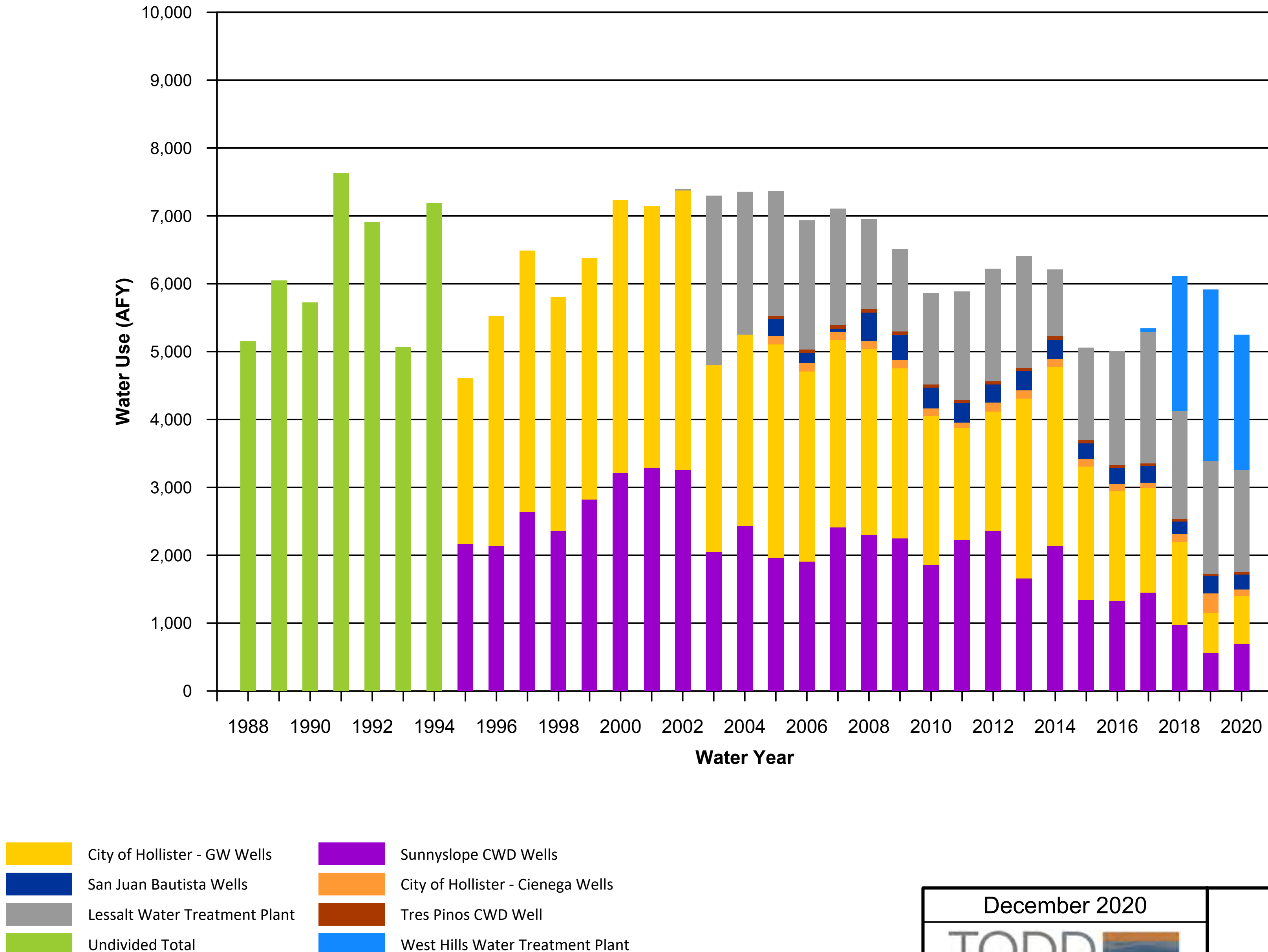



December 2020

TODD GROUNDWATER

**Figure 4-2**
**Groundwater and CVP supply in Zone 6**

**Figure 4-3** shows the municipal water supply for the City of Hollister, SSCWD, San Juan Bautista, and Tres Pinos County Water District. While historical data are not readily available for the Tres Pinos CWD, Cienega, and San Juan Bautista wells, municipal demand was satisfied entirely by groundwater prior to 2003. The completion of Lessalt Water Treatment Plant (WTP) in 2003, the expansion of Lessalt in 2016, and the completion of West Hills WTP in 2018 have significantly increased the use of CVP water for the Hollister and SSCWD municipal systems. In **Figure 4-3**, annual water supply provided through the Lessalt WTP is shown in grey and West Hills WTP in dark blue. In 2020, these two treatment plants served about 67 percent of the M&I supply, a slight decrease from last water year. This ability to maximize CVP use will increase flexibility for local water users to use groundwater or CVP. It also provides better quality water for delivery to municipal customers and result in improved wastewater quality, which supports water recycling.



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TODD GROUNDWATER

**Figure 4-3**
**Water Use in Zone 6 by Source**

# 5-WATER MANAGEMENT ACTIVITIES

District water management activities include comprehensive monitoring (summarized in Section 2) and importation and distribution of CVP water in Zone 6 (Section 4). In addition, the District provides water resources planning, water conservation support services, and managed percolation of local surface water to augment groundwater; these are summarized in this section. Sources of revenue to support District operations also are presented here.

## Water Resources Planning

The District has used multiple planning efforts to support groundwater sustainability. These have included water management plans such as the Groundwater Management Plan (1998 and 2003), Integrated Regional Water Management Plan (2007) and subsequent updates, Salt and Nutrient Management Plan (2014), Agricultural Water Management Plan (2015), and Urban Water Management Plans (2016). These plans have addressed a range of groundwater sustainability issues with advancement of water conservation, protection of water quality, and conjunctive use of imported water, local surface water, recycled water and groundwater. Current efforts and recent accomplishments are summarized below.

**Hollister Urban Area Water Project.** This project is an ongoing collaborative effort with local agencies to provide a secure and stable water supply to the region. The project has involved provision of water treatment for CVP water, which allows its direct use for municipal and industrial (M&I) purposes. It also allows delivery of improved quality water to customers. 2020 continues to see the beneficial effects of the new West Hills WTP and newly expanded Lessalt WTP. The District also has worked cooperatively for years with the City of Hollister to implement recycled water use primarily for agricultural irrigation, which is expected to increase in coming years.

**Urban Water Management Plan (UWMP).** The District, in collaboration with Sunnyslope County Water District (SSCWD) and the City of Hollister, has begun the 2020 Urban Water Management Plan (UWMP) that will be submitted to DWR by the July 2021 deadline. The UWMP provides detailed information on the current and future water supply and demand for the Hollister Urban Area and provides a comparison of supply and demand in normal years plus single-year and multi-year droughts. The UWMP will dovetail with the 2020 Agricultural Water Management Plan and the GSP to provide a framework of strong water management.

## Recycled Water

Water recycling began with targeted municipal irrigation. The system was expanded in 2014, including infrastructure and treatment capability to improve water quality for the purpose of agricultural irrigation. The system was further improved in 2015 when SBCWD installed 1.65 miles of additional distribution system piping and 30 metered deliveries to provide water for agricultural customers for approximately $1,000,000. In 2016, the Recycled Water Storage Pond was installed in “Pond 2” at the Domestic Waste Reclamation Facility (DWRF) to improve distribution system water quality and be able to store surplus supply during high agricultural demand periods when the DWRF is not producing enough recycled water. Last year in 2019, SBCWD installed a series of sand media filters upstream of the Recycled Water Distribution System to improve water quality to allow agricultural customers the ability to use drip irrigation and minimize backwash waste. These upgrades to the Recycled Water Storage Pond and distribution system cost approximately $1,500,000. Recycled water currently is provided to approximately 865 acres for agricultural production and landscape irrigation.

## Water Conservation

Water conservation is an important tool to manage demands on the groundwater basin particularly during drought. Water conservation efforts in San Benito County are conducted through the Water Resources Association (WRA). WRA is a cooperative effort among the District, City of Hollister, City of San Juan Bautista, and Sunnyslope County Water District.

In Water Year 2020, the COVID-19 pandemic altered the programs offered by the WRASBC. Most active programs were put on hold March through May but WRA staff continued to reach out via phone and video calls. Since May, field programs have resumed, including irrigation system checks and water softener replacement assistance. These programs have been altered to meet all safety measures including social distancing and masks for all participants. Indoor programs such as residential water use surveys have not restarted.

The public education program had been growing steadily over the past several years. The in-person program, which included school visits and guided field trips, is temporarily suspended due to COVID-19 but will resume when appropriate. However, WRA staff have continued to find creative ways to continue the program. In partnership with the school district, water conservation activity books were distributed to elementary to offer additional enrichment during distance learning. The WRA staff is also pursuing additional education activities including virtual tours of the water treatment and wastewater plants for students.

Public outreach has also shifted to virtual platforms. WRA staff continues to author news articles for the online news sites that serve San Benito County. In March, these articles allowed WRA to quell public concern over the safety of our water supply. Later, the articles provided water conservation and efficiency tips that were seasonal in nature and they continue to provide timely advice for water use. To supplement this effort, the WRA is developing a series of water conservation videos for distribution to the local news media and the newly updated WRA website.

WRA has been monitoring changes in water use sectors due to the COVID-19 response. With more residential water use and less water use in the agricultural and business sector, they are focusing their conservation message to residential customers.  This focus extends to new residential development in the City. WRA reviews landscape plans for the City of Hollister to make sure that new homes comply with the State's Model Water Efficient Landscape Ordinance (MWELO) and follows up with a post inspection after the landscape materials are installed to ensure the landscape plans were followed.

Finally, WRA continues to provide various rebates (toilets, landscape hardware, etc.). The most popular rebate program is the water softener demolishing/replacement program. With provision of CVP supply for municipal use, the delivered water quality has improved, and customers are willing to abandon unneeded water softeners. This program has the benefit of improving the water quality of municipal wastewater and recycled water.

## Managed Percolation

**Percolation of Local Surface Water.** In most years, local surface water released from Hernandez and Paicines reservoirs is percolated along the San Benito River and Tres Pinos Creek. Releases are managed to maximize percolation along the stream channels of the San Benito River and Tres Pinos Creek and to avoid any losses out of the basin. Hernandez Reservoir releases in 2020 were slightly below average (reflecting the below normal rainfall), amounting to 9,473 AF. Releases from Paicines were 2,037 AF, slightly above average.

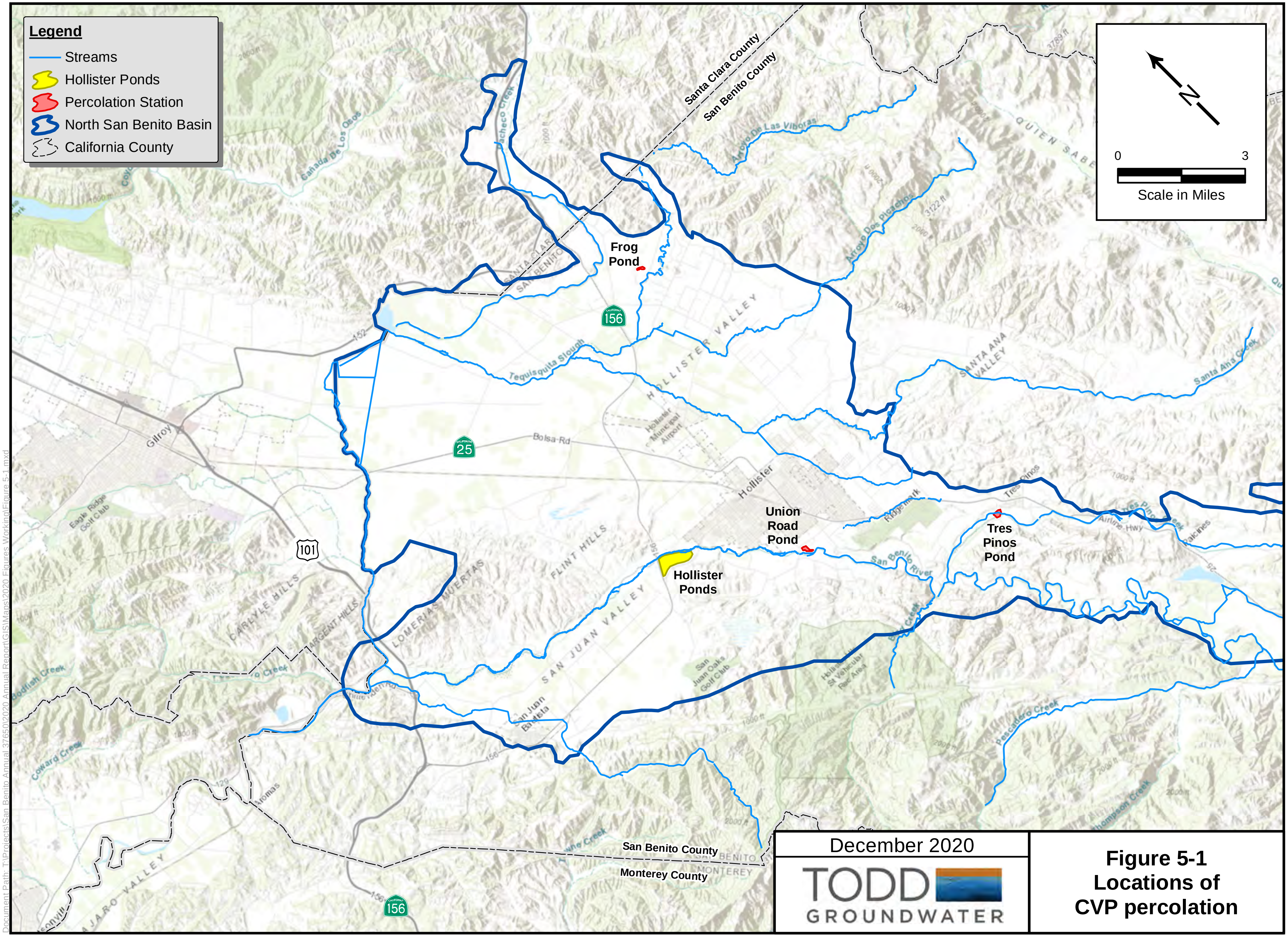
**Percolation of Wastewater.** Wastewater is percolated by the City of Hollister at its Domestic and Industrial plants, by SSCWD at its Ridgemark Facilities, and by Tres Pinos County Water District. While the City of San Juan Bautista wastewater treatment plant also discharges wastewater, the flows are not considered to percolate to the groundwater basin because of the local hydrogeologic conditions. Recent changes in operation of the wastewater facilities (including increased water recycling) and decreased municipal water use have decreased the volume percolating to the groundwater. Information about the amount of groundwater recharged from wastewater facilities is found in **Appendix D**.

**Percolation of CVP Water.** In Water Year 2020, the District percolated 3,161 AF of CVP water in four dedicated off-stream basins; locations are shown in **Figure 5-1. Figure 5-2** shows the volume of CVP recharge by major water way over time. The managed recharge of the imported water was critical in replenishing the basin in the 1980s and 1990s; however, the threat of zebra mussel contamination and low CVP allocations prevented the practice from 2008 to 2016. The District has resumed recharge at dedicated basins adjacent to streams.

## Financial Information

The District derives its operating revenue from charges levied on landowners and water users. Non-operating revenue is generated from property taxes, interest, standby and availability charges, and grants. District zones of benefit are listed in **Appendix A**. Zone 6 charges, relating to the importation and distribution of CVP water, are the focus of this section.

**Table 5-1** presents the groundwater charges for Zone 6 water users, which reflect costs associated with monitoring and management. A full worksheet of how groundwater charges are determined can be found in **Appendix F**. Groundwater charges are adjusted annually in March. For March 2020 – February 2021, District rates are $13.15 for agricultural use and $39.40 for M&I use. The District adopts rates on a three-year cycle. Current water rates were adopted January 30, 2019.

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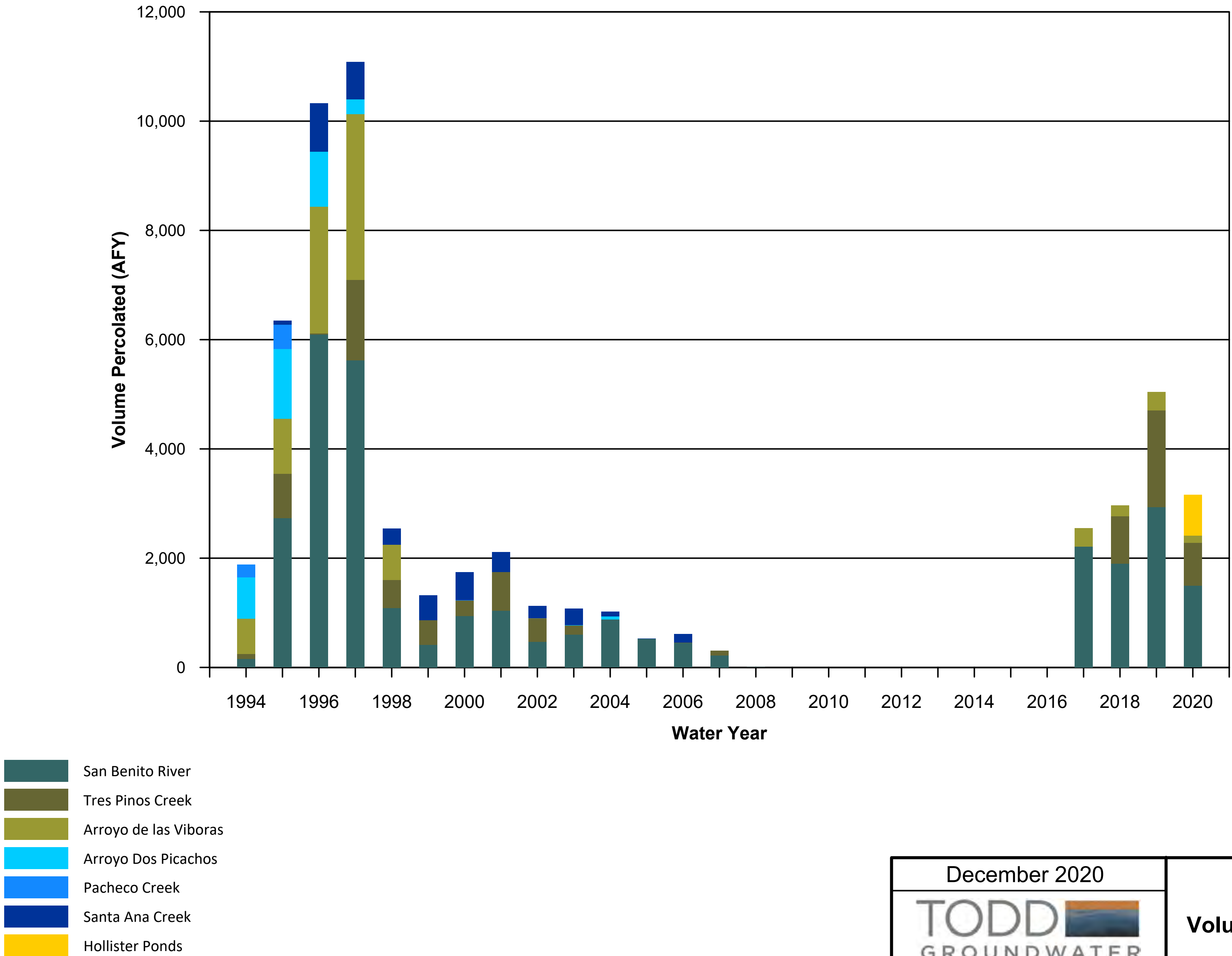
TODD GROUNDWATER

**Figure 5-1**
**Locations of CVP percolation**



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TODD GROUNDWATER

**Figure 5-2**
**Volume of Percolation**

**Table 5-1. Adopted Groundwater Charges**

| Year | Agriculture ($/AF) | M&I ($/AF) |
|---|---|---|
| 2020-2021 | $13.15 | $39.40 |
| 2021-2022 | $13.55 | $40.55 |

CVP rates (provided by the USBR) include the cost of service, restoration fund payment, charges for maintenance of San Luis Delta Mendota Water Authority facilities, and other fees (the breakdown is found in **Appendix F**). The District's blue valve rates (paid by users of CVP water) include a water charge and a power charge. Additionally, the standby and availability charge is a $6 per-acre charge assessed on all parcels with access to CVP water (an active or idle turnout from the distribution system). **Table 5-2** shows the CVP water charge and **Table 5-3** shows the CVP power charge.

**Table 5-2. Adopted Blue Valve Water Charges**

| | Blue Valve Water Charge ($/AF) | | | |
|---|---|---|---|---|
| Year | Non - Full Cost | Agricultural Full Cost (1a) | Full Cost (1b) | Municipal & Industrial |
| 2020-2021 | $265.00 | $400.00 | $421.00 | $415.00 |
| 2021-2022 | $274.00 | $411.00 | $433.00 | $424.00 |

**Table 5-3. Adopted Blue Valve Power Charges**

| Blue Valve Power Charge ($/AF) | Subsystem 2 | Subsystem 6H | Subsystem 9L | Subsystem 9H | All other subsystems |
|---|---|---|---|---|---|
| 2020-2021 | $82.85 | $40.45 | $90.80 | $134.20 | $34.75 |
| 2021-2022 | $85.35 | $41.50 | $93.55 | $138.25 | $35.75 |

Recycled water charges (**Table 5-4**) are set to recover current operating and maintenance costs related to the water service. Recycled water rates include those associated with water supply, water quality, and infrastructure.

**Table 5-4. Adopted Recycled Water Charges**

| | Recycled Water ($/AF) | |
|---|---|---|
| Effective | Agriculture Rate | Power Charge |
| Apr-2020 | $208 | $60.64 |
| Mar-2021 | $210 | $61.85 |

# 6-GROUNDWATER SUSTAINABILITY

## Sustainable Groundwater Management Act (SGMA)

The Sustainable Groundwater Management Act (SGMA) requires sustainable management of priority groundwater basins and empowers local Groundwater Sustainability Agencies (GSAs) to manage groundwater resources. San Benito County Water District GSA (SBCWD GSA), in partnership with Santa Clara Valley Water District GSA (SCVWD GSA) for small portions of the basin in Santa Clara County, is developing a Groundwater Sustainability Plan (GSP) for the North San Benito Basin, which encompasses the historically-defined Bolsa, Hollister, and San Juan Bautista Subbasins of the Gilroy-Hollister Basin and the Tres Pinos Valley Basin. This GSP is currently being developed and several chapters are posted on the GSA website for public comment. **Figure 1-1** shows the GSP area, which is mostly in San Benito County with small portions extending into Santa Clara County.

## Groundwater Sustainability Plan Development

The District began GSP development in 2018 and several draft plan sections are already available to the public through the District's website: https://www.sbcwd.com/sustainable-groundwater-management/. These following draft sections of the initial GSP are posted on the website:

**Plan Area/Institutional Setting.** The first two sections of the GSP, Introduction and Plan Area, describe the North San Benito Basin and the institutional setting.

**Hydrogeologic Conceptual Model/Groundwater Conditions.** The hydrogeologic conceptual model is a description of the structural and physical characteristics that govern groundwater occurrence, flow, storage, and quality. The Groundwater Conditions section documents historical and current groundwater conditions including groundwater levels and flow, groundwater quality, land subsidence, and interactions of groundwater and surface water.

**Water Budgets.** The water budget section quantifies the surface water and groundwater inflows, outflows, and change in storage. The section also includes a brief description of the numerical model. The technical memorandum describing the model is also available on the District's website.

**Sustainability Criteria**. The GSP addresses the five undesirable results/sustainability indicators relevant to North San Benito Basin. These include: chronic lowering of groundwater levels, groundwater storage depletion, water quality degradation, land subsidence, and depletion of interconnected surface water. For each, systematic quantification is presented of the undesirable results, minimum thresholds, and measurable objectives to guide GSP implementation.

The following two sections currently are in development and will be presented to the Technical Advisory Committee (TAC) and made available to the public in early 2021.

**Monitoring.** This GSP section establishes the GSP monitoring network and protocols that: 1) provide data to inform the hydrogeologic conceptual model, water budget and numerical model, 2) provide tracking and early warning regarding groundwater conditions and undesirable results, and 3) demonstrate progress toward and achievement of sustainability.

**Management Actions.** This GSP section will present management actions—policies, programs, and projects—that address the sustainability criteria and provide for sustainable management into the future.

## Amendment for GSP Preparation, Round 3 Tasks

In 2019, SBCWD GSA applied to DWR for additional grant funding as part of the 2019 Sustainable Groundwater Management Grant Program Planning – Round 3 Grant and in 2020 was awarded $1.17 million in grant funds. With SBCWD GSA cost sharing of $390,000, the total Round 3 project cost is $1.56 million. The Round 3 project, entitled Reaching Sustainability: Dedicated Monitoring Wells and Managed Aquifer Recharge for North San Benito Basin, was initiated in June 2020. In addition to project administration, it involves three technical tasks:

- Dedicated Monitoring Well Program
- Managed Aquifer Recharge (MAR)
- Annual Reports

These tasks, summarized below, are intended to supplement GSP preparation and to occur within the overall GSP schedule (with submittal of the GSP in January 2022).

## Dedicated Monitoring Well Program

Additional collection of hydrogeologic data and new dedicated monitoring wells are needed for GSP preparation and implementation. This reflects the expanded area of the new North San Benito Basin, an area larger than previously monitored, especially in the Southern Management Area. In addition, specific data gaps and uncertainties have been identified during preparation of GSP chapters. Objectives for siting new dedicated monitoring wells are to fill gaps in the existing monitoring network and provide a groundwater monitoring framework to support GSP implementation.

Achieving these objectives has required detailed analysis including development and implementation of a geographically based index overlay methodology. This indexed overlay method has included development of GIS datasets and subsequent mapping of these datasets together to find locations that fill multiple data gaps. As needed, the relative priorities of various data needs have been assessed qualitatively with input from District staff. This process has identified areas for the installation of both deep and shallow monitoring wells. The areas identified for deep monitoring wells have been delineated on an parcel basis, and at time of writing, District staff are contacting property owners of these parcels to identify owners willing to have a monitoring well installed on their property. The areas identified for shallow monitoring wells are primarily within public rights of way, and the District is working to secure access to those locations for the installation of shallow wells for monitoring of interconnected surface water. Next steps include preparation of well designs, drilling and construction of the monitoring wells, and preparation of a technical memorandum documenting the work.

## Managed Aquifer Recharge Study

This study addresses questions of how additional MAR can be achieved in North San Benito: where, which method, what water source and when, and how much benefit can be gained. Unlike some basins with highly permeable alluvial fans and recharge forebays, the most useful recharge areas in the North San Benito Subbasin may not be obvious. Moreover, the best areas are likely to represent the sum of many various factors. Hence a systematic and precise analysis of geographically distributed recharge factors is provided in this study along with field exploration to provide subsurface documentation of site suitability. At time of writing, substantial information has been compiled relevant to MAR and spatial datasets have been developed for factors including land use, topography, soils, geology, depth to groundwater, groundwater quality, and water supply infrastructure. Three basic methods have been identified: recharge basins, injection wells, and FloodMAR or AgMAR, which involve application of floodwater or available surface water supply to farmland (water spreading). Potential sources of recharge supply have been evaluated and CVP water has been identified as the primary source. The spatial database has been used to identify promising areas for recharge. At time of writing, a short list of promising sites is being developed field investigation (soil borings) and numerical modeling. Next steps involve selection of most promising sites for conceptual design, technical feasibility, and cost estimating, followed by preparation of a technical memorandum.

## 2020 and 2021 Annual Reports

This task involves preparation of the 2020 and 2021 Annual Reports and presentation to the SBCWD Board of Directors. This will involve transitioning Annual Reports, prepared consistent with requirements of the San Benito County Water District Act, to satisfy SGMA requirements in addition to SBCWD requirements. These Annual Reports will summarize GSP progress, including the Dedicated Monitoring Well Program and MAR study.

# 6-GROUNDWATER SUSTAINABILITY

## Future Annual Reports

When the GSP is completed (before January 31, 2022) the GSP implementation process will continue with annual reporting and with five-year updates. SBCWD has been preparing Annual Groundwater Reports for many decades consistent with the District Act (see **Appendix A**) and future Annual Reports will be revised to be responsive to SGMA and GSP Regulations. SGMA Annual Reports have specific requirements that include documentation of groundwater levels and storage change and reporting of basin-wide groundwater extraction.

Several elements are required by GSP Regulation and already are included in the District's Annual Reports, including:

- Monitoring data stored in a Data Management System
- General information, including an executive summery and location map
- Detailed description and graphical representation of groundwater levels (contours and hydrographs)
- Surface water supply by use

GSP regulations require future annual reports to include additional information and to address the entire North San Benito Basin:

- Detailed description and graphical representation of groundwater use.
- Groundwater extractions and a map that illustrates general location and volume.
- Total water use for the basin collected by the best available measurement methods reported by sector.
- Change in storage maps for the basin and cumulative change in storage for the basin. While this is currently provided in the Annual Report for the northern portion of the basin, the analysis must be extended to the entire basin. Consistent with the GSP under preparation, the numerical model will be used to calculate and present change in storage values.
- Description of progress towards implanting the plan.

The Annual SGMA Reports will serve as a bridge between the GSP being developed now and the first 5-year update in 2027. The Annual Reports will describe progress in implementing the plan, including monitoring programs, management actions, and projects. Groundwater basin conditions will be described in terms of the sustainability indicators (undesirable results) and with reference to the sustainability criteria including the minimum threshold and measurable objectives defined in the GSP. The table below summarizes the indicators and indicates briefly how the annual report will provide status updates.

**Table 6-1. SGMA Indicators in Future Annual Reports**

| | Indicator | Status of Minimum Threshold |
|---|---|---|
|  | Groundwater-Level Declines | Compile water level data.<br>Compare key wells elevations with MTs |
|  | Groundwater-Storage Reductions | Compute groundwater storage using the numerical model. |
|  | Water-Quality Degradation | Compile water quality data.<br>Summarize the findings for the triennal review. |
|  | Land Subsidence | Download and review DWR InSar data |
|  | Interconnected Surface-Water Depletions | Review key shallow wells elevations with MTs |
| | | |

# 7-RECOMMENDATIONS

District policies and programs have served to effectively manage water resources for many years. The District, working collaboratively with other agencies, has eliminated historical overdraft through importation of CVP water, has developed and managed multiple sources of supply to address drought, has established an active and effective water conservation program, has initiated programs to protect water quality, and has improved delivered water quality to many municipal customers. The District also has provided consistent reporting and outreach. The following recommendations are responsive to the District Act and look forward to continuing effective management consistent with SGMA.

## Monitoring Programs

Through GSP implementation, the monitoring programs will be expanded to the entire North San Benito Groundwater Basin and improved to ensure accurate and consistent data for GSP management and the Annual Reports. Detailed monitoring recommendations are being developed as part of the GSP. As summarized here, the Round 3 Dedicated Monitoring Program is being conducted to provide a framework of dedicated monitoring wells to support documentation of groundwater levels, storage, and quality in the Annual Reports and GSP. Accurate measurement of groundwater pumping has been identified as an important data gap and GSP preparation includes consideration of different methods to evaluate groundwater pumping. SGMA Annual Reports will need to document groundwater extraction for the entire basin.

## Groundwater Production and Replenishment

Past District percolation operations helped to reverse historical overdraft and then accumulate a water supply reserve. The District currently manages groundwater storage and surface water to minimize excessively high or low groundwater elevations on a temporal and geographic basis. The District should continue to operate Hernandez and Paicines to improve downstream groundwater conditions. In 2020, the District provided off-channel percolation of CVP water; this too should be continued given availability of CVP water and persistence of local low groundwater levels. Basin-wide analysis of opportunities for additional percolation is being conducted as part of the Round 3 Managed Aquifer Recharge Study to develop additional percolation capacity to capture and store available imported water when available; such replenishment operations are critical to sustainable groundwater supply.

## Groundwater Charges

The groundwater charge for the USBR contract year (March 2021-February 2022) is recommended to be $13.55 per AF for agricultural use in Zone 6 and a groundwater charge of $40.55 per AF is recommended for M&I use The District adopts rates on a three-year cycle. Current water rates were adopted January 30, 2019.

# 8-REFERENCES

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Jones & Stokes Associates CH2M Hill, Groundwater Management Plan for the San Benito County Part of Gilroy-Hollister Groundwater Basin, April 1998.

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San Luis & Delta-Mendota Water Authority (SLDMWA), Water Supply Reports, November 2020, http://www.sldmwa.org/operations/water-supply-reports/

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Yates, G. and C-M Zhang, Groundwater flow and solute transport models for the San Benito County portion of the Gilroy-Hollister groundwater basin. May 11. Davis, CA, and Denver, CO. Prepared for San Benito County Water District and San Benito County Planning Department, Hollister, CA, 2001.

# APPENDIX A REPORTING REQUIREMENTS

## List of Tables

# APPENDIX A REPORTING REQUIREMENTS

The San Benito County Water District Act (1953) is codified in California Water Code Appendix 70. Section 70-7.6 authorizes the District Board of Directors to require the District to prepare an annual groundwater report; this report addresses groundwater conditions of the District and its zones of benefit (**Table A-1**) for the water year, which begins October 1 of the preceding calendar year and ends September 30 of the current calendar year. The Board has consistently ordered preparation of Annual Reports, and the reports have included the contents specified Section 70-7.6:

- An estimate of the annual overdraft for the current water year and for the ensuing water year
- Information for the consideration of the Board in its determination of the annual overdraft and accumulated overdraft as of September 30 of the current year
- A report as to the total production of water from the groundwater supplies of the District and its zones as of September 30 of the current year
- Information for the consideration of the Board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the District and its zones
- The amount of water the District is obligated to purchase during the ensuing water year
- A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the District and its zones during the ensuing water year
- A recommendation as to whether or not a groundwater charge should be levied in any zone(s) of the District in the ensuing water year and if so, a rate per acre-foot for all water other than agricultural water for such zone(s)
- Any other information the Board requires.
- The full text of Appendix 70, Section 70-7.6 through 7.8 is enclosed at the end of this appendix.
- Each water year a special topic is identified for further consideration. These topics have included water quality, salt loading, shallow wells, and others. Additional analyses and documentation provided in previous annual reports are summarized in **Table A-2.**

District management of water resources is focused on three Zones of Benefit, listed below.

**Table A-1. District Zones of Benefit**

| Zone | Area | Provides |
|---|---|---|
| 1 | Entire County | Specific District administrative expenses |
| 3 | San Benito River Valley (Paicines to San Juan) and Tres Pinos River Valley (Paicines to San Benito River) | Operation of Hernandez and Paicines reservoirs and related groundwater recharge and management activities |
| 6 | San Juan, Hollister East, Hollister West, Pacheco, Bolsa SE, and Tres Pinos subbasins | Importation and distribution of CVP water and related groundwater management activities |

**Table A-2. Special Topics in Previous Annual Reports**

| Water Year | Additional Analyses and Reporting |
|---|---|
| 2000 | Methodology to calculate water supply benefits of Zone 3 and 6 operations |
| 2001 | Preliminary salt balance |
| 2002 | Investigation of individual salt loading sources |
| 2003 | Documentation of nitrate in supply wells, drains, monitor wells, San Juan Creek |
| 2004 | Documentation of depth to groundwater in shallow wells |
| 2005 | Tabulation of waste discharger permit conditions and recent water quality monitoring results |
| 2006 | Rate study |
| 2007 | Water quality update |
| 2008 | Water budget update |
| 2009 | Water demand and supply |
| 2010 | Water quality update |
| 2011 | Water budget update |
| 2012 | Land use update |
| 2013 | Water quality update |
| 2014 | Water balance update and Groundwater Sustainability |
| 2015 | Groundwater Sustainability – Basin Boundaries and GSAs |
| 2016 | Water quality update |
| 2017 | Water budget update |
| 2018 | GSP Update |
| 2019 | Water quality update |

# APPENDIX A REPORTING REQUIREMENTS

## Water Code Appendix 70 Excerpts

Section 70-7.6. Groundwater; investigation and report: recommendations San Benito County

Sec. 7.6. the board by resolution require the district to annually prepare an investigation and report on groundwater conditions of the district and the zones thereof, for the period from October 1 of the preceding calendar year through September 30 of the current year and on activities of the district for protection and augmentation of the water supplies of the district and the zones thereof. The investigation and report shall include all of the following information:

(a) Information for the consideration of the board in its determination of the annual overdraft.

(b) Information for the consideration of the board in its determination of the accumulated overdraft as of September 30 of the current calendar year.

(c) A report as to the total production of water from the groundwater supplies of the district and the zones thereof as of September 30 of the current calendar year.

(d) An estimate of the annual overdraft for the current water year and for the ensuing water year.

(e) Information for the consideration of the board in its determination of the estimated amount of agricultural water and the estimated amount of water other than agricultural water to be withdrawn from the groundwater supplies of the district and the zones thereof for the ensuing water year.

(f) The amount of water the district is obligated to purchase during the ensuing water year.

(g) A recommendation as to the quantity of water needed for surface delivery and for replenishment of the groundwater supplies of the district and the zones thereof the ensuing water year.

(h) A recommendation as to whether or not a groundwater charge should be levied in any zone or zones of the district during the ensuing year.

(i) If any groundwater charge is recommended, a proposal of a rate per acre-foot for agricultural water and a rate per acre-foot for all water other than agricultural water for such zone or zones.

(j) Any other information the board requires.

(Added by Stats. 1965, c. 1798, p.4167, 7. Amended by Stats.1967,c.934, 5, eff. July27,1967; Stats. 1983, c. 402, 1; Stats. 1998, c. 219 (A.B.2135), 1.)

**Section 70-7.7. Receipt of report; notice of hearing; contents; hearing**

Sec. 7.7. (a) On the third Monday in December of each year, the groundwater report shall be delivered to the clerk of the board in writing. The clerk shall publish, pursuant to Section 6061 of the Government Code, a notice of the receipt of the report and of a public hearing to be held on the second Monday of January of the following year in a newspaper of general circulation printed and published within the district, at least 10 days prior to the date at which the public hearing regarding the groundwater report shall be held. The notice shall include, but is not limited to, an invitation to all operators of water producing facilities within the district to call at the offices of the district to examine the groundwater report.

(b) The board shall hold, on the second Monday of January of each year, a public hearing, at which time any operator of a water-producing facility within the district, or any person interested in the condition of the groundwater supplies or the surface water supplies of the district, may in person, or by representative, appear and submit evidence concerning the groundwater conditions and the surface water supplies of the district. Appearances also may be made supporting or protesting the written groundwater report, including, but not limited to, the engineer's recommended groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4167, 8. Amended by Stats. 1983, c. 02,2; Stats. 1998, c. 219 (A.B.2135,2.)

Section 70-7.8. Determination of groundwater charge; establishment of rates; zones; maximum charge; clerical errors

Sec. 7.8. (a) Prior to the end of the water year in which a hearing is held pursuant to subdivision (b) of Section 7.7, the board shall hold a public hearing, noticed pursuant to Section 6061 of the government Code, to determine if a groundwater charge should be levied, it shall levy, assess, and affix such a charge or charges against all persons operating groundwater- producing facilities within the zone or zones during the ensuing water year. The charge shall be computed at fixed and uniform rate per acre-foot for agricultural water, and at a fixed and uniform rate per acre-foot for all water other than agricultural water. Different rates may be established in different zones. However, in each zone, the rate for agricultural water shall be fixed and uniform and the rate for water other than agricultural water shall be fixed and uniform. The rate for agricultural water shall not exceed one-third of the rate for all water other than agricultural water.

(b) The groundwater charge in any year shall not exceed the costs reasonably borne by the district in the period of the charge in providing the water supply service authorized by this act in the district or a zone or zones thereof.

(c) Any groundwater charge levied pursuant to this section shall be in addition to any general tax or assessment levied within the district or any zone or zones thereof.

(d) Clerical errors occurring or appearing in the name of any person or in the description of the water-producing facility where the production of water there from is otherwise properly charged, or in the making or extension of any charge upon the records which do not affect the substantial rights of the assesse or assesses, shall not invalidate the groundwater charge.

(Added by Stats. 1965, c. 1798, p. 4168, 9. Amended by Stats. 1983, c. 402, 3; Stats.1983, c. 402, 3; Stats. 1998, c. 219 (A.B.2135), 3.)

# APPENDIX B CLIMATE DATA

## List of Tables and Figures

**Table B-1. Monthly Precipitation at the SBCWD CIMIS Station (inches)**

| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 0.12 | 0.01 | 2.21 | 4.38 | 4.52 | 1.56 | 1.33 | 1.32 | 0.00 | 0.01 | 0.00 | 0.00 | 15.46 | 117% |
| 1997 | 0.96 | 3.16 | 4.26 | 6.84 | 0.21 | 0.09 | 0.19 | 0.02 | 0.10 | 0.00 | 0.00 | 0.03 | 15.86 | 120% |
| 1998 | 0.16 | 3.78 | 2.59 | 4.94 | 9.06 | 2.70 | 2.31 | 2.40 | 0.09 | 0.02 | 0.00 | 0.08 | 28.13 | 213% |
| 1999 | 0.54 | 1.93 | 0.79 | 2.54 | 2.49 | 1.52 | 0.67 | 0.06 | 0.07 | 0.00 | 0.00 | 0.00 | 10.61 | 80% |
| 2000 | 0.14 | 0.98 | 0.11 | 4.05 | 4.53 | 0.68 | 0.40 | 0.45 | 0.10 | 0.00 | 0.00 | 0.02 | 11.46 | 87% |
| 2001 | 3.54 | 0.80 | 0.23 | 2.86 | 2.77 | 0.62 | 2.20 | 0.01 | 0.01 | 0.03 | 0.02 | 0.00 | 13.09 | 99% |
| 2002 | 0.70 | 11.48 | 11.93 | 0.66 | 1.15 | 1.57 | 0.37 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 28.14 | 213% |
| 2003 | 0.00 | 1.67 | 5.04 | 0.77 | 1.41 | 1.06 | 3.05 | 0.06 | 0.00 | 0.00 | 0.06 | 0.00 | 13.12 | 99% |
| 2004 | 0.20 | 0.60 | 5.25 | 1.31 | 4.21 | 0.59 | 0.27 | 0.08 | 0.01 | 0.00 | 0.00 | 0.01 | 12.53 | 95% |
| 2005 | 1.95 | 0.54 | 3.46 | 2.49 | 2.89 | 3.42 | 0.83 | 0.64 | 0.43 | 0.00 | 0.00 | 0.04 | 16.69 | 126% |
| 2006 | 0.07 | 0.27 | 3.08 | 1.49 | 1.01 | 4.96 | 1.73 | 0.39 | 0.01 | 0.00 | 0.02 | 0.01 | 13.04 | 99% |
| 2007 | 0.20 | 0.73 | 1.69 | 0.57 | 2.22 | 0.29 | 0.55 | 0.02 | 0.00 | 0.02 | 0.00 | 0.43 | 6.72 | 51% |
| 2008 | 0.71 | 0.67 | 0.92 | 4.56 | 2.06 | 0.09 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9.07 | 69% |
| 2009 | 0.28 | 1.05 | 1.89 | 0.35 | 3.73 | 1.83 | 0.20 | 0.47 | 0.00 | 0.00 | 0.00 | 0.15 | 9.95 | 75% |
| 2010 | 0.50 | 0.02 | 1.31 | 2.29 | 2.19 | 1.74 | 3.44 | 0.61 | 0.00 | 0.01 | 0.00 | 0.00 | 12.11 | 92% |
| 2011 | 0.72 | 1.85 | 2.59 | 1.57 | 2.63 | 2.33 | 0.19 | 0.78 | 0.30 | 0.00 | 0.00 | 0.00 | 12.96 | 98% |
| 2012 | 0.69 | 0.96 | 0.07 | 0.81 | 0.46 | 2.34 | 1.39 | 0.26 | 0.09 | 0.00 | 0.00 | 0.00 | 7.07 | 54% |
| 2013 | 0.01 | 2.23 | 1.15 | 1.35 | 0.64 | 0.46 | 0.30 | 0.02 | 0.01 | 0.00 | 0.03 | 0.10 | 6.30 | 48% |
| 2014 | 0.07 | 0.37 | 0.17 | 0.22 | 1.91 | 1.59 | 0.86 | 0.02 | 0.00 | 0.00 | 0.00 | 0.14 | 5.35 | 41% |
| 2015 | 1.57 | 0.48 | 5.78 | 0.02 | 1.20 | 0.22 | 0.24 | 0.87 | 0.00 | 0.01 | 0.09 | 0.08 | 10.56 | 80% |
| 2016 | 0.22 | 3.65 | 1.58 | 3.98 | 0.57 | 3.72 | 0.79 | 0.05 | 0.08 | 0.08 | 0.06 | 0.10 | 14.88 | 113% |
| 2017 | 1.77 | 2.48 | 3.33 | 4.66 | 6.05 | 1.70 | 1.09 | 0.50 | 0.32 | 0.00 | 0.02 | 0.00 | 21.92 | 166% |
| 2018 | 0.20 | 1.12 | 0.19 | 2.39 | 0.29 | 2.74 | 1.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8.26 | 63% |
| 2019 | 0.17 | 2.52 | 1.48 | 2.24 | 4.02 | 2.55 | 0.25 | 1.95 | 0.20 | 0.00 | 0.00 | 0.00 | 15.38 | 117% |
| 2020 | 0.00 | 1.40 | 3.69 | 1.39 | 0.00 | 2.78 | 1.18 | 0.42 | 0.24 | 0.13 | 0.02 | 0.00 | 11.25 | 85% |
| AVG | 0.62 | 1.79 | 2.59 | 2.35 | 2.49 | 1.73 | 1.01 | 0.47 | 0.08 | 0.01 | 0.01 | 0.05 | 13.20 | 100% |

Note: The average precipitation is based on the period of record (1875-2018).

-The CIMIS value for September 2017 (2.4") includes measurement error due to irrigation overspray. The corrected District value is 0".

-The CIMIS value for February, May, June, and August 2018 (0.8", 2.6", 0.1", 0.03") includes measurement error due to irrigation overspray. The corrected District value is 0.3" for February and 0" for all other months.

-The CIMIS value for October and November 2018 included measurement error due to irrigation overspray. The corrected District value is 0.17" for October and 2.52" for

**Table B-2. Reference Evapotranspiration at the SBCWD CIMIS Station (inches)**

| Water Year | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | TOTAL | % Normal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1996 | 3.88 | 2.24 | 1.22 | 1.48 | 1.88 | 3.67 | 5.10 | 6.06 | 6.73 | 7.39 | 6.68 | 4.71 | 51.04 | 104% |
| 1997 | 3.84 | 1.84 | 1.37 | 1.38 | 2.48 | 4.27 | 5.84 | 7.51 | 7.13 | 7.18 | 6.71 | 5.67 | 55.22 | 112% |
| 1998 | 3.85 | 1.84 | 1.52 | 1.29 | 1.38 | 2.82 | 4.26 | 4.53 | 5.27 | 6.91 | 6.83 | 4.72 | 45.22 | 92% |
| 1999 | 3.51 | 1.73 | 1.52 | 1.54 | 1.84 | 3.01 | 4.72 | 5.80 | 6.66 | 6.92 | 5.91 | 4.67 | 47.83 | 97% |
| 2000 | 4.00 | 1.98 | 1.89 | 1.22 | 1.62 | 3.69 | 5.14 | 6.04 | 6.73 | 6.74 | 6.19 | 4.74 | 49.98 | 101% |
| 2001 | 2.91 | 1.71 | 1.47 | 1.47 | 1.81 | 3.07 | 3.90 | 6.15 | 6.54 | 6.02 | 6.23 | 4.75 | 46.03 | 93% |
| 2002 | 3.51 | 1.91 | 1.24 | 1.53 | 2.26 | 3.66 | 4.21 | 6.37 | 7.05 | 7.24 | 6.14 | 5.39 | 50.51 | 102% |
| 2003 | 3.57 | 1.94 | 1.25 | 1.56 | 1.80 | 3.87 | 3.79 | 6.00 | 6.47 | 7.29 | 6.15 | 5.07 | 48.76 | 99% |
| 2004 | 4.11 | 1.73 | 1.24 | 1.32 | 1.72 | 3.98 | 5.19 | 6.38 | 6.71 | 6.63 | 5.98 | 5.32 | 50.31 | 102% |
| 2005 | 3.08 | 1.69 | 1.44 | 1.30 | 1.69 | 2.95 | 4.38 | 5.74 | 6.36 | 6.86 | 6.13 | 4.55 | 46.17 | 94% |
| 2006 | 3.59 | 2.00 | 1.19 | 1.43 | 2.18 | 2.43 | 3.00 | 5.49 | 6.41 | 7.02 | 5.60 | 4.38 | 44.72 | 91% |
| 2007 | 3.28 | 1.69 | 1.37 | 1.77 | 1.77 | 4.11 | 4.76 | 6.29 | 6.89 | 6.79 | 6.46 | 4.65 | 49.83 | 101% |
| 2008 | 3.48 | 2.21 | 1.44 | 1.25 | 2.03 | 3.76 | 5.17 | 5.97 | 6.88 | 6.74 | 6.31 | 5.00 | 50.24 | 102% |
| 2009 | 3.82 | 1.87 | 1.36 | 1.70 | 1.72 | 3.51 | 4.83 | 5.53 | 6.31 | 7.08 | 6.31 | 5.30 | 49.34 | 100% |
| 2010 | 3.45 | 2.21 | 1.71 | 1.26 | 1.80 | 3.49 | 3.87 | 5.37 | 6.71 | 6.29 | 5.88 | 4.98 | 47.02 | 95% |
| 2011 | 3.02 | 1.86 | 1.05 | 1.59 | 2.05 | 2.71 | 4.43 | 5.34 | 5.99 | 6.56 | 5.74 | 4.64 | 44.98 | 91% |
| 2012 | 3.27 | 1.89 | 1.83 | 1.84 | 2.46 | 3.34 | 4.39 | 6.39 | 6.81 | 6.63 | 6.00 | 4.60 | 49.45 | 100% |
| 2013 | 3.25 | 1.82 | 1.16 | 1.50 | 2.10 | 3.71 | 5.39 | 6.26 | 6.36 | 6.46 | 5.98 | 4.83 | 48.82 | 99% |
| 2014 | 3.51 | 2.02 | 1.80 | 2.08 | 1.85 | 3.58 | 4.89 | 6.83 | 6.61 | 6.43 | 6.02 | 4.74 | 50.36 | 102% |
| 2015 | 3.90 | 1.86 | 1.45 | 1.80 | 2.16 | 4.13 | 5.12 | 5.01 | 6.41 | 6.52 | 6.49 | 5.34 | 50.19 | 102% |
| 2016 | 4.11 | 2.05 | 1.39 | 1.32 | 2.72 | 3.40 | 4.65 | 5.71 | 7.54 | 7.22 | 5.74 | 5.15 | 51.00 | 103% |
| 2017 | 3.40 | 2.11 | 1.47 | 1.55 | 1.76 | 3.73 | 4.45 | 6.29 | 6.82 | 7.62 | 6.03 | 5.16 | 50.39 | 102% |
| 2018 | 4.15 | 1.93 | 1.98 | 1.57 | 2.66 | 3.25 | 4.81 | 5.83 | 7.29 | 7.65 | 6.60 | 5.15 | 52.87 | 107% |
| 2019 | 3.85 | 2.20 | 1.54 | 1.58 | 1.91 | 3.42 | 4.81 | 5.17 | 6.68 | 7.15 | 6.54 | 5.36 | 50.21 | 102% |
| 2020 | 4.24 | 2.31 | 1.37 | 1.60 | 2.78 | 3.15 | 4.54 | 6.53 | 7.17 | 6.96 | 6.23 | 4.78 | 51.66 | 105% |
| AVG | 3.62 | 1.95 | 1.45 | 1.52 | 2.02 | 3.47 | 4.63 | 5.94 | 6.66 | 6.89 | 6.20 | 4.95 | 49.29 | 100% |

Note: The averages are for the available period of record, 1995 for reference evapotranspiration.

# APPENDIX C GROUNDWATER DATA

## List of Tables and Figures

Table C-1. Groundwater Elevations October 2019 through October 2020

| Well Number | Well Depth (feet) | Depth to Top of Screens (feet) | Subbasin | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Oct-19 | Jan-20 | Apr-20 | Jul-20 | Oct-20 |
| **Southern Management Area** | | | | | | | | |
| 14-6-14Q | UNK | UNK | Paicines | 634.5 | 638.0 | 636.2 | 627.8 | 635.4 |
| 14-6-35B | UNK | UNK | Paicines | 655.0 | 655.7 | 658.6 | 654.8 | 654.8 |
| 14-6-26K1 | UNK | UNK | Paicines | 642.6 | 644.2 | 645.9 | 643.4 | 644.3 |
| 14-6-26F | UNK | UNK | Paicines | 644.8 | 644.3 | 644.7 | 644.5 | 644.0 |
| 14-6-36D | UNK | UNK | Paicines | NM | NM | 649.5 | 642.5 | 640.5 |
| 14-6-26H1 | UNK | UNK | Paicines | 640.1 | 650.3 | 642.4 | 638.5 | 633.5 |
| 1536 | UNK | UNK | TPCV | 298.0 | 303.0 | 304.0 | 299.0 | 294.0 |
| 14-6-13B | UNK | UNK | TPCV | 648.2 | 649.7 | 649.0 | 643.8 | 639.4 |
| GRANITE ROCK WELL 1 | UNK | UNK | TPCV | 312.4 | 314.2 | 312.4 | 309.9 | 307.5 |
| GRANITE ROCK WELL 2 | UNK | UNK | TPCV | 337.0 | 337.1 | 332.2 | 326.1 | 321.1 |
| San Justo 5 | UNK | UNK | TPCV | 275.5 | 275.1 | 275.0 | 275.0 | 274.8 |
| 14-7-19G | UNK | UNK | TPCV | 711.3 | 714.5 | 715.2 | 710.0 | 705.8 |
| 14-7-20K | UNK | UNK | TPCV | 719.3 | 721.1 | 726.6 | 718.9 | 715.5 |
| **San Juan Management Area** | | | | | | | | |
| 12-4-17L20 | UNK | UNK | SJ | 120.5 | 124.1 | NM | 121.3 | 120.2 |
| 12-4-18J1 | UNK | UNK | SJ | 123.0 | 124.6 | 125.2 | 122.1 | 120.6 |
| 12-4-20C3 | UNK | UNK | SJ | 111.8 | 113.1 | NM | NM | NM |
| 12-4-21M1 | 250 | UNK | SJ | 142.4 | 143.9 | 147.7 | 142.8 | 141.6 |
| 12-4-26G1 | 876 | 240 | SJ | 148.3 | 156.1 | 154.8 | 150.7 | 155.5 |
| 12-4-34H1 | 387 | 120 | SJ | 151.7 | 168.4 | 173.7 | 142.6 | 146.0 |
| 12-4-35A1 | 325 | 110 | SJ | 172.6 | 191.1 | | 164.0 | 167.7 |
| 12-5-30H1 | 240 | UNK | SJ | 206.2 | 206.6 | 208.1 | 208.6 | 207.0 |
| 12-5-30R1 | 199 | 87 | SJ | 366.5 | NM | NM | NM | NM |
| 12-5-31H1 | UNK | UNK | SJ | 199.5 | 211.7 | 212.0 | 200.5 | 195.4 |
| 13-4-03H1 | 312 | 168 | SJ | 149.8 | 169.1 | 171.7 | 145.9 | 138.5 |
| 13-4-4A3 | UNK | UNK | SJ | 191.2 | 194.0 | 194.2 | 190.3 | 165.0 |
| RIDER BERRY | UNK | UNK | SJ | 146.2 | 160.0 | 160.7 | 151.3 | 134.4 |
| **Bolsa Management Area** | | | | | | | | |
| 11-4-25H1 | UNK | UNK | B | 75.3 | 118.4 | 122.0 | 46.5 | 63.5 |
| 11-4-26B1 | UNK | UNK | B | 127.4 | 137.0 | 137.7 | 124.3 | 123.1 |
| 11-4-34A1 | 100 | UNK | B | 132.8 | 135.0 | 134.8 | 128.1 | 130.5 |
| 11-5-20N1 | 300 | UNK | B | 68.8 | 111.4 | 117.1 | 57.6 | 55.6 |
| 11-5-21E2 | 220 | 100 | B | 155.0 | 155.0 | 155.0 | 155.0 | 155.0 |
| 11-5-27P2 | 331 | 67 | B | 170.4 | 174.2 | 174.2 | 169.2 | 168.7 |
| 11-5-28B1 | 198 | 125 | B | 168.0 | 168.0 | 168.0 | 168.0 | 168.0 |
| 11-5-28P4 | 140 | 80 | B | 165.0 | 165.0 | 165.0 | 165.0 | 165.0 |
| 11-5-31F1 | 515 | 312 | B | 57.2 | 93.7 | 96.2 | 47.1 | 51.5 |
| 11-5-33B1 | 125 | UNK | B | 169.0 | 169.0 | 169.0 | 169.0 | 169.0 |
| 12-5-05G1 | 500 | 150 | B | 107.1 | 107.7 | 107.0 | 105.2 | 104.8 |
| 12-5-05M1 | UNK | UNK | B | 58.3 | 81.8 | 85.0 | 40.6 | 49.6 |
| 12-5-06L1 | UNK | UNK | B | 147.0 | 150.6 | 148.0 | 149.0 | 146.4 |
| 12-5-07P1 | 750 | 360 | B | 68.0 | 69.0 | 70.0 | 64.0 | 65.8 |
| 12-5-17D1 | 950 | 314 | B | 75.0 | 77.0 | 74.0 | 70.0 | 71.5 |
| **Llagas - SCVWD** | | | | | | | | |
| 11S04E02D008 | UNK | UNK | SCVWD | 146.3 | 165.1 | NM | 137.0 | 136.9 |
| 11S04E02N001 | UNK | UNK | SCVWD | 139.6 | 158.6 | NM | 119.4 | 128.2 |
| 11S04E03J002 | UNK | UNK | SCVWD | 144.9 | 165.1 | NM | 132.1 | 132.5 |
| 11S04E08K002 | UNK | UNK | SCVWD | 152.1 | 162.2 | NM | 151.3 | 144.0 |
| 11S04E10D004 | UNK | UNK | SCVWD | 148.0 | 159.9 | 155.5 | 139.0 | 137.9 |
| 11S04E15J002 | UNK | UNK | SCVWD | 136.4 | 144.0 | 140.8 | 123.8 | 125.3 |
| 11S04E17N004 | UNK | UNK | SCVWD | 151.6 | 162.3 | NM | 151.2 | 143.9 |
| 11S04E22N001 | UNK | UNK | SCVWD | 124.0 | 142.5 | NM | 121.9 | 122.7 |
| 11S04E32R002 | UNK | UNK | SCVWD | 120.9 | 133.8 | 126.6 | 117.4 | 117.0 |

Table C-1. Groundwater Elevations October 2019 through October 2020

| Well Number | Well Depth (feet) | Depth to Top of Screens (feet) | Subbasin | Groundwater Elevations (feet MSL) | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Oct-19 | Jan-20 | Apr-20 | Jul-20 | Oct-20 |
| **Hollister Management Area** | | | | | | | | |
| 12-5-09M1 | 240 | 105 | BSE | 124.9 | 126.3 | 137.0 | 126.4 | 127.8 |
| 12-5-22N1 | 372 | 250 | BSE | NM | 87.1 | 92.9 | 89.4 | 90.3 |
| 2317 | UNK | UNK | HE | 224.5 | 225.1 | 225.6 | 225.4 | 225.2 |
| 12-5-22C1 | 237 | 102 | HE | 176.0 | 187.7 | 188.8 | 129.5 | 178.3 |
| 12-5-22J2 | 355 | 120 | HE | 192.5 | 195.0 | 196.0 | 194.7 | 194.2 |
| 12-5-23A20 | 862 | 178 | HE | 184.0 | 184.8 | 186.0 | 185.5 | 180.0 |
| 12-5-36B20 | 500 | 430 | HE | 199.2 | 200.0 | 196.7 | 196.8 | 194.8 |
| 12-6-07P1 | 147 | UNK | HE | 243.6 | 246.1 | 248.0 | 243.5 | 242.5 |
| 12-6-18G1 | 198 | 70 | HE | 265.3 | 270.0 | 275.0 | 267.5 | 265.0 |
| 12-6-30E1 | UNK | UNK | HE | 347.9 | 348.9 | 348.0 | 347.5 | 347.0 |
| 13-6-07D2 | UNK | UNK | HE | 338.3 | 338.5 | 338.9 | 337.9 | 337.3 |
| ROSSI 1 | UNK | UNK | HE | 231.6 | 233.2 | 233.2 | 228.3 | 230.5 |
| 12-5-27E1 | 175 | UNK | HW | 201.7 | 233.6 | 209.2 | 205.6 | 204.6 |
| 12-5-28J1 | 220 | UNK | HW | 215.0 | 217.8 | 221.7 | 218.2 | 217.0 |
| 12-5-28N1 | 408 | 168 | HW | 222.7 | 223.3 | 230.6 | NM | NM |
| 12-5-33E2 | 121 | 81 | HW | 216.0 | 217.7 | 221.4 | 217.3 | 218.0 |
| 12-5-34P1 | 195 | 153 | HW | 220.0 | 223.5 | 227.0 | 225.0 | 222.5 |
| 13-5-03L1 | 126 | UNK | HW | 231.0 | 233.7 | 237.6 | 235.1 | 233.1 |
| 13-5-04B | UNK | UNK | HW | 230.4 | 233.4 | 235.7 | 233.6 | 231.3 |
| 13-5-10B1 | UNK | UNK | HW | 220.5 | 224.3 | 214.5 | 213.0 | 216.5 |
| 13-5-10L1 | 252 | 52 | HW | 292.0 | NM | NM | NM | NM |
| 13-5-11E1 | UNK | UNK | HW | 281.7 | 290.2 | 288.4 | 287.5 | 284.5 |
| San Justo 4 | UNK | UNK | HW | 272.1 | 271.9 | 270.4 | 271.8 | 271.0 |
| San Justo 6 | UNK | UNK | HW | 236.2 | 233.5 | 235.5 | 236.0 | 234.3 |
| 11-5-26N2 | 232 | 95 | P | 171.0 | 174.6 | 174.6 | 170.0 | 169.3 |
| 11-5-26R3 | 225 | 65 | P | 189.0 | 185.3 | 185.8 | 180.6 | 178.6 |
| 11-5-35C1 | 180 | UNK | P | 157.5 | 180.5 | 180.7 | 170.4 | 174.6 |
| 11-5-35G1 | 230 | UNK | P | 182.2 | 184.8 | 185.2 | 182.6 | 182.9 |
| 11-5-35Q3 | UNK | UNK | P | 170.0 | 179.1 | 176.9 | 158.7 | 168.7 |
| 11-5-36C1 | 98 | UNK | P | 195.4 | 197.2 | 197.1 | 198.5 | 192.2 |
| 11-5-36M1 | UNK | UNK | P | 183.9 | 183.9 | 186.0 | 184.1 | 182.0 |
| 11-6-31M2 | 188 | 155 | P | 236.5 | 227.3 | 227.0 | 224.6 | 218.9 |
| 12-5-01G2 | 300 | UNK | P | 183.7 | 184.4 | 182.8 | 177.3 | 180.8 |
| 12-5-02H5 | 128 | 42 | P | 182.8 | 184.1 | 181.7 | 179.8 | 178.8 |
| 12-5-02L2 | 170 | UNK | P | 195.1 | 196.5 | 197.0 | 195.1 | 194.1 |
| 12-5-03B1 | 128 | 100 | P | 182.0 | 182.0 | 182.0 | 182.0 | 182.0 |
| 12-6-06K1 | 260 | 16 | P | 260.0 | 260.0 | 260.0 | 260.0 | 260.0 |
| 12-6-06L4 | 235 | 50 | P | 220.4 | 220.2 | 220.0 | 219.0 | 215.3 |
| 13-5-11Q1 | 178 | 61 | TP | 294.4 | 295.4 | 294.4 | 293.0 | 294.6 |
| 13-5-12D4 | UNK | UNK | TP | 229.0 | 251.0 | 250.0 | 249.0 | 244.0 |
| 13-5-12K1 | UNK | UNK | TP | 328.0 | 329.0 | 330.0 | 321.0 | 288.0 |
| 13-5-12N20 | 352 | 301 | TP | 319.6 | 320.3 | 320.7 | 319.0 | 317.4 |
| 13-5-13F1 | 134 | 30 | TP | 334.1 | 335.0 | 335.9 | 335.3 | 334.0 |
| 13-5-13H1 | 252 | 112 | TP | 344.9 | 346.1 | 346.1 | 344.0 | 342.7 |
| 13-5-13J2 | 180 | UNK | TP | 347.1 | 348.2 | 347.5 | 346.0 | 344.2 |
| 13-5-13Q1 | 185 | 44 | TP | 333.0 | 336.8 | 336.0 | 332.9 | 331.5 |
| 13-5-14C1 | UNK | UNK | TP | 293.0 | 294.1 | 294.0 | 291.8 | 289.3 |
| 13-6-19J1 | 340 | 128 | TP | 435.2 | 434.6 | 434.6 | NM | NM |
| 13-6-19K1 | 211 | UNK | TP | 360.8 | 361.2 | 359.9 | 399.7 | 394.6 |
| 13-6-20K1 | UNK | UNK | TP | 429.0 | 425.0 | 420.3 | 420.9 | 417.8 |
| 11-5-12E1 | 103 | 52 | PC | NM | 235.4 | NM | NM | NM |
| 11-5-13D1 | 125 | UNK | PC | 227.3 | 229.7 | 232.0 | 220.8 | 222.5 |
| 11-5-23R2 | 118 | 43 | PC | 206.7 | NM | 210.3 | 207.5 | 205.5 |
| 11-5-24C1 | 134 | UNK | PC | 213.0 | NM | NM | NM | NM |
| 11-5-24C2 | 165 | 70 | PC | 223.0 | 226.1 | 226.7 | 223.5 | 218.3 |
| 11-5-24L1 | 70 | UNK | PC | 207.6 | 212.0 | 212.6 | 207.6 | 202.5 |
| 11-5-25G1 | 225 | UNK | PC | 208.4 | 208.4 | 208.0 | 201.0 | 198.9 |

UNK - Unknown
NM - Not Monitored

**Table C-2. Groundwater Change Attributes**

| Subbasin | Subbasin Area (Acres) | Average Storativity[1] |
|---|---|---|
| San Juan | 11,708 | 0.05 |
| Hollister West | 6,050 | 0.05 |
| Tres Pinos | 4,725 | 0.05 |
| Pacheco | 6,743 | 0.03 |
| Northern Hollister East | 10,686 | 0.03 |
| Southern Hollister East | 5,175 | 0.03 |
| Bolsa SE | 2,691 | 0.08 |
| Bolsa | 20,003 | 0.01 |

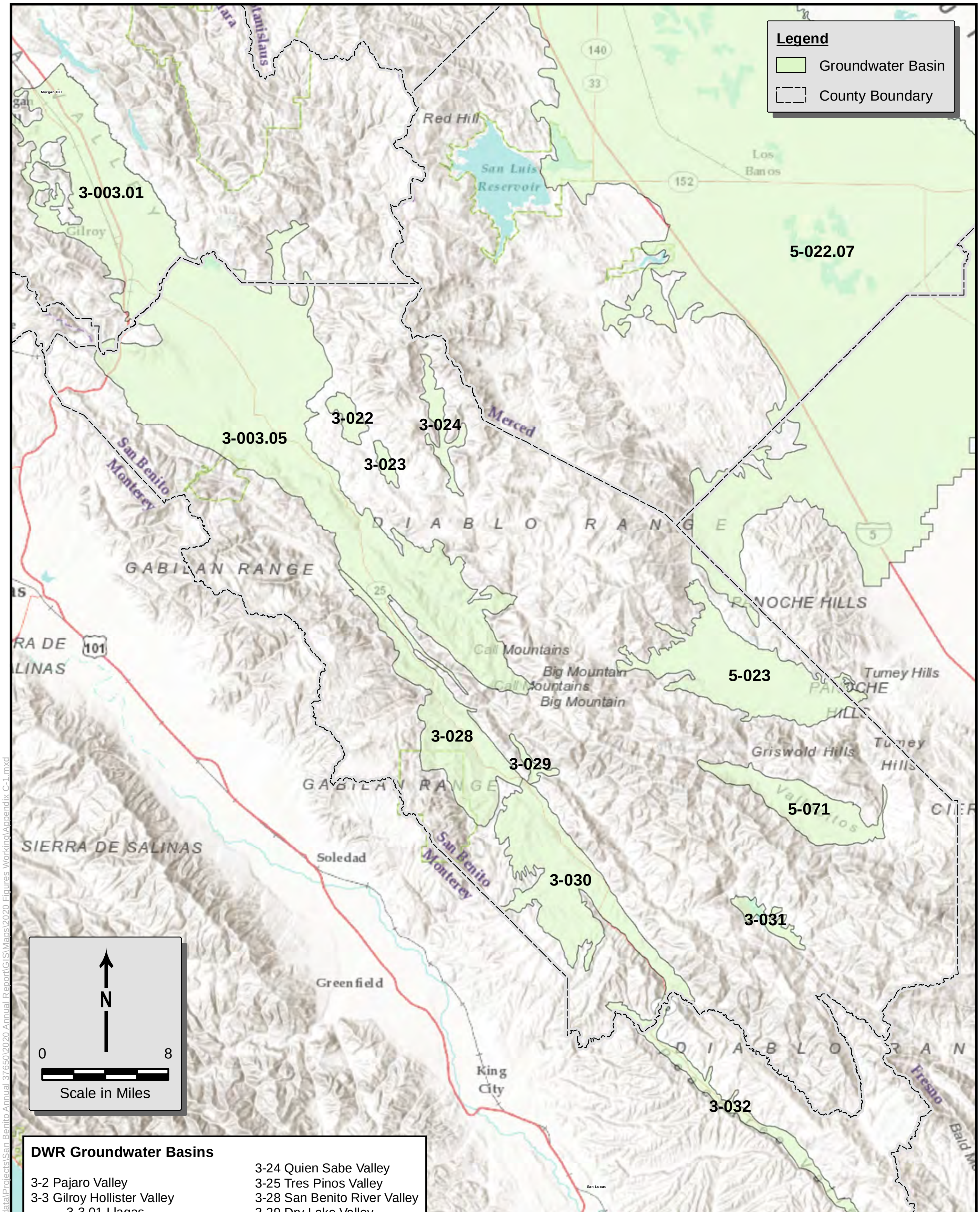
1. Storativity values from Yates/Zhang, 2001

**Table C-3. Groundwater Change in Elevation 2006-2020 (feet)**

| | Average Change in Groundwater Elevation | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subbasin | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| San Juan | 0.9 | (4.5) | 0.3 | (0.7) | (1.4) | (0.9) | 0.0 | (10.7) | (7.9) | (9.4) | (3.6) | 14.6 | 3.5 | (1.7) | (5.8) |
| Hollister West | 3.1 | (1.7) | 3.3 | (1.4) | (1.6) | (0.7) | 2.1 | (5.7) | (17.4) | (3.6) | 0.9 | 6.9 | 9.5 | 6.5 | 2.3 |
| Tres Pinos | 2.5 | (2.3) | 0.7 | 8.1 | (10.5) | 1.0 | 2.5 | (2.5) | (6.7) | (6.7) | (6.0) | 4.4 | 0.9 | 15.0 | (7.6) |
| Pacheco | 1.9 | (4.4) | (1.4) | 8.1 | (6.6) | 1.9 | (4.4) | (3.0) | (7.4) | 1.9 | 3.0 | 8.6 | (2.4) | 1.8 | (3.2) |
| Northern Hollister East | 3.6 | (6.5) | (4.2) | 10.1 | (8.7) | 2.7 | (2.4) | 1.6 | (9.1) | 0.8 | (1.5) | 5.8 | 2.6 | 0.6 | (1.6) |
| Southern Hollister East | 3.3 | (1.5) | 5.5 | 9.4 | 4.9 | (1.9) | (2.2) | (1.1) | (6.9) | 1.6 | 8.1 | 0.5 | 7.2 | 2.4 | (1.2) |
| Bolsa SE | 1.5 | (6.8) | 11.5 | (24.8) | 25.3 | (11.6) | 0.2 | (4.3) | (10.7) | (3.3) | (9.9) | 8.2 | 7.2 | 3.2 | 0.2 |
| Bolsa | 6.8 | (3.3) | 9.0 | (16.9) | 23.2 | (11.2) | 10.7 | (3.4) | (25.6) | 4.6 | (2.9) | 10.6 | (2.6) | (0.6) | (3.29) |

**Table C-4. Groundwater Change in Storage 2006-2020 (acre-feet)**

| | Average Change in Groundwater Storage (AF) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subbasin | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
| San Juan | 510 | (2,626) | 168 | (437) | (811) | (523) | 0 | (6,239) | (4,653) | (5,530) | (2,086) | 8,531 | 2,077 | (1,016.0) | (3,383.3) |
| Hollister West | 947 | (510) | 1,001 | (431) | (477) | (198) | 640 | (1,730) | (5,267) | (1,090) | 282 | 2,084 | 2,878 | 1,962.0 | 684.0 |
| Tres Pinos | 584 | (553) | 169 | 1,913 | (2,485) | 228 | 601 | (586) | (1,574) | (1,579) | (1,427) | 1,034 | 216 | 3,552.0 | (1,802.8) |
| Pacheco | 391 | (892) | (275) | 1,639 | (1,335) | 389 | (882) | (597) | (1,490) | 388 | 604 | 1,736 | (488) | 362.0 | (654.1) |
| Northern Hollister East | 1,167 | (2,087) | (1,350) | 3,253 | (2,798) | 870 | (757) | 528 | (2,918) | 242 | (474) | 1,867 | 818 | 203.0 | (515.7) |
| Southern Hollister East | 506 | (227) | 846 | 1,457 | 766 | (301) | (339) | (177) | (1,067) | 250 | 1,263 | 72 | 1,123 | 365.0 | (185.0) |
| Bolsa SE | 333 | (1,458) | 2,478 | (5,338) | 5,443 | (2,508) | 53 | (918) | (2,300) | (719) | (2,139) | 1,767 | 1,543 | 695.0 | 37.0 |
| Bolsa | 1,358 | (659) | 1,794 | (3,372) | 4,631 | (2,239) | 2,144 | (674) | (5,112) | 915 | (578) | 2,125 | (514) | (112.0) | (658.1) |



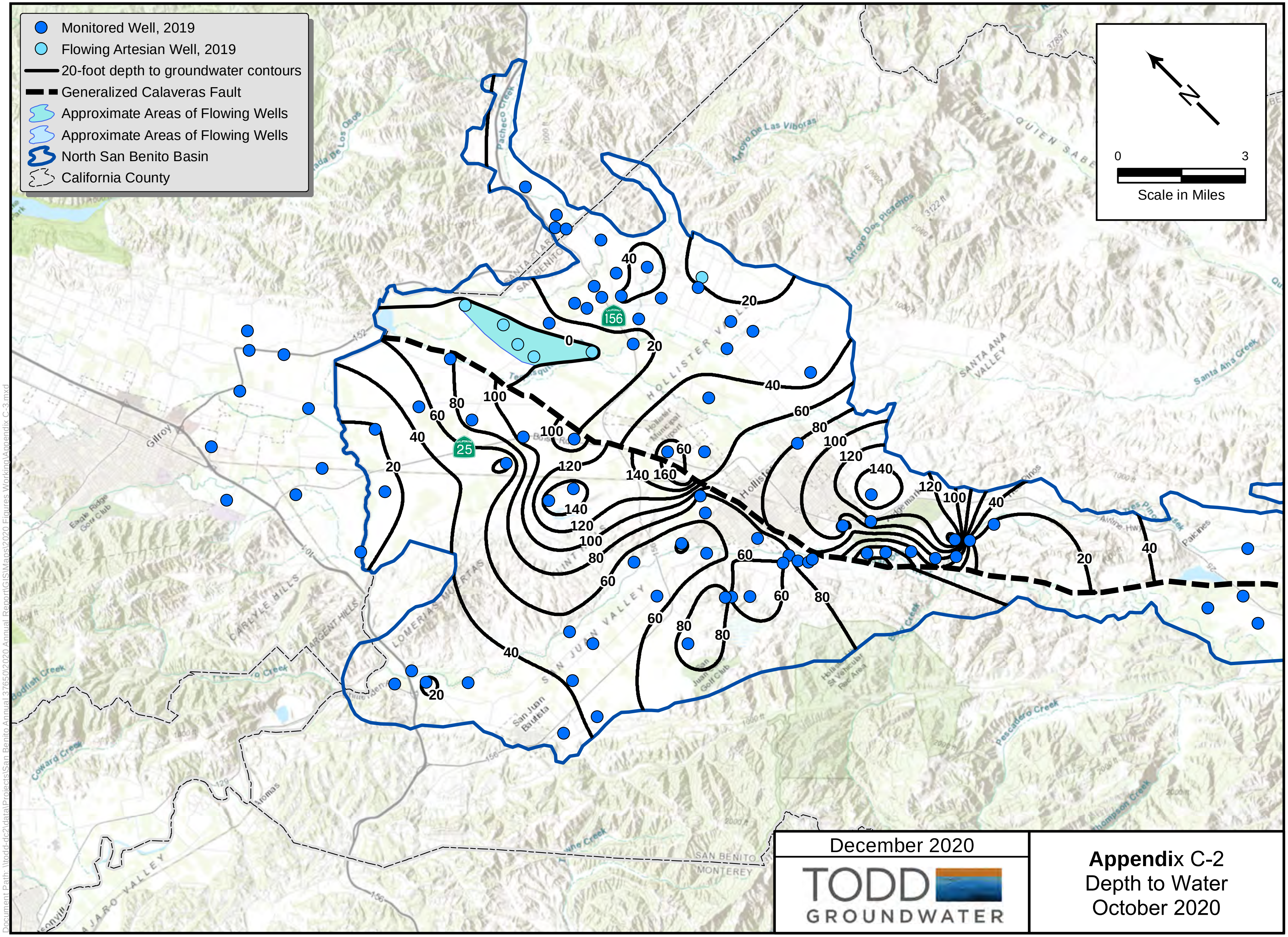

**DWR Groundwater Basins**

3-2 Pajaro Valley
3-3 Gilroy Hollister Valley
3-3.01 Llagas
3-3.05 North San Benito
3-22 Santa Ana Valley
3-23 Upper Santa Ana Valley
3-32 Peachtree
3-24 Quien Sabe Valley
3-25 Tres Pinos Valley
3-28 San Benito River Valley
3-29 Dry Lake Valley
3-30 Bitter Water Valley
3-31 Hernandez Valley
5-22.7 Delta Mendota
5-23 Panoche Valley
5-71 Vallecitos Valley

December 2020

TODD GROUNDWATER

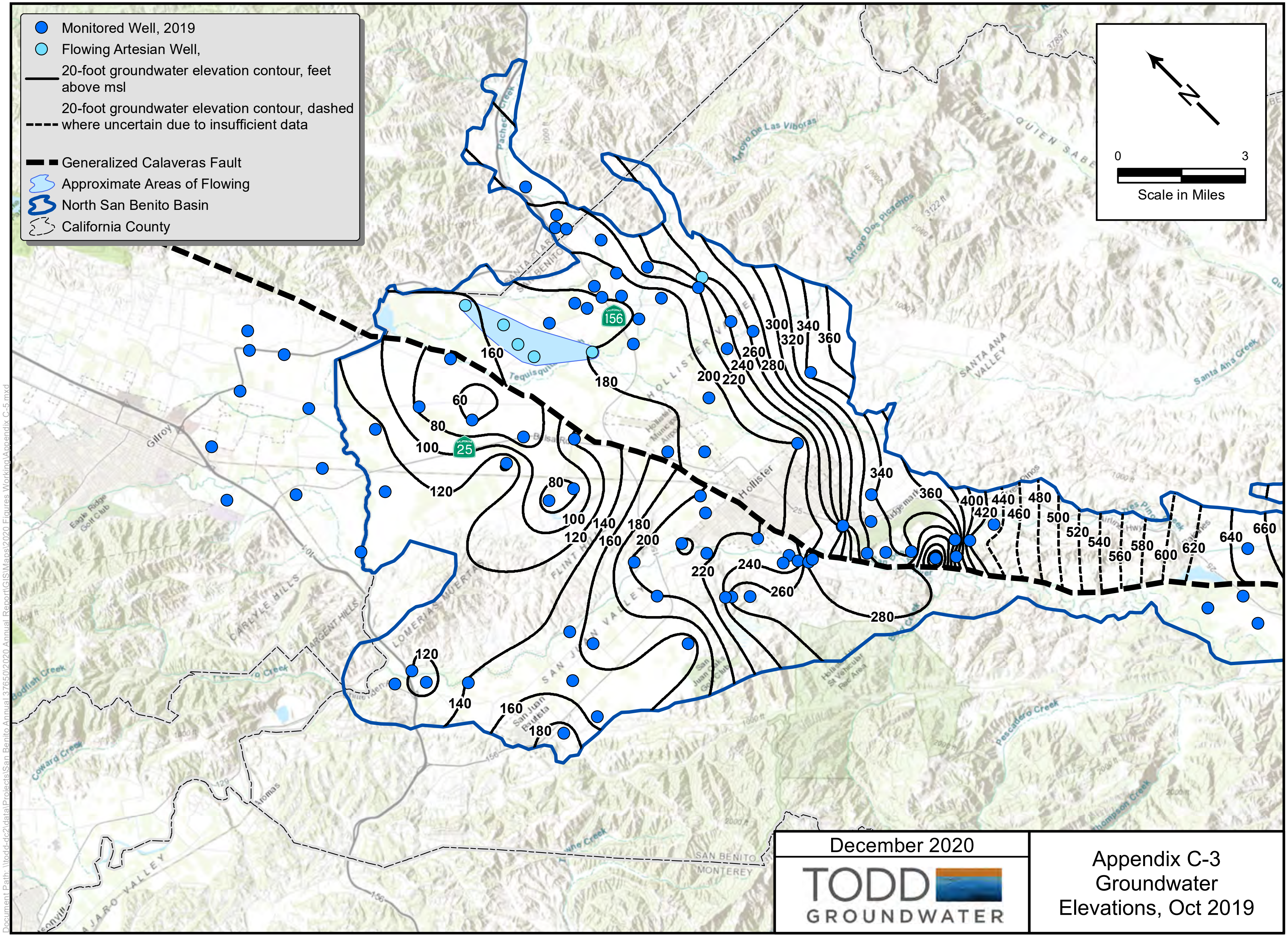
**Appendix C-1**
**Groundwater Basins in San Benito County**




December 2020

TODD GROUNDWATER

**Appendix** C-2
Depth to Water
October 2020




December 2020

TODD GROUNDWATER

Appendix C-3
Groundwater Elevations, Oct 2019

# APPENDIX D PERCOLATION DATA

## List of Tables and Figures

**Table D-1. Reservoir Water Budgets for Water Year 2020 (acre-feet)**

| | Hernandez | Paicines | San Justo | |
|---|---|---|---|---|
| **Observed Storage** | | | | |
| Starting Storage (Oct 2019) | 2,100 | 300 | 4,861 | |
| Ending Storage (Sept 2020) | 506 | 300 | 6,143 | |
| **Inflows** | | | | |
| Rainfall | 128 | 60 | 199 | |
| San Benito River | 8,390 | 1,248 | n.a. | |
| Hernandez-Paicines transfer | n.a. | 535 | n.a. | |
| San Felipe Project* | n.a. | n.a. | 21,357 | * |
| **Total Inflows** | **8,518** | **1,842** | **21,556** | |
| **Outflows** | | | | |
| Hernandez spills | 0 | n.a. | n.a. | |
| Hernandez-Paicines transfer | 535 | n.a. | n.a. | |
| Tres Pinos Creek percolation releases | n.a. | 2,037 | n.a. | |
| San Benito River percolation releases | 9,473 | 0 | n.a. | |
| CVP Deliveries* | n.a. | n.a. | 20,287 | * |
| Evaporation and seepage (less interceptor wells) | 476 | 310 | 1,152 | |
| **Total Outflows** | **10,484** | **2,347** | **21,439** | |
| **Change in Storage** | | | | |
| **Observed storage change (Ending - Starting)** | **-1,594** | **0** | **1,282** | |
| **Calculated net storage change (Inflow - Outflows)** | **-1,966** | **-505** | **116** | |
| **Unaccounted for Water (Observed - Calculated)**** | **372** | **505** | **1,166** | |

| **Reservoir Information** | | | |
|---|---|---|---|
| Reservoir capacity | 17,200 | 2,870 | 11,000 |
| Maximum storage | 12,572 | 2,580 | 10,308 |
| Minimum storage | 558 | 250 | 4,573 |

* Reflects imported water for beneficial use, not all stored in reservoir

** Negative value is water shortage, positive value is water surplus

**Table D-2. Historical Reservoir Releases (AFY)**

| WY | Hernandez | Paicines | TOTAL |
|---|---|---|---|
| 1996 | 13,535 | 6,139 | 19,674 |
| 1997 | 3,573 | 2,269 | 5,842 |
| 1998 | 26,302 | 450 | 26,752 |
| 1999 | 12,084 | 1,293 | 13,377 |
| 2000 | 13,246 | 2,326 | 15,572 |
| 2001 | 12,919 | 3,583 | 16,502 |
| 2002 | 9,698 | 310 | 10,008 |
| 2003 | 5,434 | 0 | 5,434 |
| 2004 | 3,336 | 0 | 3,336 |
| 2005 | 19,914 | 677 | 20,591 |
| 2006 | 14,112 | 196 | 14,308 |
| 2007 | 12,022 | 1,254 | 13,276 |
| 2008 | 7,646 | 495 | 8,141 |
| 2009 | 4,883 | 0 | 4,883 |
| 2010 | 8,484 | 4,147 | 12,631 |
| 2011 | 9,757 | 2,397 | 12,154 |
| 2012 | 6,341 | 1,321 | 7,662 |
| 2013 | 3,963 | 677 | 4,640 |
| 2014 | 0 | 0 | 0 |
| 2015 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 |
| 2017 | 23,191 | 2,407 | 25,597 |
| 2018 | 6,054 | 384 | 6,438 |
| 2019 | 15,924 | 2,045 | 17,969 |
| 2020 | 9,473 | 2,037 | 11,510 |
| **AVG** | **9,676** | **1,376** | **11,052** |

**Table D-3. Historical Percolation of CVP Water (AFY)**

| | | Arroyo de las Viboras | | | Arroyo Dos Picachos | | | Santa Ana Creek | | | | | San Benito River | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water Year[1] | Pacheco Creek | Road | Creek 1 (Frog Ponds) | Creek 2 | Fallon Road | Jarvis Lane | Creek | John Smith Road | Maranatha Road | Airline Highway | Ridgemark | Tres Pinos Creek (and Pond) | Union Road Pond | Hollister Ponds | Total |
| 1994 | 232 | 136 | 515 | 0 | 0 | 550 | 209 | 0 | 0 | 0 | 0 | 85 | 158 | 0 | 1,885 |
| 1995 | 444 | 238 | 770 | 2 | 0 | 654 | 622 | 73 | 0 | 0 | 0 | 809 | 2,734 | 0 | 6,345 |
| 1996 | 0 | 494 | 989 | 832 | 67 | 235 | 708 | 531 | 197 | 134 | 25 | 21 | 6,097 | 0 | 10,330 |
| 1997 | 0 | 447 | 601 | 1,981 | 77 | 0 | 200 | 17 | 353 | 286 | 29 | 1,477 | 5,619 | 0 | 11,087 |
| 1998 | 0 | 132 | 109 | 403 | 0 | 0 | 0 | 65 | 0 | 158 | 74 | 518 | 1,084 | 0 | 2,543 |
| 1999 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 256 | 48 | 141 | 10 | 452 | 413 | 0 | 1,322 |
| 2000 | 1 | 0 | 0 | 6 | 0 | 0 | 3 | 236 | 21 | 240 | 12 | 285 | 938 | 0 | 1,740 |
| 2001 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 161 | 17 | 186 | 1 | 703 | 1,041 | 0 | 2,110 |
| 2002 | 0 | 0 | 0 | 2 | 0 | 0 | 1 | 78 | 2 | 143 | 0 | 426 | 470 | 0 | 1,122 |
| 2003 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 119 | 9 | 172 | 0 | 163 | 605 | 0 | 1,074 |
| 2004 | 0 | 0 | 0 | 0 | 0 | 0 | 52 | 83 | 0 | 0 | 0 | 1 | 882 | 0 | 1,018 |
| 2005 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 527 | 0 | 527 |
| 2006 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 156 | 0 | 0 | 0 | 1 | 451 | 0 | 614 |
| 2007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 88 | 216 | 0 | 304 |
| 2008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 6 |
| 2009 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2010 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2012 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2013 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2014 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2015 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2016 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2017 | 0 | 0 | 340 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,209 | 0 | 2,549 |
| 2018 | 0 | 0 | 199 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 867 | 1,899 | 0 | 2,965 |
| 2019 | 0 | 0 | 335 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,775 | 2,932 | 0 | 5,043 |
| 2020 | 0 | 0 | 134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 780 | 1,499 | 747 | 3,161 |

1. 2017-2020 percolation occurred only to recharge basins adjacent to the listed streams.

**Table D-4. Percolation of Municipal Wastewater during Water Year 2020**

| | Pond Area[1] (acres) | Effluent Discharge (acre-feet) | Evaporation[2] (acre-feet) | Percolation (acre-feet) |
|---|---|---|---|---|
| Hollister - domestic | 93 | 2,658 | 266 | 2,392 |
| Hollister - industrial | 39 | 0 | 0 | 0 |
| Ridgemark Estates I & II | 7 | 176 | 21 | 155 |
| Tres Pinos | 2 | 11 | 5 | 6 |
| Total | 141 | 2,846 | 292 | 2,553 |

Notes:

1. Hollister pond areas are from Dickson and Kenneth D. Schmidt and Associates (1999) and include treatment ponds in addition to percolation ponds at the domestic wastewater treatment plant. Assumes 80% of total pond area in use at any time (Rose, pers. comm.). These areas should be updated as operations change.

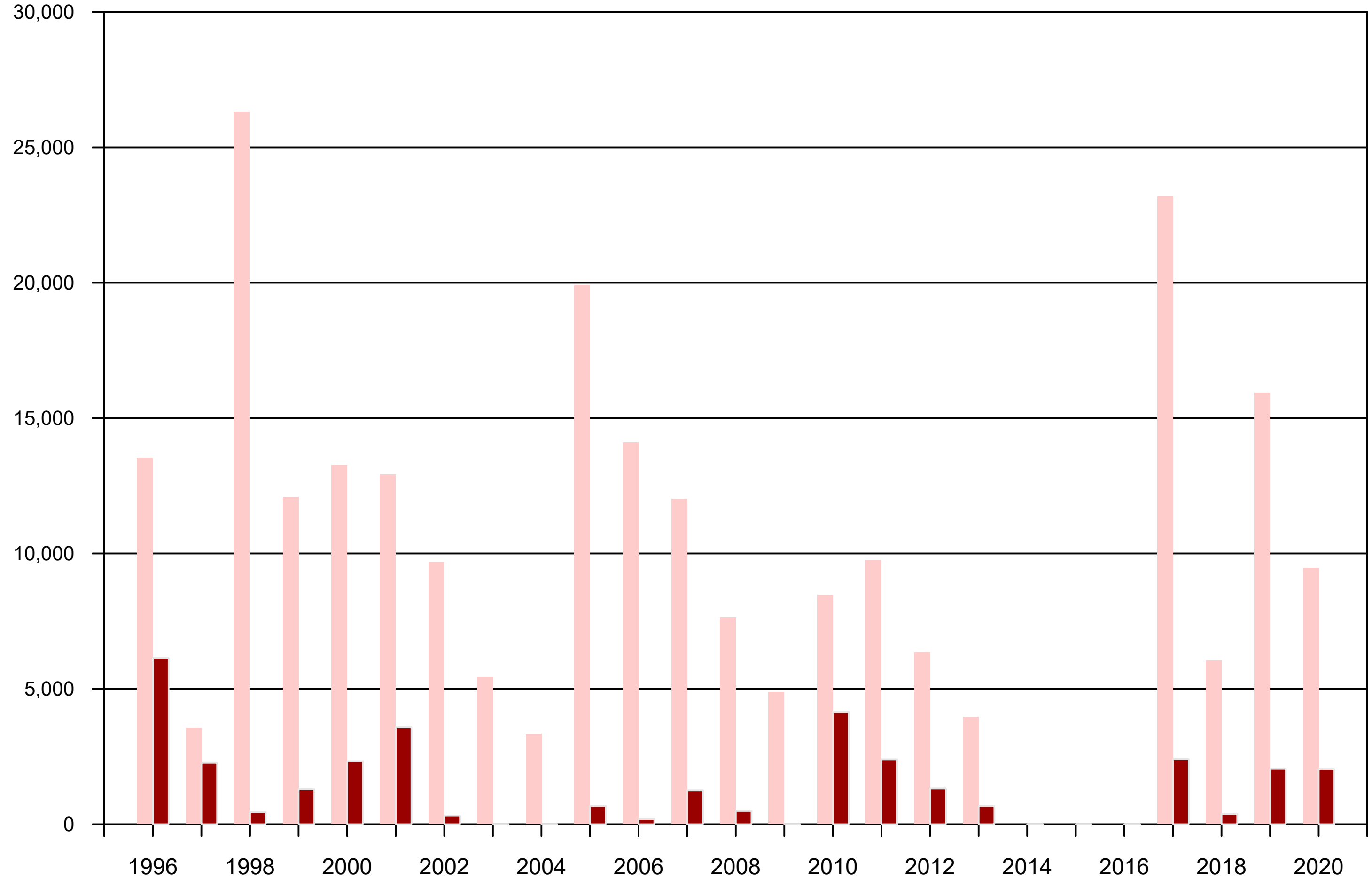
2. Average evaporation less precip = 43 inches (56 in/yr evaporation (DWR Bulletin 73-79) less 13 in/yr precip (CIMIS) The IWTP evaporation was adjusted to account only for when the ponds are in use.

The San Juan Bautista plant is not included because the unnamed tributary of San Juan Creek that receives its effluent usually gains flow along the affected reach and is on the southwest side of the San Andreas Fault. These conditions prevent the effluent from recharging the basin.

**Table D-5. Historical Percolation of Municipal Wastewater (AFY)**

| | Hollister Reclamation Plant - Domestic | Hollister - industrial wastewater and stormwater | Ridgemark Estates I & II | Tres Pinos | TOTAL |
|---|---|---|---|---|---|
| 1994 | 1,775 | 665 | 155 | 5 | 2,600 |
| 1995 | 1,935 | 610 | 180 | 10 | 2,735 |
| 1996 | 2,020 | 689 | 207 | 14 | 2,930 |
| 1997 | 1,965 | 909 | 201 | 17 | 3,092 |
| 1998 | 2,490 | 518 | 231 | 17 | 3,256 |
| 1999 | 1,693 | 1,476 | 156 | 12 | 3,337 |
| 2000 | 2,110 | 1,136 | 293 | 24 | 3,563 |
| 2001 | 1,742 | 1,078 | 303 | 24 | 3,147 |
| 2002 | 1,884 | 1,545 | 283 | 24 | 3,736 |
| 2003 | 2,009 | 1,432 | 279 | 24 | 3,744 |
| 2004 | 1,787 | 1,536 | 268 | 21 | 3,612 |
| 2005 | 1,891 | 1,323 | 227 | 26 | 3,468 |
| 2006 | 1,797 | 1,211 | 216 | 33 | 3,257 |
| 2007 | 1,740 | 1,228 | 139 | 19 | 3,126 |
| 2008 | 1,580 | 1,257 | 139 | 19 | 2,996 |
| 2009 | 1,976 | 428 | 172 | 19 | 2,594 |
| 2010 | 1,922 | 37 | 172 | 19 | 2,150 |
| 2011 | 1,807 | 466 | 183 | 19 | 2,476 |
| 2012 | 1,740 | 605 | 177 | 19 | 2,541 |
| 2013* | 889 | 332 | 188 | 21 | 1,430 |
| 2014 | 1,552 | 86 | 179 | 21 | 1,838 |
| 2015 | 1,816 | 344 | 161 | 21 | 2,342 |
| 2016 | 1,923 | 305 | 154 | 21 | 2,402 |
| 2017 | 1,945 | 57 | 154 | 20 | 2,177 |
| 2018 | 1,365 | 57 | 150 | 15 | 1,587 |
| 2019 | 1,822 | 0 | 149 | 16 | 1,986 |
| 2020 | 2,392 | 0 | 155 | 6 | 2,553 |

*Potential missing data






Hernandez
Paicines

December 2020

TODD GROUNDWATER

**Appendix D-1**
**Reservoir Releases for Percolation**

# APPENDIX E WATER USE DATA FOR ZONE 6

## List of Tables and Figures

**Table E-1. Recent CVP Allocation and Use**

| Water Year | Municipal and Industrial (M&I) CVP | | | | Agricultural CVP | | | |
|---|---|---|---|---|---|---|---|---|
| | Percent of Contract Allocation[1] | Percent of Historic Average[2] | Contract Amount Used (AF) | Contract Amount Used (%) | Percent of Contract Allocation[3] | Percent of Contract and M&I Adjustment[2] | Contract Amount Used (AF)[4] | Contract Amount Used (%) |
| | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | | (USBR Water Year Mar-Feb) | | (Hydrologic Water Year Oct-Sep) | |
| 2006 | 100% | | 3,152 | 38% | 100% | | 19,840 | 56% |
| 2007 | 100% | | 4,969 | 60% | 40% | | 18,865 | 53% |
| 2008 | 37% | 75% | 2,232 | 27% | 40% | 45% | 10,514 | 30% |
| 2009 | 29% | 60% | 1,978 | 24% | 10% | 11% | 6,439 | 18% |
| 2010 | 37% | 75% | 2,197 | 27% | 45% | 50% | 10,061 | 28% |
| 2011 | 100% | | 2,433 | 29% | 80% | | 16,234 | 46% |
| 2012 | 51% | 75% | 2,683 | 33% | 40% | 40% | 17,267 | 49% |
| 2013 | 47% | 70% | 2,652 | 32% | 20% | 22% | 12,914 | 36% |
| 2014 | 34% | 50% | 1,599 | 29% | 0% | 0% | 7,545 | 21% |
| 2015 | 25% | | 1,810 | 22% | 0% | | 3,697 | 10% |
| 2016 | 55% | | 1,914 | 23% | 5% | | 4,434 | 12% |
| 2017 | 100% | | 2,909 | 35% | 100% | | 15,837 | 45% |
| 2018 | 75% | | 5,679 | 69% | 50% | | 17,418 | 49% |
| 2019 | 100% | | 4,457 | 54% | 75% | | 16,774 | 47% |
| 2020 | 70% | | 4,953 | 60% | 20% | | 15,327 | 43% |
| Average (11-20) | 66% | | | | 39% | | | |

Notes: 1 Total contract (100% allocation) M&I 8,250 AFY
2 Shortage Policy Adjustments
3 Total contract (100% allocation) Ag 35,550 AFY
4 Includes water percolated

**Table E-2. Historical Water Use by Subbasin and Water Source (AFY)**

| Subbasin [1] | Pacheco | | Bolsa Southeast | | | San Juan | | Hollister West | | | Hollister East [2] | | | Tres Pinos | | Total Zone 6 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Source | GW | CVP | GW | CVP | RW | GW | CVP | GW | CVP | RW | GW | CVP | RW | GW | CVP | GW | CVP | RW |
| 1993 | 2,251 | 3,210 | 3,474 | 533 | | 9,278 | 4,300 | 7,213 | 90 | | 3,744 | 7,275 | | 5,658 | 224 | 31,618 | 15,633 | 0 |
| 1994 | 3,748 | 3,394 | 3,467 | 602 | | 10,859 | 3,836 | 7,327 | 87 | | 5,475 | 6,808 | | 5,294 | 263 | 36,169 | 14,990 | 0 |
| 1995 | 2,756 | 3,474 | 2,855 | 720 | | 9,328 | 4,554 | 7,092 | 460 | | 3,428 | 6,647 | | 4,475 | 275 | 29,935 | 16,130 | 0 |
| 1996 | 2,533 | 3,500 | 2,682 | 782 | | 8,726 | 5,187 | 5,717 | 679 | | 3,396 | 8,267 | | 3,695 | 408 | 26,748 | 18,823 | 0 |
| 1997 | 2,209 | 4,205 | 2,755 | 997 | | 9,587 | 6,191 | 7,602 | 907 | | 3,534 | 8,284 | | 4,620 | 466 | 30,307 | 21,048 | 0 |
| 1998 | 2,035 | 2,165 | 1,561 | 361 | | 6,963 | 4,099 | 4,991 | 591 | | 4,037 | 5,291 | | 3,751 | 289 | 23,338 | 12,796 | 0 |
| 1999 | 2,553 | 3,219 | 2,453 | 433 | | 9,312 | 5,990 | 7,013 | 726 | | 3,701 | 7,279 | | 4,199 | 391 | 29,231 | 18,038 | 0 |
| 2000 | 2,270 | 3,256 | 2,418 | 355 | | 8,681 | 6,372 | 7,590 | 869 | | 3,108 | 7,279 | | 4,006 | 542 | 28,073 | 18,673 | 0 |
| 2001 | 1,848 | 3,443 | 2,126 | 411 | | 7,977 | 7,232 | 7,377 | 685 | | 2,213 | 7,010 | | 3,599 | 621 | 25,140 | 19,402 | 0 |
| 2002 | 2,322 | 3,840 | 2,193 | 497 | | 7,571 | 7,242 | 6,577 | 706 | | 2,588 | 7,390 | | 3,994 | 737 | 25,244 | 20,411 | 0 |
| 2003 | 2,425 | 3,277 | 2,175 | 493 | | 7,434 | 7,127 | 6,222 | 720 | | 1,897 | 9,329 | | 2,805 | 788 | 22,958 | 21,734 | 0 |
| 2004 | 2,461 | 3,607 | 2,405 | 740 | | 8,121 | 7,357 | 4,971 | 614 | | 2,321 | 10,726 | | 3,204 | 966 | 23,484 | 24,010 | 0 |
| 2005 | 1,320 | 3,106 | 1,849 | 514 | | 6,608 | 6,245 | 5,084 | 680 | | 2,586 | 9,198 | | 2,378 | 642 | 19,825 | 20,384 | 0 |
| 2006 | 1,208 | 3,495 | 1,864 | 661 | | 6,741 | 7,200 | 4,633 | 579 | | 2,555 | 10,253 | | 2,537 | 803 | 19,538 | 22,992 | 0 |
| 2007 | 1,034 | 3,832 | 2,005 | 572 | | 7,658 | 6,160 | 5,118 | 553 | | 3,867 | 10,194 | | 2,908 | 804 | 22,590 | 22,115 | 0 |
| 2008 | 1,900 | 1,568 | 2,014 | 333 | | 7,796 | 3,160 | 4,375 | 399 | | 3,962 | 6,792 | | 2,743 | 493 | 22,789 | 12,745 | 0 |
| 2009 | 3,370 | 1,257 | 2,082 | 179 | | 11,956 | 1,605 | 4,186 | 19 | | 4,733 | 4,697 | | 2,871 | 447 | 29,199 | 8,204 | 0 |
| 2010 | 2,553 | 1,771 | 1,897 | 207 | | 9,561 | 3,452 | 4,081 | 10 | 151 | 4,460 | 6,056 | | 1,686 | 488 | 24,238 | 11,984 | 151 |
| 2011 | 1,992 | 2,420 | 2,781 | 229 | | 4,987 | 5,623 | 3,940 | 394 | 183 | 1,947 | 9,575 | | 2,454 | 427 | 18,102 | 18,667 | 183 |
| 2012 | 3,723 | 2,652 | 1,556 | 288 | | 5,782 | 5,976 | 4,298 | 549 | 230 | 2,004 | 9,917 | | 2,492 | 568 | 19,855 | 19,949 | 230 |
| 2013 | 4,157 | 1,976 | 2,348 | 292 | | 11,044 | 4,134 | 5,656 | 374 | 357 | 5,430 | 8,224 | | 2,452 | 565 | 31,087 | 15,566 | 357 |
| 2014 | 3,303 | 1,020 | 2,157 | 32 | | 10,018 | 1,984 | 7,227 | 233 | 262 | 4,872 | 5,490 | | 3,014 | 384 | 30,592 | 9,144 | 262 |
| 2015 | 4,279 | 555 | 2,401 | 20 | | 12,739 | 975 | 4,730 | 148 | 101 | 7,230 | 3,568 | | 2,948 | 241 | 34,327 | 5,507 | 101 |
| 2016 | 4,386 | 420 | 2,558 | 30 | 38 | 13,581 | 819 | 4,031 | 162 | 253 | 6,383 | 4,810 | 207 | 2,223 | 106 | 33,162 | 6,347 | 499 |
| 2017 | 2,949 | 2,097 | 1,414 | 365 | 66 | 7,542 | 5,853 | 3,255 | 217 | 108 | 2,209 | 7,488 | 192 | 2,447 | 177 | 19,815 | 16,197 | 366 |
| 2018 | 4,375 | 1,529 | 3,063 | 291 | 3 | 8,932 | 6,383 | 3,922 | 2,054 | 468 | 3,699 | 9,686 | 0 | 1,865 | 188 | 25,856 | 20,131 | 471 |
| 2019 | 2,780 | 2,162 | 2,568 | 318 | 2 | 6,648 | 3,990 | 2,093 | 273 | 567 | 2,802 | 9,261 | 0 | 1,193 | 184 | 18,083 | 16,188 | 569 |
| 2020 | 3,151 | 1,922 | 2,092 | 391 | 21 | 7,454 | 4,618 | 2,440 | 287 | 505 | 4,002 | 9,690 | 0 | 1,396 | 211 | 20,536 | 17,119 | 526 |
| AVG 93-20 | 2,710 | 2,585 | 2,329 | 416 | 26 | 8,674 | 4,917 | 5,313 | 502 | 290 | 3,649 | 7,732 | 80 | 3,104 | 453 | 25,780 | 16,605 | 133 |

GW = groundwater, CVP = Central Valley Project, RW = recycled water

1. Subbasin refers to the 1996-defined Subbains

2. Hollister East includes CVP water delivered to the West Hills Treatment Plant in San Juan but supplied to Hollister East customers.

3. Does not include CVP water used for percolation

**Table E-3a. Recent Water Use by Subbasin and User Type, Includes Recycled Water (AFY) - Agriculture**

| Management Area | Subbasin[1] | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agriculture | | | | | | | | | | | | | | | | | |
| Hollister | Bolsa SE | 2,352 | 2,517 | 2,570 | 2,334 | 2,252 | 2,103 | 3,004 | 1,837 | 2,635 | 2,180 | 2,417 | 2,601 | 1,831 | 3,315 | 2,889 | 2,494 |
| | Hollister East | 8,543 | 9,526 | 10,685 | 8,012 | 6,860 | 8,315 | 9,067 | 9,453 | 10,832 | 8,151 | 8,464 | 8,784 | 7,756 | 9,594 | 7,673 | 9,451 |
| | Hollister West | 2,128 | 1,936 | 2,145 | 1,509 | 1,708 | 1,888 | 2,190 | 2,228 | 3,324 | 2,584 | 2,750 | 2,192 | 1,338 | 2,337 | 1,807 | 2,145 |
| | Pacheco | 4,190 | 4,469 | 4,573 | 3,220 | 4,304 | 4,242 | 4,279 | 6,148 | 5,990 | 4,121 | 4,658 | 4,616 | 4,964 | 5,663 | 4,838 | 4,592 |
| | Tres Pinos | 800 | 1,004 | 954 | 655 | 670 | 640 | 471 | 641 | 652 | 514 | 1,513 | 572 | 468 | 448 | 276 | 370 |
| San Juan | San Juan | 11,496 | 12,622 | 12,185 | 9,581 | 12,397 | 11,960 | 10,009 | 10,964 | 14,376 | 11,183 | 13,123 | 13,826 | 11,916 | 14,568 | 10,134 | 10,563 |
| | **TOTAL** | **29,509** | **32,074** | **33,112** | **25,310** | **28,192** | **29,148** | **29,020** | **30,980** | **37,810** | **28,734** | **32,926** | **32,591** | **28,273** | **35,925** | **27,616** | **19,053** |

**Table E-3b. Recent Water Use by Subbasin and User Type, Includes Recycled Water (AFY) - M&I**

| Management Area | Subbasin[1] | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M&I | | | | | | | | | | | | | | | | | |
| Hollister | Bolsa SE | 12 | 8 | 7 | 13 | 9 | 0 | 6 | 6 | 4 | 9 | 5 | 25 | 14 | 43 | 0 | 9 |
| | Hollister East[2] | 3,241 | 3,280 | 3,203 | 2,742 | 2,570 | 2,307 | 2,594 | 2,608 | 2,961 | 2,277 | 2,334 | 2,617 | 2,132 | 3,790 | 4,389 | 4,242 |
| | Hollister West | 3,636 | 3,168 | 3,361 | 3,265 | 2,710 | 2,555 | 2,235 | 2,710 | 2,796 | 5,072 | 2,229 | 2,254 | 2,242 | 4,106 | 1,126 | 1,086 |
| | Pacheco | 235 | 234 | 293 | 248 | 323 | 83 | 133 | 227 | 144 | 203 | 176 | 191 | 81 | 241 | 104 | 481 |
| | Tres Pinos | 2,220 | 2,336 | 2,748 | 2,581 | 2,648 | 1,534 | 2,410 | 2,710 | 2,365 | 2,884 | 1,676 | 1,757 | 2,156 | 1,606 | 1,101 | 1,238 |
| San Juan | San Juan | 1,356 | 1,320 | 1,640 | 1,375 | 1,164 | 1,053 | 601 | 793 | 803 | 820 | 590 | 574 | 1,479 | 747 | 504 | 1,510 |
| | **TOTAL** | **10,700** | **10,345** | **11,252** | **10,225** | **9,424** | **7,532** | **7,979** | **9,055** | **9,073** | **11,263** | **7,010** | **7,417** | **8,105** | **10,533** | **7,225** | **7,056** |

1. Subbasin refers to the 1996-defined Subbains
2. Hollister East includes 1,990 AF of CVP water delivered to the West Hills Treatment Plant in San Juan but supplied to Hollister East customers.

**Table E-4. Historical Water Use by User Type in Zone 6 - Includes Recycled Water (AFY)**

| WY | Agricultural | Municipal, and Industrial | Total | % Ag |
|---|---|---|---|---|
| 1988 | 46,366 | 5,152 | 51,518 | 90% |
| 1989 | 32,387 | 6,047 | 38,434 | 84% |
| 1990 | 49,663 | 5,725 | 55,388 | 90% |
| 1991 | 46,640 | 7,631 | 54,271 | 86% |
| 1992 | 32,210 | 6,912 | 39,122 | 82% |
| 1993 | 38,878 | 5,066 | 43,944 | 88% |
| 1994 | 41,854 | 7,186 | 49,040 | 85% |
| 1995 | 36,399 | 8,272 | 44,671 | 81% |
| 1996 | 39,845 | 8,131 | 47,976 | 83% |
| 1997 | 41,482 | 11,068 | 52,550 | 79% |
| 1998 | 27,526 | 8,605 | 36,131 | 76% |
| 1999 | 37,203 | 10,066 | 47,269 | 79% |
| 2000 | 36,062 | 10,764 | 46,826 | 77% |
| 2001 | 34,035 | 10,640 | 44,675 | 76% |
| 2002 | 34,354 | 11,300 | 45,654 | 75% |
| 2003 | 33,533 | 11,159 | 44,692 | 75% |
| 2004 | 35,597 | 11,898 | 47,495 | 75% |
| 2005 | 29,510 | 10,699 | 40,209 | 73% |
| 2006 | 32,074 | 10,456 | 42,530 | 75% |
| 2007 | 33,112 | 13,311 | 46,424 | 71% |
| 2008 | 25,310 | 10,225 | 35,535 | 71% |
| 2009 | 28,192 | 9,424 | 37,616 | 75% |
| 2010 | 29,148 | 7,531 | 36,679 | 79% |
| 2011 | 29,020 | 7,932 | 36,952 | 79% |
| 2012 | 30,980 | 9,055 | 40,095 | 77% |
| 2013 | 37,810 | 9,073 | 46,653 | 81% |
| 2014 | 28,734 | 11,226 | 39,960 | 72% |
| 2015 | 32,926 | 7,161 | 39,935 | 82% |
| 2016 | 32,591 | 7,417 | 40,008 | 81% |
| 2017 | 28,273 | 8,105 | 36,012 | 79% |
| 2018 | 35,925 | 10,533 | 46,458 | 77% |
| 2019 | 27,616 | 7,225 | 34,841 | 79% |
| 2020 | 29,616 | 8,565 | 38,181 | 78% |
| **AVERAGE** | **34,390** | **8,896** | **43,265** | **79%** |

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**Table E-5. Municipal Water Use by Major Purveyor for Water Year 2020 (AF)**

| | WY 2020 | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Groundwater** | | | | | | | | | | | | | |
| Sunnyslope CWD | **694** | 26 | 29 | 17 | 68 | 34 | 52 | 45 | 61 | 75 | 87 | 122 | 78 |
| City of Hollister | **707** | 106 | 23 | 56 | 21 | 15 | 29 | 27 | 81 | 82 | 72 | 106 | 90 |
| City of Hollister - Cienega Wells | **95** | 8 | 6 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 9 | 9 |
| San Juan Bautista | **224** | 25 | 15 | 15 | 16 | 19 | 13 | 10 | 15 | 16 | 26 | 23 | 32 |
| Tres Pinos CWD | **35** | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 4 | 3 | 4 | 4 |
| **Groundwater Subtotal** | **1,755** | **169** | **75** | **97** | **115** | **78** | **104** | **92** | **168** | **185** | **196** | **264** | **213** |
| **CVP Imported Water** | | | | | | | | | | | | | |
| Lessalt Treatment Plant | **1,503** | 171 | 145 | 114 | 60 | 95 | 142 | 116 | 132 | 162 | 151 | 108 | 107 |
| West Hills Treatment Plant | **1,990** | 140 | 124 | 127 | 124 | 113 | 124 | 142 | 202 | 207 | 230 | 277 | 179 |
| **Imported Water Subtotal** | **3,493** | **311** | **269** | **241** | **185** | **208** | **266** | **258** | **334** | **369** | **381** | **385** | **286** |
| **Municipal Total** | | | | | | | | | | | | | |
| **TOTAL Municipal Water Supply** | **5,248** | **480** | **344** | **338** | **299** | **286** | **370** | **350** | **502** | **553** | **578** | **649** | **499** |

0.66551726

**Table E-6. Historical Municipal Water Use by Major Purveyor (AFY)**

| WY | Sunnyslope CWD - GW | City of Hollister - GW | City of Hollister - Cienega Wells[1] | San Juan Bautista | Tres Pinos CWD | Lessalt Treatment Plant | West Hills Treatment Plant | Undivided Total | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 1988 | | | | | | 0 | 0 | 5,152 | 5,152 |
| 1989 | | | | | | 0 | 0 | 6,047 | 6,047 |
| 1990 | | | | | | 0 | 0 | 5,725 | 5,725 |
| 1991 | | | | | | 0 | 0 | 7,631 | 7,631 |
| 1992 | | | | | | 0 | 0 | 6,912 | 6,912 |
| 1993 | | | | | | 0 | 0 | 5,066 | 5,066 |
| 1994 | | | | | | 0 | 0 | 7,186 | 7,186 |
| 1995 | 2,167 | 2,446 | | | | 0 | 0 | | 4,613 |
| 1996 | 2,139 | 3,386 | | | | 0 | 0 | | 5,525 |
| 1997 | 2,638 | 3,848 | | | | 0 | 0 | | 6,486 |
| 1998 | 2,357 | 3,441 | | | | 0 | 0 | | 5,798 |
| 1999 | 2,820 | 3,558 | | | | 0 | 0 | | 6,378 |
| 2000 | 3,214 | 4,021 | | | | 0 | 0 | | 7,235 |
| 2001 | 3,290 | 3,851 | | | | 0 | 0 | | 7,141 |
| 2002 | 3,256 | 4,120 | | | | 21 | 0 | | 7,398 |
| 2003 | 2,053 | 2,754 | | | | 2,494 | 0 | | 7,302 |
| 2004 | 2,426 | 2,828 | | | | 2,101 | 0 | | 7,356 |
| 2005 | 1,959 | 3,147 | 123 | 247 | 49 | 1,843 | 0 | | 7,368 |
| 2006 | 1,907 | 2,801 | 123 | 150 | 49 | 1,900 | 0 | | 6,930 |
| 2007 | 2,413 | 2,758 | 123 | 47 | 49 | 1,719 | 0 | | 7,108 |
| 2008 | 2,294 | 2,746 | 123 | 417 | 47 | 1,323 | 0 | | 6,949 |
| 2009 | 2,251 | 2,503 | 123 | 373 | 47 | 1,212 | 0 | | 6,509 |
| 2010 | 1,861 | 2,194 | 108 | 308 | 47 | 1,344 | 0 | | 5,861 |
| 2011 | 2,225 | 1,651 | 80 | 292 | 47 | 1,593 | 0 | | 5,887 |
| 2012 | 2,360 | 1,761 | 130 | 267 | 45 | 1,657 | 0 | | 6,219 |
| 2013 | 1,655 | 2,655 | 120 | 281 | 46 | 1,648 | 0 | | 6,405 |
| 2014 | 2,134 | 2,646 | 114 | 285 | 49 | 979 | 0 | | 6,207 |
| 2015 | 1,348 | 1,960 | 114 | 225 | 49 | 1,364 | 0 | | 5,060 |
| 2016 | 1,331 | 1,615 | 105 | 232 | 49 | 1,682 | 0 | | 5,014 |
| 2017 | 1,449 | 1,543 | 79 | 249 | 32 | 1,940 | 51 | | 5,344 |
| 2018 | 978 | 1,217 | 121 | 184 | 34 | 1,596 | 1,990 | | 6,119 |
| 2019 | 565 | 588 | 283 | 257 | 33 | 1,660 | 2,524 | | 5,912 |
| 2020 | 694 | 707 | 95 | 224 | 35 | 1,503 | 1,990 | | 5,248 |

1. Data from Hollister Cienega Wells for 2005-2008 was estimated to be the same as WY 2009
Cells with no data indicate that the information is unavailable, while years with no use are shown explicitly as 0's.

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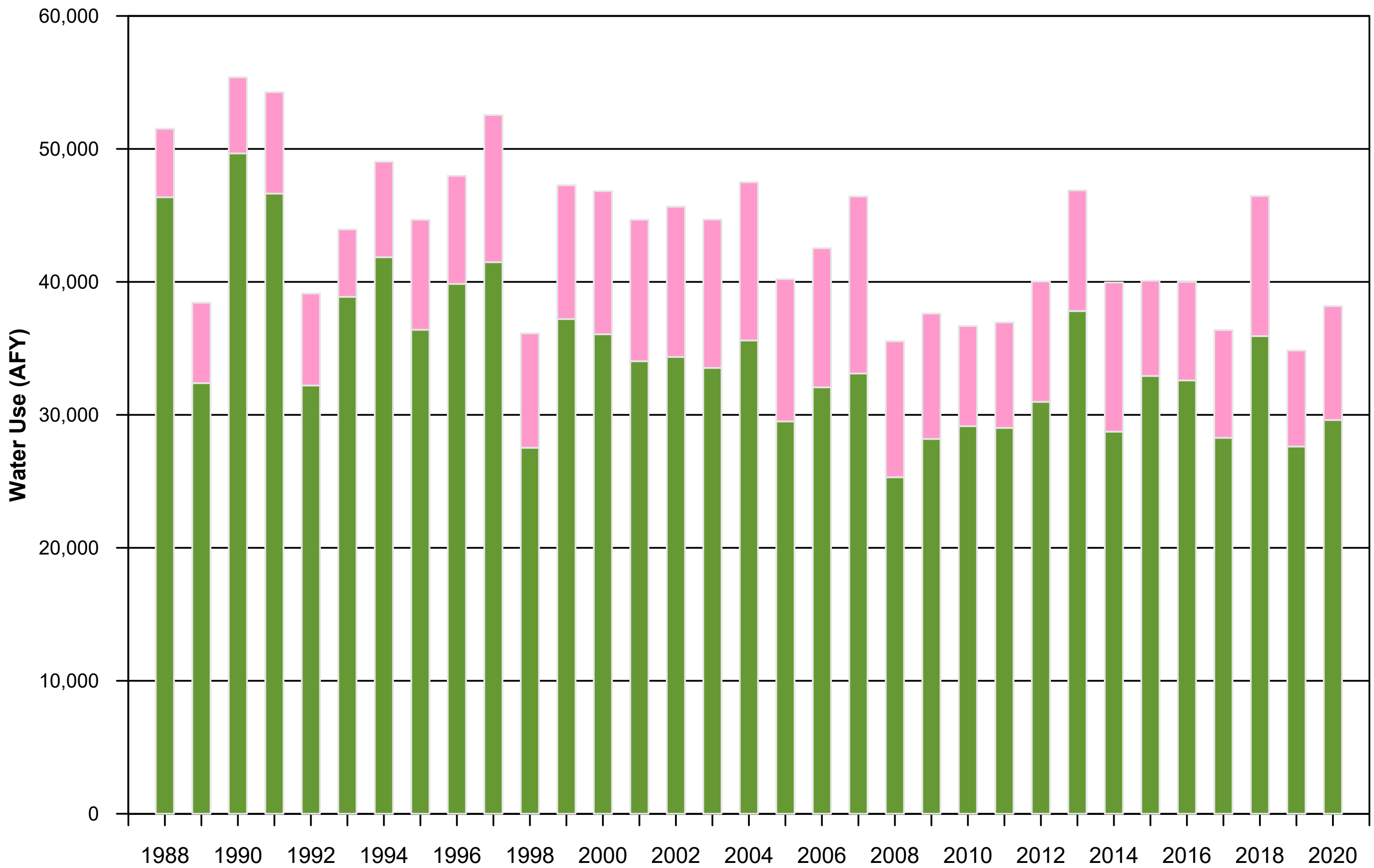


Agriculture
Groundwater



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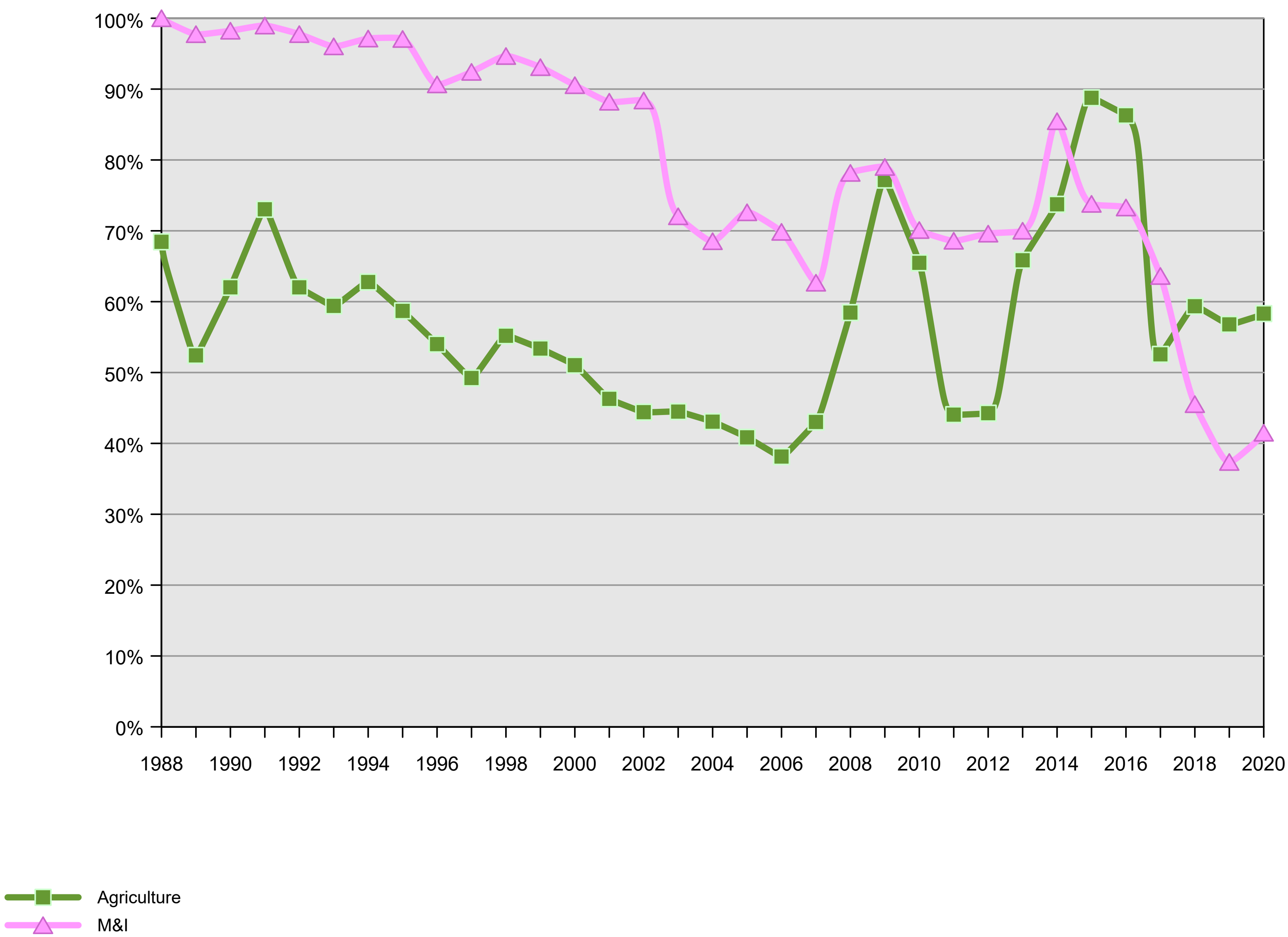
**Appendix E-1**
**Agricultural and Municpal Water Use**

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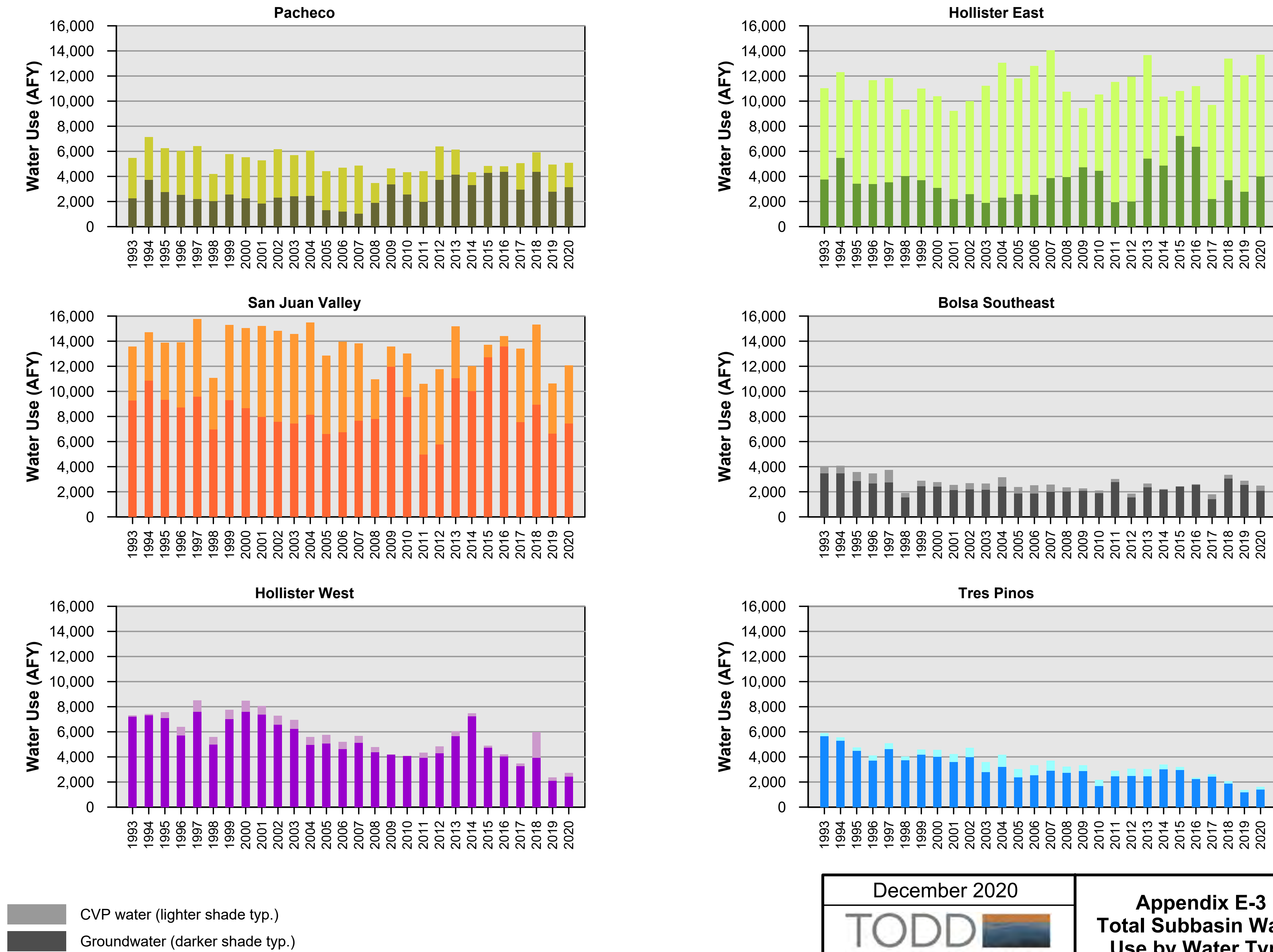
**Appendix E-2**
**Water Use in Zone 6**
**by Source**

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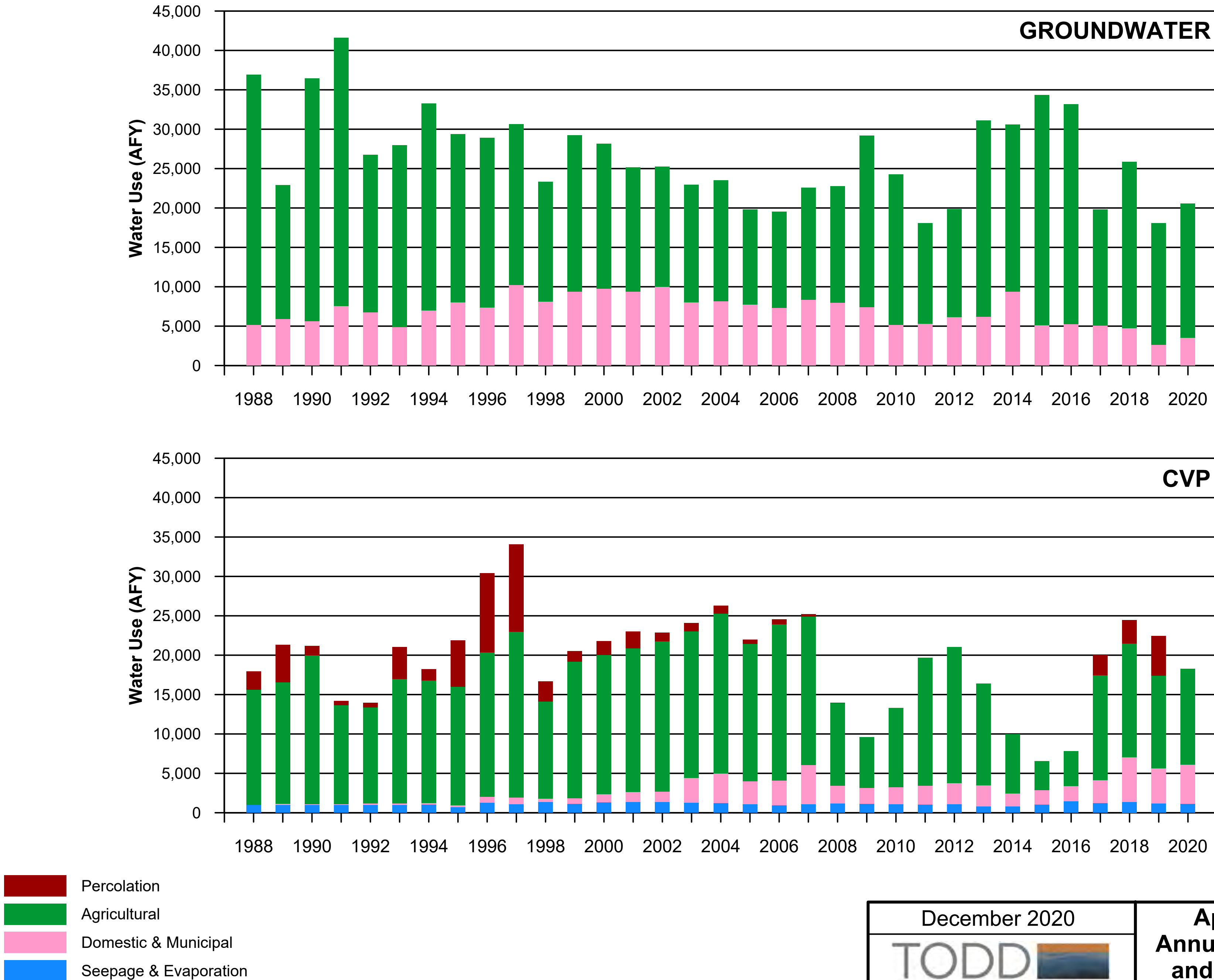
**Appendix E-3**
**Total Subbasin Water Use by Water Type**

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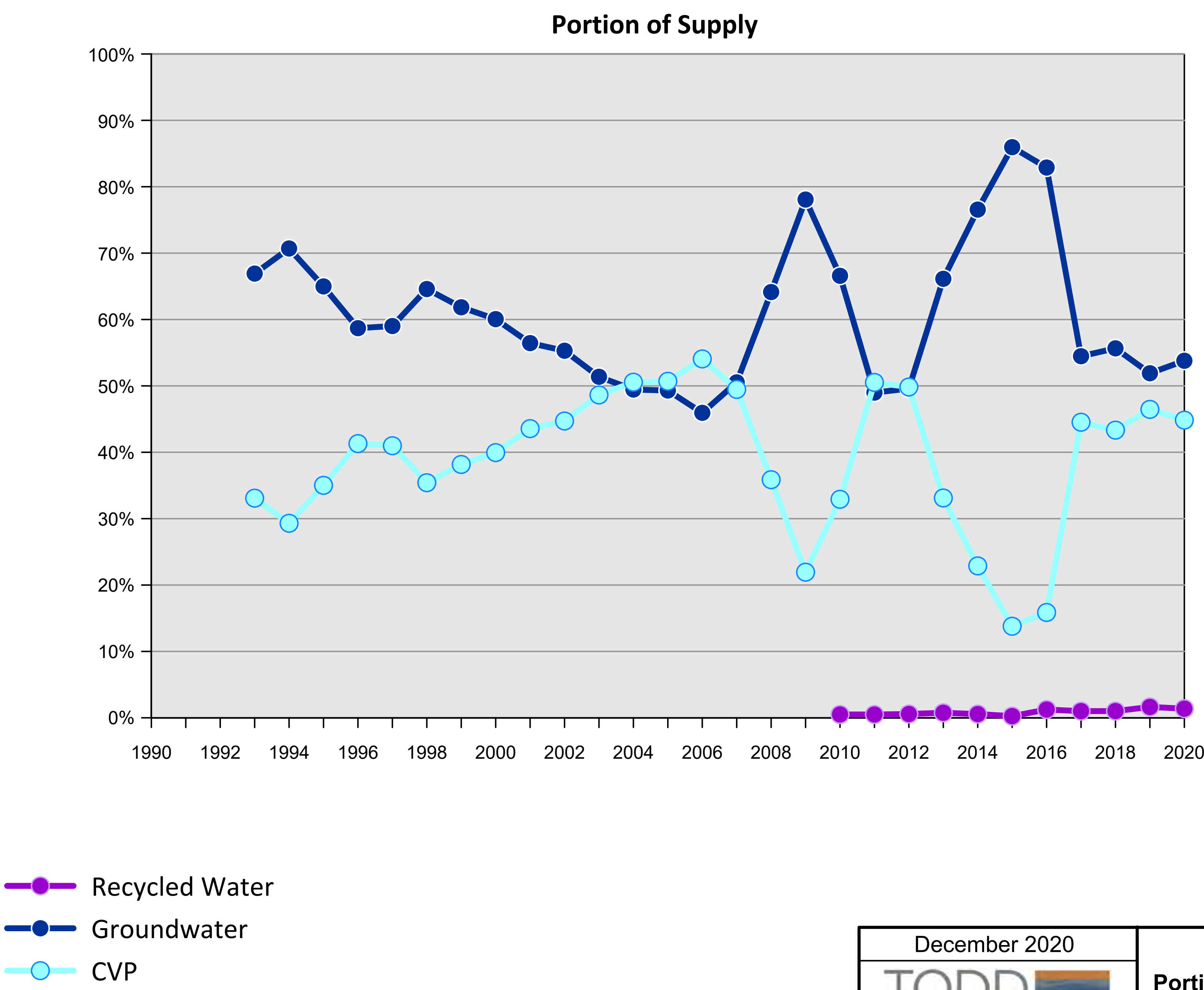
**Appendix E-4**
**Annual Total of CVP and Groundwater by Use**

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December 2020

TODD GROUNDWATER

**Appendix E-5**
**Portion of Total Supply from Groundwater Use**

# APPENDIX F RATES AND CHARGES

## List of Tables and Figures

**Table F-1. 2019 Recommended Groundwater Revenue Requirement/Charges**

**San Benito County Water District**
**Groundwater Rates**
**Water Year**
**2019-2020, 2020-2021, 2021-2022**
**Zone 6**

| REVENUE REQUIREMENTS | | | | | Rates[2] | |
|---|---|---|---|---|---|---|
| **Component** | **Rate ($/AF)** | **Quantity (A/F)[1]** | **Amount** | | **Ag** (per A/F) | **M & I** (per A/F) |
| **SOURCE OF SUPPLY O&M** | | | | | | |
| AG | $ 18.68 | 23,974 | $ 447,851 | | $ 18.68 | |
| M&I | $ 18.68 | 4,877 | $ 91,110 | | | $ 18.68 |
| **PERCOLATION COSTS** | | | | | | |
| **Cost of Water** | | | | | | |
| AG Cost of Water[3] | $ 53.51 | 2,105 | $ 112,612 | | $ 4.70 | |
| M&I Cost of Water[3] | $ 163.58 | 428 | $ 70,036 | | | $ 14.36 |
| **Power Costs** | | | | | | |
| AG Power Charge for percolation | $ 58.83 | 2,105 | 123,812 | | $ 5.16 | |
| M&I Power Charge for percolation | $ 58.83 | 428 | 25,188 | | | $ 5.16 |
| **TOTAL** | | | | | $ 28.54 | $ 38.21 |
| Current Groundwater Charge[4] (per acre foot) | | | | | $ 7.95 | $ 24.25 |
| **RECOMMENDED Rate Basis (per acre foot)** | | | | | | |
| Water Year 2019-2020 | | | | | **$ 12.74** | **$ 38.21** |
| Water Year 2020-2021 | | | | | **$ 13.12** | **$ 39.36** |
| Water Year 2021-2022 | | | | | **$ 13.51** | 40.54 |
| **RECOMMENDED CHARGES (per acre foot)** | | | | | **$ 12.75** | 38.25 |
| Water Year 2019-2020 | | | | | **$ 13.15** | 39.40 |
| Water Year 2020-2021 | | | | | **$ 13.55** | 40.55 |
| Water Year 2021-2022 | | | | | | |

Notes:

1 Assumed Volumes
Groundwater usage (based on average of past 4 years)

| | |
|---|---|
| Ag usage | 23,974 |
| M&I usage | 4,877 |
| Total | 28,851 |

2 Rates=Revenue Requirements/projected groundwater usage

3 Cost of Water:
AG: USBR and SLDMWA O&M
M&I: USBR and SLDMWA O&M, USBR Out-of-Basin Interest

4 Groundwater charge adopted by San Benito County Water District Board of Directors in January 2017 (Ag) and January 2016 (M&I)

5 Assumed volumes for percolation (based on 3 year average)

| | | |
|---|---|---|
| Ag | 83% | 2105 |
| M&I | 17% | 428 |
| Total | 100% | 2533 |

6 Annual escalation rate 3%

7 Rates charged will be rounded up to nearest $.05

Note: Section 70-7.8 (a) of the District Act states that the agricultural rate shall not exceed one-third of the rates for all water other than agricultural water.

**Table F-2. Historical and Current San Benito County Water District CVP (Blue Valve) Water Rates (dollars/af)**

| USBR Water Year | Standby & Availability Charge (dollars/acre) | Water Charge | | Power Charge | | | | | Groundwater Charge (dollars/af) | | | Recycled Water (per AF) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Agricultural | Municipal & Industrial | Distribution Subsystem | | | | | Agricultural | Municipal & Industrial | | Agricultural | Power Charge |
| | | | | 2 | 6H | 9L | 9H | Others | | | | | |
| 1987 | $8.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | | | |
| 1988 | $2.00 | $34.00 | n.c. | | | | | | n.i. | n.i. | | | |
| 1991 | $4.00 | $38.00 | $110.00 | | | | | | $6.25 | $22.00 | | | |
| 1992 | $4.00 | $45.00 | $120.00 | | | | | | $2.00 | $10.00 | | | |
| 1994 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $5.00 | | | |
| 1995 | $4.50 | $77.61 | $168.92 | | | | | | $1.00 | $15.75 | First 100 af | | |
| | | | | | | | | | | $36.70 | Next 500 af | | |
| | | | | | | | | | | $54.60 | Over 600 af | | |
| 1996 | $6.00 | $75.00 | $150.00 | | | | | | $1.50 | $33.00 | | | |
| 1997 | $6.00 | $75.00 | $157.00 | | | | | | $1.50 | $33.00 | | | |
| 1998 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $33.00 | | | |
| 2000 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $11.50 | | | |
| 2001 | $6.00 | $75.00 | $155.00 | | | | | | $1.50 | $25.00 | | | |
| 2004 | $6.00 | $75.00 | $150.00 | $24.30 | $46.75 | $25.05 | $53.70 | $15.25 | $1.50 | $10.00 | | | |
| 2005 | $6.00 | $80.00 | $150.00 | $26.15 | $49.40 | $35.00 | $66.90 | $17.10 | $1.50 | $21.50 | | | |
| 2006 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | | | |
| 2007 | $6.00 | $85.00 | $160.00 | $23.60 | $36.05 | $34.70 | $65.75 | $18.40 | $1.50 | $21.50 | | | |
| 2008 | $6.00 | $100.00 | $170.00 | $17.25 | $19.40 | $32.60 | $62.75 | $14.85 | $1.50 | $21.50 | | | |
| 2009 | $6.00 | $115.00 | $180.00 | $17.50 | $20.25 | $42.55 | $74.85 | $16.30 | $2.50 | $22.50 | | | |
| 2010 | $6.00 | $135.00 | $200.00 | $22.00 | $27.30 | $49.75 | $84.35 | $21.75 | $2.50 | $22.50 | | | |
| 2011 | $6.00 | $155.00 | $220.00 | $22.70 | $28.15 | $51.25 | $86.90 | $22.40 | $2.50 | $22.50 | | | |
| 2012 | $6.00 | $170.00 | $235.00 | $23.35 | $29.00 | $52.80 | $89.50 | $23.10 | $2.50 | $22.50 | | | |
| 2013 | $6.00 | $170.00 | $235.00 | $40.30 | $29.25 | $43.05 | $91.55 | $22.40 | $3.25 | $23.25 | | | |
| 2014 | $6.00 | $170.00 | $238.00 | $41.55 | $30.15 | $44.35 | $94.30 | $23.10 | $3.60 | $23.25 | | | |
| 2015 | $6.00 | $179.00 | $247.00 | $42.75 | $31.05 | $45.70 | $97.15 | $23.80 | $3.95 | $23.25 | | | |
| 2016 | $6.00 | $272.00 | $363.00 | $123.10 | $75.65 | $109.95 | $162.55 | $66.05 | $4.95 | $24.25 | | $182.55 | $57.70 |
| 2017 | $6.00 | $191.00 | $363.00 | $126.80 | $77.90 | $113.25 | $167.45 | $68.05 | $6.45 | $24.25 | | $183.45 | $59.45 |
| 2018 | $6.00 | $209.00 | $363.00 | $130.60 | $80.25 | $116.25 | $172.45 | $70.10 | $7.95 | $24.25 | | $183.45 | $59.45 |
| 2019 | $6.00 | $254.00 | $404.00 | $80.45 | $39.30 | $88.15 | $130.30 | $33.70 | $12.75 | $38.25 | | $183.45 | $59.45 |
| 2020 | $6.00 | $265.00 | $415.00 | $82.85 | $40.45 | $90.80 | $134.10 | $34.75 | $13.15 | $39.40 | | $208.00 | $60.64 |

Notes:
af = acre-feet.
n.c. = no classification.
n.i. = not implemented
All rates effective March 1 through following February.

**Table F-3. Recent US Bureau of Reclamation Charges per Acre-Foot for CVP Water**

| User Category and Cost Item | Irrigation[1] | | | | | | Municipal & Industrial | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cost of service (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] | Cost of service[2] (non-full cost) | Restoration fund[3] | SLDMWA[4] | Trinity PUD Assessment | Total | Contract rate[5] |
| 1994 | $71.68 | $6.20 | n.a. | | $77.88 | $17.21 | $165.67 | $12.40 | n.a. | | $178.07 | $85.86 |
| 1995 | $66.47 | $6.35 | n.a. | | $72.82 | $17.21 | $132.90 | $12.69 | n.a. | | $145.59 | $85.86 |
| 1996 | $65.63 | $6.53 | n.a. | | $72.16 | $27.46 | $127.40 | $13.06 | n.a. | | $140.46 | $85.86 |
| 1997 | $69.57 | $6.70 | n.a. | | $76.27 | $27.46 | $143.27 | $13.39 | n.a. | | $156.66 | $85.86 |
| 1998 | $61.58 | $6.88 | $5.00 | | $73.46 | $27.46 | $130.88 | $13.76 | $5.00 | | $149.64 | $85.86 |
| 1999 | $60.30 | $6.98 | $2.73 | | $70.01 | $27.46 | $127.91 | $13.96 | $2.73 | | $144.60 | $85.86 |
| 2000 | $64.24 | $7.10 | $6.43 | | $77.77 | $27.46 | $129.59 | $14.20 | $6.43 | | $150.22 | $85.86 |
| 2001 | $69.50 | $7.28 | $2.65 | | $79.43 | $27.46 | $129.40 | $14.56 | $4.15 | | $148.11 | $85.86 |
| 2002 | $68.71 | $7.54 | $6.61 | | $82.86 | $24.30 | $130.32 | $15.08 | $6.61 | | $152.01 | $79.13 |
| 2003 | $72.20 | $7.69 | $5.46 | | $85.35 | $24.30 | $129.07 | $15.38 | $5.46 | | $149.91 | $79.13 |
| 2004 | $74.52 | $7.82 | $6.61 | | $88.95 | $24.30 | $134.86 | $15.64 | $6.61 | | $157.11 | $79.13 |
| 2005 | $77.10 | $7.93 | $7.99 | | $93.02 | $24.30 | $132.01 | $15.87 | $7.99 | | $155.87 | $79.13 |
| 2006 | $91.13 | $8.24 | $9.31 | | $108.68 | $30.93 | $214.41 | $16.49 | $9.31 | | $240.21 | $77.12 |
| 2007 | $93.53 | $8.58 | $9.99 | $0.11 | $112.21 | $30.93 | $215.32 | $17.15 | $9.99 | $0.11 | $242.46 | $80.08 |
| 2008[6] | $28.12 | $8.79 | $10.95 | $0.07 | $47.93 | $30.93 | $33.34 | $17.57 | $10.95 | $0.07 | $61.68 | $33.34 |
| 2009 | $30.20 | $9.06 | $11.49 | $0.07 | $50.82 | $30.20 | $32.77 | $18.12 | $11.49 | $0.07 | $62.45 | $32.77 |
| 2010 | $33.27 | $9.11 | $11.91 | $0.11 | $54.40 | $33.27 | $36.11 | $18.23 | $11.91 | $0.11 | $66.36 | $36.11 |
| 2011 | $38.92 | $9.29 | $9.51 | $0.05 | $57.77 | $38.92 | $42.58 | $18.59 | $9.51 | $0.05 | $70.73 | $42.58 |
| 2012 | $39.71 | $9.39 | $15.20 | $0.05 | $64.35 | $39.71 | $37.95 | $18.78 | $15.20 | $0.05 | $71.98 | $37.95 |
| 2013 | $40.39 | $9.79 | $17.29 | $0.05 | $67.52 | $39.91 | $38.71 | $19.58 | $17.29 | $0.05 | $75.63 | $40.92 |
| 2014 | $46.87 | $9.99 | $28.81 | $0.23 | $85.90 | $46.87 | $29.70 | $19.98 | $28.81 | $0.23 | $78.72 | $29.70 |
| 2015 | $53.82 | $10.07 | $30.66 | $0.23 | $94.78 | $53.82 | $34.74 | $20.14 | $30.66 | $0.23 | $85.77 | $34.74 |
| 2016 | $85.12 | $10.21 | $30.66 | $0.30 | $126.29 | $38.28 | $61.24 | $20.41 | $30.66 | $0.30 | $112.61 | $23.42 |
| 2017 | $66.17 | $10.23 | $14.15 | $0.30 | $90.85 | $39.90 | $49.50 | $20.45 | $14.15 | $0.30 | $84.40 | $22.85 |
| 2018 | $79.09 | $10.47 | $20.39 | $0.30 | $110.25 | $48.35 | $43.74 | $20.94 | $20.39 | $0.30 | $85.37 | $17.45 |
| 2019 | $67.32 | $10.63 | $20.26 | $0.30 | $98.51 | $40.14 | $37.54 | $21.26 | $20.26 | $0.30 | $79.36 | $17.98 |
| 2020 | $72.24 | $10.91 | $27.57 | $0.12 | $110.84 | $52.76 | $37.18 | $21.82 | $27.57 | $0.12 | $86.69 | $17.87 |

Notes:

(1) Total USBR rate given for non-full cost users only, as they represent the majority of water users.

(2) Cost-of-service for agricultural and municipal and industrial users includes a capital repayment rate and an operation and maintenance (O&M) rate. For municipal and industrial customers, cost-of-service also includes a deficit charge, which includes interest on unpaid O&M and interest on capital and on unpaid deficit.

(3) Restoration fund charges apply October 1 through September 30. All other rates effective March 1 through following February.

(4) Beginning in 1998, the San Luis-Delta Mendota Water Authority instituted this charge to "self-fund" costs associated with maintaining the Delta-Mendota Canal and certain other facilities, which were formerly funded directly by the Bureau of Reclamation. SLDMWA issues preliminary rates in December for the upcoming contract year (March-February). These rates are used for rate-setting purposes; actual rates may vary.

(5) The contract rate is the minimum rate CVP contractors are allowed to pay. To the extent that the contract rate does not cover interest plus actual operation and maintenance costs, a contractor deficit is accumulated that is charged interest at the current-year treasury borrowing rate.

(6) Per the amendatory contract with the USBR "out of basin" capital costs that were previously included in the cost of service are now under a separate repayment contract.

(7) Cost of service rates are inclusive of USBR direct pumping and Project Use Energy costs.

## List of Acronyms

| | |
|---|---|
| AF or A/F | acre-foot |
| AFY | acre-foot per year |
| AG | agriculture |
| BMP | Best Management Practices |
| CASGEM | California Statewide Groundwater Elevation Monitoring |
| CEQA | California Environmental Quality Act |
| cfs | cubic feet per second |
| CIMIS | California Irrigation Management Information System |
| COC | Constituent of Concern |
| CVP | Central Valley Project |
| District or SBCWD | San Benito County Water District |
| CWD | County Water District |
| DDW | Division of Drinking Water |
| DWR | California Department of Water Resources |
| DWTP | Domestic Wastewater Treatment Plant |
| ET | evapotranspiration |
| ft | feet |
| GAMA | Groundwater Ambient Monitoring and Assessment |
| GICIMA | Groundwater Information Center Interactive Map |
| GPBO | General Basin Plan Objective |
| gpd | gallons per day |
| GSA | Groundwater Sustainability Agency |
| GSP | Groundwater Sustainability Plan |
| GW | groundwater |
| HUA | Hollister Urban Area |
| IRWMP | Integrated Regional Water Management Plan |
| ITRC | Irrigation Training and Research Center, California Polytechnic State University |
| IWTP | Industrial Wastewater Treatment Plant |
| M&I | Municipal and Industrial |
| MA | Management Area |
| MCL | Maximum Contaminant Level |
| MGD | million gallons per day |
| msl | mean sea level |
| MW | Monitored well |
| NGVD | National Geodetic Vertical Datum |
| pdf | Adobe Acrobat Portable Document Format |
| PPWD | Pacheco Pass Water District |
| PVWMA | Pajaro Valley Water Management Agency |
| RW | recycled water |
| RWQCB | Regional Water Quality Control Board |

## List of Acronyms (cont.)

| | |
|---|---|
| SCVWD | Santa Clara Valley Water District |
| SEIR | Supplemental Environmental Impact Report |
| SGMA | Sustainable Groundwater Management Act |
| SLDMWA | San Luis & Delta-Mendota Water Authority |
| SMCL | Secondary Maximum Contaminant Levels |
| SSCWD | Sunnyslope County Water District |
| USBR | U.S. Bureau of Reclamation |
| UWMP | Urban Water Management Plan |
| WRA | Water Resources Association of San Benito County |
| WTP | Water Treatment Plant |
| WWTP | Wastewater Treatment Plant |
| WY | water year |

# APPENDIX G

# Groundwater Model Update and Enhancement 2020 Report

# NORTH SAN BENITO BASIN GROUNDWATER MODEL UPDATE AND ENHANCEMENT 2020

**March 2020**

TODD GROUNDWATER

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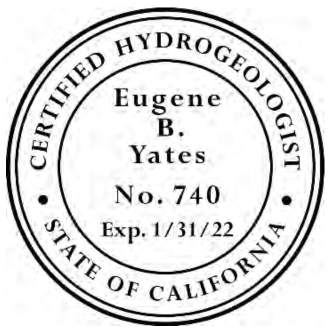
# SIGNATURE PAGE




Eugene B. (Gus) Yates, PG, CHG

Senior Hydrologist

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# 1. INTRODUCTION

In 2001, San Benito County Water District (District) developed a groundwater flow model of the San Benito County part of the Gilroy-Hollister Groundwater Basin. The model has undergone revisions and enhancements to meet the needs of specific projects, most recently in 2014 (Todd Groundwater 2015). Extensive revisions, an update of the calibration period and recalibration have been done in 2019 to meet the needs of two projects: preparation of a groundwater sustainability plan for the North San Benito Subbasin and evaluation of potential impacts of enlarging Pacheco Reservoir. Major elements of this work include:

- Expanding the modeled area to include all of the North San Benito Subbasin of the Gilroy-Hollister Groundwater Basin in San Benito County plus the basin area along Pacheco Creek that extends north into Santa Clara County. This included a major expansion to the southeast, nearly doubling the total model area.
- Implementing a fine, uniform model grid.
- Updating all model input time series data as well as water-level hydrographs used for model calibration through water year 2019.
- Recalibration of the hydraulic characteristics of aquifer materials, stream beds and faults.
- Preparation of hydrologic time series data for model input back to water year 1922 to enable simulation of the 1922-2003 period used for the Pacheco Reservoir Expansion Project design work.
- Change from MODFLOW2000 to MODFLOW2005 and from STR to SFR stream flow module.

This report documents the expanded, updated and recalibrated model, including ancillary modeling steps used to prepare inflows to the groundwater model.

# 2. BOUNDARIES OF THE BASIN, MODEL AND WATERSHED

The Gilroy-Hollister Groundwater Basin as defined by the California Department of Water Resources (DWR) includes two subbasins: the North San Benito Subbasin (herein Basin) and Llagas Subbasin, and encompasses valley floor and adjacent hilly areas in northern San Benito County and southern Santa Clara County, as shown in **Figure G-1**. The basin consists of unconsolidated to slightly consolidated sediments with primary porosity that store and transmit significant quantities of groundwater. These formations occur not just beneath the valley floor areas but also in some of the adjacent upland areas. Consequently, the basin boundaries are defined by geology and faults, not by topography. For example, the San Andreas Fault forms much of the southeastern boundary of the basin and cuts across hilly terrain southeast of Hollister. However, almost all extraction and use of groundwater occur in the valley floor areas.

The Hollister Valley extends 10 miles northwest from Hollister to the Pajaro River, which is the county line. A broad, flat region on the San Benito County side of the river is known as the Bolsa subarea. Beyond the river, the Llagas Valley and subbasin continue another 15 miles northwest in Santa Clara County and include the cities of Gilroy and Morgan Hill. The San Juan Valley trends west from Hollister along the San Benito River and includes the City of San Juan Bautista. It is separated from the Bolsa subarea by the Lomerias Muertas and Flint Hills, which are an upward fold of Purisima Formation that rises as much as 1,100 feet above the valley floor areas. The Purisima Formation also makes up the hills along the southern edges of the San Juan and Hollister Valleys, but it is truncated by the San Andreas

Fault. The basin extends southeast of Hollister 25 miles up the valleys associated with Tres Pinos Creek and the San Benito River. Except for the relatively small Paicines and Tres Pinos Creek Valleys, that region is mostly hilly upland areas with hydrogeologic characteristics similar to those of the hills farther north.

The area simulated by the groundwater model includes the entire Gilroy-Hollister Basin in San Benito County plus alluvium beneath Pacheco Creek in Santa Clara County. The Llagas Subbasin is represented as a gradient-dependent groundwater inflow boundary.

Water enters the basin as surface runoff and subsurface inflow from watersheds draining the Diablo Range bordering the eastern edge of the basin and the Gabilan Range bordering the southwestern edge. To develop estimates of surface and subsurface inflows from these tributary areas to the groundwater basin, a rainfall-runoff-recharge model is used to simulate the entire watershed tributary to the Basin. This model simulates all near-surface hydrologic processes, including rainfall, runoff, infiltration, evapotranspiration, effects of impervious areas and irrigation, soil moisture storage and percolation to stream base flow and deep groundwater recharge.

# 3. BASIN GEOLOGY AND STRUCTURE

## 3.1. BASIN FILL GEOLOGY

The geologic materials that comprise the basin fill are non-marine sediments of Pliocene age or younger (less than 5 million years old). Some deposits are named, others are referenced simply by age. Data from exploratory oil wells indicate that basin fill sediments extend as much as 4,000 feet below the ground surface near the center of the basin, far beyond the depths of water supply wells (Kilburn, 1972). **Figure G-2** shows a map of the geologic materials exposed at the land surface (CGS, 2002). In the valley floor areas, surficial deposits consist of relatively young alluvium, generally less than 200 feet thick. Most of the basin fill consists of Pliocene and Pleistocene age clays, silts, sands and gravels, including the Purisima Formation. These formations are exposed at the land surface in the hills surrounding the valleys. In the eastern and southeastern parts of Hollister Valley, semi-consolidated deposits are encountered in the subsurface that yield little groundwater and are commonly referred to as the San Benito Gravels of Lawson 1895.

The basin is structurally complex. The substantial depth of the basin and the current topography of the land surface resulted in part from folding of the geologic deposits. For example, the high hills that separate the Bolsa area from the San Juan Valley are associated with the Sargent anticline (upward fold).

## 3.2. FAULTS

Basin fill materials are cut by several faults that can be mapped on the basis of surface geology and/or their effects on groundwater levels. The most prominent of these is the Calaveras Fault, which bisects the Hollister Valley from northwest to southeast. It offsets hills west of the Hollister Airport and created San Felipe Lake at the north end of the valley (a sag pond). It acts as a barrier to the generally westward movement of groundwater, resulting in flowing wells and perennial stream base flow on the east side of the fault in the northern part of the valley. Geologic mapping as well as groundwater level data indicate that the fault consists of several parallel splinters.

The Ausaymas Fault (Quien Sabe Fault on some maps) crosses the northeastern part of Hollister Valley (see Figure G-2). It created a series of low hills in the valley floor area near Orchard Road and Comstock Road, and it also acts as a barrier to groundwater flow. It trends from the mouth of Pacheco Creek valley toward Santa Ana valley, but geologic maps generally show it disappearing before it gets there. Based on model calibration efforts for this study, there is hydrologic evidence (abrupt changes in groundwater levels) that a branch of the fault might trend southeast toward the southern part of Hollister. This branch is included in the groundwater model.

The Tres Pinos Fault is shown on some geologic maps (see Figure G-2) curving northwest from the town of Tres Pinos along Highway 25 toward Hollister (for example, Kilburn, 1972). There is some water-level evidence that the fault is present, and it is also included in the groundwater model.

Faulting is also associated with the Sargent Anticline in the Lomerias Muertas and Flint Hills. There is a barrier to groundwater flow that crosses the narrow gap of alluvium between the eastern end of the Flint Hills and the low hills of exposed Plio-Pleistocene materials in Hollister. That barrier is included as a fault in the groundwater model.

## 4. MODELING SOFTWARE AND DIGITAL FILE AVAILABILITY

The computer program used to simulate groundwater flow continues to be MODFLOW 2005, which is public-domain software developed by the U.S. Geological Survey (Harbaugh, 2005). The various versions of MODFLOW are the most widely used groundwater modeling software in the United States. Several commercially available (proprietary) software programs were used to prepare model input and evaluate model output. These include Microsoft Excel, Groundwater Vistas, and ArcGIS. Finally, the rainfall-runoff-recharge model and several pre-processing utility programs were developed in the Fortran 90 programming language by Todd Groundwater.

Readers interested in obtaining input files for the rainfall-runoff-recharge model and groundwater model, or the files used to produce figures in this documentation may obtain them from the District:

San Benito County Water District
30 Mansfield Road
Hollister, CA 95024
Tel. 831-637-8218
Attn. Jeff Cattaneo, Sara Singleton or Garrett Haertle

## 5. MODEL GRID AND LAYERS

MODFLOW uses a finite-difference numerical method that requires a rectilinear grid of model cells. In plan view, the model grid contains 200 rows by 271 columns of cells. The spacing between rows is uniformly 500 feet. The spacing between columns is 500 feet in the main Basin area and 1,000 feet in the southeastern part of the Basin, as shown in **Figure G-3**. The larger grid spacing in that region reflects the lack of pumping stresses and water-level data in that area.

The model has five layers numbered 1 through 5 from top to bottom. In most areas, the layers simply represent depth intervals within the basin and do not correspond to identifiable geologic features. Where upward water-level gradients are present, layer 2 is used to represent the low-permeability clay and silt layers that restrict vertical flow. Individual gravel, sand, silt and clay layers within the basin tend to be thin and of limited areal extent. Previous studies have had limited success correlating layers between wells on the basis of well completion reports prepared by drillers. This could be due to inconsistent use of lithologic descriptors by drillers, the difficulty in identifying clay layers when drilling with the mud-rotary method (the most common method), and/or actual discontinuity of layers over short distances. Recent re-analysis of geologic information for the Groundwater Sustainability Plan (see Section 3.6) reached the same conclusion.

The top of the basin and the groundwater model is the land surface. Elevation points every 10 meters were extracted from the National Elevation Dataset to define the top of layer 1 (http://ned.usgs.gov). The bottom of the model grid was set at a depth slightly below the depth of most water supply wells. Because of layering within the basin fill sediments, groundwater at depths much greater than water supply wells tends to remain inactive and has little effect on water levels and flow in the overlying, actively-pumped aquifers. The bottom elevation of layer 1 was carefully selected as a surface slightly below the minimum historical water level recorded during water years 1975-2017. This had the advantage of preventing layer 1 cells from going dry during the calibration simulation but the disadvantage of creating a thick top layer in some places, which decreased the ability to simulate vertical gradients precisely. Dry cells cannot be included in the mathematical operations used to simulate groundwater flow, so cells are permanently removed from the active flow domain if they go dry. Other versions of MODFLOW are available that can simulate unsaturated and saturated conditions concurrently. This keeps all cells active, but at the cost of substantially increased model run time.

The thicknesses of layers 2 through 5 are constant throughout the modeled area, so their bottom elevations have the same shape as the bottom of layer 1 but at a lower elevation. Layer 2 is only 20 feet thick, which serves two purposes. It allows more realistic simulation of salt concentrations near the water table, because salt loads from the ground surface are not averaged over a large depth interval. Also, layer 2 is used in some locations to represent fine-grained layers that create confined conditions and upward water-level gradients. Layers 3, 4 and 5 are 120 feet, 180 feet and 260 feet thick, respectively. Thus, the total saturated thickness represented by the model is about 600-780 feet, depending on the saturated thickness of layer 1 at any given place and time. **Figures G-4 and G-5** show cross sections of the model grid along row 98 and column 76, respectively, to illustrate the shapes and relative thicknesses of the layers.

## 6. SIMULATION PERIOD AND TIME STEPS

The model calibration period was updated to simulate the historical period of water years 1975-2017. This 43-year period is desirable for model calibration purposes because it includes a wide range of hydrologic and water use conditions. It begins when groundwater levels were low in some parts of the basin due to preceding decades of groundwater overdraft. The low initial water levels were immediately accentuated by the 1976-1977 drought. Water levels generally rose during the wet period of water years 1978-1986 and then declined during the drought of 1987-1992. Recovery from the drought was very rapid due to wet climatic conditions and the beginning of water imports in the early and mid-1990s. In the early years of operation, imported water was actively percolated through creek beds during the dry season as well as used directly for agricultural and urban uses, offsetting groundwater pumping. Water-level recovery was so dramatic that by the late 1990s, wells in some locations began flowing under artesian pressure (that is, without pumping). The calibration period also includes the 2013-2015 drought and most of the subsequent recovery.

The model is transient and advances in monthly time increments. Monthly-average values of inflows and outflows are applied during each of these “stress periods”. Internally, the model subdivides each stress period into three computational time steps that increase in duration from approximately 6 to 14 days. Model inputs related to rainfall recharge and stream recharge were calculated daily using the rainfall-runoff-recharge model, then averaged to monthly values for input to the groundwater model. This is generally more accurate than working directly with monthly values of rainfall and stream flow because runoff and recharge processes are nonlinear.

## 7. RAINFALL-RUNOFF-RECHARGE MODEL

A rainfall-runoff-recharge model developed by Todd Groundwater was used to prepare estimates of groundwater recharge from rainfall, irrigation, bedrock inflow, and pipe leaks. It also generated the estimates of groundwater use for agricultural irrigation and flows in ungauged streams tributary to or within the basin. The rainfall-runoff-recharge model is built around a soil moisture balance of the root zone, which is simulated continuously using daily time steps for the 43-year calibration period. Numerous variables are involved in the physical processes of rainfall, interception, runoff, infiltration, root zone soil moisture storage, evapotranspiration, irrigation, shallow groundwater storage, recharge of deeper regional aquifers from shallow groundwater, and lateral flow of shallow groundwater into streams. Accordingly, the groundwater basin and tributary watersheds were divided into small recharge zones over which the most influential variables were relatively homogeneous. The daily water balance was then simulated for each zone, and the results aggregated geographically to cells in the groundwater model grid and temporally to the model stress periods.

The rainfall-runoff-recharge model provides several benefits to the groundwater modeling effort:

- It represents the hydrological processes with governing equations that reflect the actual physical processes, at least in a simplified way. This allows sensitivity or suspected errors to be traced to specific assumptions and processes.
- It enforces the principle of conservation of mass on the recharge and stream flow values. Beginning with rainfall, all water mass is accounted for as it moves through the hydrological system.
- It allows additional data sets to be included in model calibration. In tributary watersheds with gauged stream flow data, measured flows can be compared with simulated flows, which consist of the sum of direct runoff and shallow-groundwater seepage to streams. Simulated irrigation frequency can be compared with actual grower practices, and applied irrigation amounts can be compared with water delivery data recorded by the District. Simulated urban irrigation amounts can be compared with seasonal variations in measured urban water use, which are primarily the result of urban irrigation.
- It provides estimates of stream flow in ungauged tributary streams, as well as runoff from valley floor areas within the active model domain.
- It provides estimates of inflow from bedrock and/or upland areas adjacent to the active model domain and constrains the amounts of inflow according to the water balance for each tributary watershed.
- It simulates the effects of runoff from impervious surfaces in urban areas, either to storm drainage systems or to adjacent pervious soils.
- It simulates changes in land use over the 43-year calibration period and the resulting changes in recharge and irrigation demand.
- It combines and parses all of these flows—plus estimated recharge from leaky water and sewer pipes—into recharge values by model cell and stress period in the format required by MODFLOW.

The following sections describe the input data sets and the assumptions and governing equations used to simulate each hydrologic process included in the rainfall-runoff-recharge model.

## 7.1. LAND USE AND RECHARGE ZONES

Recharge zones were developed by intersecting and editing numerous maps in GIS. The starting point was a map of land parcels in San Benito County current as of 2014. Parcel-based recharge zones are necessary for the San Benito model because the use of imported water use is recorded by parcel. Parcel numbers that changed subsequent to 2014 were linked to the prior parcel locations so that the complete history of imported water use could be simulated seamlessly. The rainfall-runoff-recharge model estimates irrigation pumping by subtracting the use of imported water and recycled water from simulated irrigation demand. Urban parcels were consolidated into zones with relatively homogeneous proportions of irrigated, non-irrigated and impervious land cover, which vary depending on the density and type of urban development. Agricultural parcels were assigned a crop type based on land use surveys by DWR in 1975, 1997 and 2010. Land use in 2014 developed using remote sensing techniques was obtained from DWR. To interpolate smoothly between the years with land use information, parcels with changed land use were each assigned different transition years during the interval between mapping dates.

Parcels were subdivided as needed to reflect the boundaries of agricultural fields. In upland areas of the tributary watersheds, recharge zones were manually delineated into grass, shrub and tree categories based on recent air photos (Google Earth). Those land use polygons were further split if they overlapped a watershed boundary. A few large expanses of grassland in the tributary watersheds were also divided if they spanned a rainfall gradient exceeding 1 in/yr of average annual rainfall. Divisions were also made if recharge zones overlapped two distinctly different soil types. Finally, a few extra polygon divisions were made where necessary to simulate land use changes from earlier years. This process of overlapping, consolidating and splitting polygons resulted in 2,768 recharge zones, of which 23 were in external watersheds with gauged streams that were included for the purpose of calibrating model parameters. A map of the zones and their land uses in 2014 is shown in **Figure G-6.**

Land use in each zone was assigned to one of twenty-one categories. The many types of agricultural crops grown in San Benito County were consolidated into eight groups that reflect distinct root depths, growing seasons or crop coefficients for evapotranspiration. A separate category for small vegetables was used in the Bolsa area, where poor drainage results in a shorter growing season. Natural vegetation was divided into five categories, and urban and developed land uses into seven categories. The categories are listed in **Table G-1** along with their total acreages in 2014 in the groundwater basin management areas and tributary watersheds.

Each land use category is further divided into irrigated, non-irrigated and impervious subareas. These are not explicitly mapped but are expressed as percentages of total zone area. Zones representing irrigated cropland, for example, were mostly assumed to be 92 percent irrigated, with the remainder consisting of farm roads and occasional buffer areas of natural vegetation. Based on examination of aerial photographs, the percent impervious cover in urban land use areas was estimated to be 10 percent for rural residential, 20 percent for urban residential, 70 percent for commercial and 80 percent for industrial. The corresponding percent irrigated area for those categories was estimated to be 10, 13, 10 and 0 percent, respectively.

## 7.2. RAINFALL

The distribution of average annual rainfall over the basin and tributary watersheds was obtained from PRISM climate modeling (http://www.prism.oregonstate.edu/ ), shifted uniformly downward slightly so that the modeled value for Hollister matched the long-term average at the Hollister climate station. Also, high simulated values of rainfall in the upper parts of some tributary watersheds were identified as a possible cause of excessively high simulated stream flow. Annual precipitation was adjusted slightly downward in those areas to be more consistent with isohyetal patterns mapped by Rantz (1969) and to match measured stream flow in watersheds with gauges. Each recharge zone was assigned an average annual rainfall value based on its location, as shown in **Figure G-7**.

The surface hydrology model requires daily rainfall as one of two transient inputs. Daily rainfall for the Hollister station during 1975-2014 was used for this purpose, with missing values supplied by correlation with rainfall in Gilroy. Daily rainfall for each recharge zone was calculated as Hollister daily rainfall multiplied by the ratio of zonal average-annual rainfall to Hollister average-annual rainfall.

## 7.3. INTERCEPTION

Plant leaves intercept some of the rain that falls from the sky, and the amount is roughly proportional to the total leaf area of the vegetation canopy. The estimated interception on each day of rain ranged from zero for industrial, idle and vacant land uses, to 0.03 inch for most crops including turf and 0.06 inch for trees in full leaf. These estimates were inferred from published results of interception studies (Viessman and others, 1977). For each day of the simulation, rainfall reaching the land surface (throughfall) is calculated as rainfall minus interception. Interception storage is assumed to completely evaporate each day and is not carried over from one day to the next.

## 7.4. RUNOFF AND INFILTRATION

Most throughfall infiltrates into the soil, but direct runoff occurs when net rainfall exceeds a certain threshold. The threshold at which runoff commences and the percent of additional rainfall that runs off are significantly influenced by a number of variables, including soil texture, soil compaction, leaf litter, ground slope, and antecedent moisture. These factors can be highly variable within a recharge zone, and data are not normally available for them. Also, the intercept and slope of the rainfall-runoff relationship depend on the time increment of analysis. Most analytical equations for infiltration and runoff apply to spatial scales of a few square meters over periods of minutes to hours (Viessman and others, 1977). They are suitable for detailed analysis of individual storm events. The curve number approach to estimating runoff also applies to single, large storm events. It is not suitable for continuous simulation of runoff over the complete range of rainfall intensities (Van Mullen and others, 2002). The approach used in the rainfall-runoff-recharge model is similar but less complex than the approach used in popular watershed models such as HSPF (Bicknell and others, 1997).

In the rainfall-runoff-recharge model, daily infiltration is simulated as a three-segment linear function of throughfall, and throughfall in excess of infiltration is assumed to become runoff. The general shape of the relationship of daily infiltration to daily net rainfall is shown in **Figure G-8** (upper graph). Below a specified runoff threshold, all daily throughfall is assumed to infiltrate. Above that amount, a fixed percentage of throughfall is assumed to infiltrate, which is the slope of the second segment of the infiltration function. Finally, an upper limit is imposed that represents the maximum infiltration capacity of the soil. The runoff threshold, the percentage of excess net rainfall that infiltrates, and the maximum daily infiltration capacity were assumed to vary by land use and were among the variables adjusted for model calibration. The runoff threshold ranged from 0.2 inches per day (in/d) for unpaved areas in industrial and commercial zones to 1.1 in/d for turf and natural vegetation areas. The infiltration percentage for excess rainfall ranged from 55 percent in commercial and industrial areas to 87 percent in large turf areas and upland natural vegetation. The maximum daily infiltration was set to 8 in/d for all land uses and soil types, which for practical purposes puts no upper limit on daily infiltration.

The above parameter values are for soils that are relatively dry. Infiltration rates decrease as soils become more saturated. This phenomenon led to the development of the Antecedent Runoff Condition adjustment factor for rainfall-runoff equations (Rawls and others, 1993). However, application of the concept has been focused on individual storm events. For the purpose of the rainfall-runoff-recharge model, the adjustment provides a means of simulating empirical observations that a given amount of rainfall produces less runoff at the beginning of the rainy season when soils are relatively dry than at the end of the rainy season when soils are relatively wet. This effect is included in the recharge model as a multiplier that decreases the estimated infiltration as soil saturation increases. This multiplier is applied to the runoff threshold, the infiltration slope and the maximum infiltration rate. The multiplier decreases from 1.0 when the soil is dry to a user-selected value between 1.0 and 0.60 when the soil is fully saturated (lower graph in **Figure G-8**). A low value has the effect of decreasing infiltration (and potential groundwater recharge) toward the end of the rainy season or in very wet years, and also to increase simulated peak runoff during large storm events. The multiplier under saturated conditions was assumed to be 0.75 for the San Benito rainfall-runoff-recharge model.

Runoff from impervious surfaces was assumed to equal 100 percent of rainfall. Runoff that flows into a storm drain system (known as "connected impervious runoff") contributes to stream flow but not groundwater recharge. However, runoff from some impervious surfaces flows onto adjacent areas of pervious soils ("disconnected impervious runoff"). The surface hydrology model treats this type of runoff as if it were a large increment of additional rainfall where it flows over or ponds on the pervious soils. The excess water can quickly saturate the soil and initiate deep percolation. The model incorporates this process by means of a variable representing the fraction of impervious runoff that becomes deep percolation. Data and literature values are not available for this variable. It was estimated to be 10 percent in commercial and industrial areas and 30 percent in residential areas. The study area is not heavily urbanized, so this variable does not strongly influence the water balance or simulation results.

## 7.5. Root Zone Depth and Moisture Content

The storage capacity of the root zone equals the product of the vegetation root depth and the available water capacity of the soil. The available water capacity for each recharge zone was a depth-weighted average for the dominant soil type, as reported in the soil survey (Natural Resources Conservation Service, 2015). Root depth is a complex variable. Except for cropland, vegetation cover typically consists of a mix of species with different root depths. At a very local scale, roots are deepest directly beneath a plant and shallower between plants. Root density and water extraction also typically decrease with depth within the root zone. To complicate matters, root depth is somewhat facultative for some plants, which means that roots will tend to grow deeper in soils with low available water capacity, such as sands. Finally, root depth in upland watershed areas can be restricted by shallow bedrock.

The root depth selected for each recharge zone essentially represents an average of all these factors. Simulated recharge and stream base flow are both quite sensitive to vegetation root depth, and values were adjusted during the joint calibration of the rainfall-runoff-recharge model and the groundwater flow model. Separate root depths were specified for irrigated and non-irrigated vegetation in each recharge zone. Root depths for turf and crops were required to be the same in all zones. Some variation in rooting depths of natural vegetation among watersheds was introduced while calibrating simulated stream flow to measured stream flow. In general, however, root depths did not appear to be greatly restricted by shallow bedrock in the tributary watershed areas.

## 7.6. EVAPOTRANSPIRATION

Evapotranspiration is affected by meteorologic conditions, plant type, plant maturity, and soil moisture availability. All of these factors are included in the rainfall-runoff-recharge model. The evaporative demand created by meteorological conditions is represented by reference evapotranspiration (ETo). Numerous equations have been developed over the years relating ETo to solar radiation, air temperature, relative humidity and wind speed. For the purposes of this study, daily values of ETo were obtained from a microclimate station in Hollister that is part of the California Irrigation Management Information System (CIMIS) network. However, those data had to be extrapolated in space and time to obtain values for every recharge zone for the entire 1975-2017 calibration period. Spatially, the study area overlaps two regions in a statewide map of ETo zones prepared by the CIMIS program (Jones, 1999). Most of the study area is in zone 10, but the San Juan Valley is in zone 3 due to the influence of cool marine air that blows inland through Chittenden Gap along the Pajaro River. Annual ETo in zone 3 is 94 percent as large as in zone 10 (46.2 versus 49.1 inches). Accordingly, daily ETo values from the Hollister CIMIS station were multiplied by 0.94 to obtain ETo for zones in the San Juan Valley.

The Hollister CIMIS station began operation in 1994. ETo for each day during water years 1974-1993 was estimated to equal average ETo for the corresponding calendar month multiplied by an adjustment factor derived from the relationship between ETo and air temperature. The factor equaled the slope of a linear regression of ETo versus maximum air temperature for that month of the year, using data from the period of record for the Hollister CIMIS station. Historical daily air temperatures were obtained from the National Oceanic and Atmospheric Administration climate station in Hollister and used to generate the multipliers to convert average monthly ETo to estimated daily ETo.

Vegetation factors are lumped into multipliers called crop coefficients. Reference ET is the amount of water evapotranspired from a broad expanse of turf mowed to a height of 4-6 inches with ample irrigation. ETo is multiplied by a crop coefficient to obtain the actual ET of a different crop or vegetation type at a particular stage in its growth and development. Although primarily used for agricultural crops, crop coefficients can also be applied to urban landscape plants and natural vegetation. Compilations of crop coefficients for many plant types based on field studies are available from numerous sources, in some cases specified by calendar month and in others by growth stage of the plant. Monthly crop coefficients for the 21 land use categories in the surface hydrology model are shown in **Table G-2.** These were developed from a comparison of published values from six sources (Blaney and others, 1963; DWR, 1975; U.N. Food and Agriculture Organization, 2006; Snyder and others, 2007; Williams, 2001; and ITRC, 2003), adjusted to reflect combinations of crops and growing seasons represented by the land use categories. Small vegetables are a dominant crop. Because of their short growing seasons, multiple crops are often grown each year. The monthly crop coefficients reflect a mix of growth stages due to staggered planting of different fields. Based on input from several local growers, the growing season for small vegetables is March-November in most parts of the basin and April-November in the Bolsa area, where poorly-drained soils delay the planting season. Most fields are bare soil during December-February, and the crop coefficient represents an estimate of evaporation from soils periodically wetted by rain events.

## 7.7. Irrigation

Evapotranspiration gradually depletes soil moisture, and for irrigated areas the rainfall-runoff-recharge model triggers an irrigation event whenever soil moisture falls below a specified threshold. The amount of applied irrigation water is equal to the volume required to refill soil moisture storage to field capacity, divided by the assumed irrigation efficiency. An irrigation threshold equal to 80 percent of maximum soil moisture storage was used for urban landscaping and all crops. This variable primarily affects the frequency of irrigation; a higher threshold results in more frequent irrigation but approximately the same total amount of water applied annually. Irrigation efficiency was assumed to be 75 percent for urban landscaping, reflecting the low application uniformity, overspray and inattention to soil moisture conditions common in residential landscape practice. An efficiency of 85 percent was assumed for all agricultural crops except vineyards, which are drip-irrigated and assigned an efficiency of 95 percent. Regulated deficit irrigation was also applied to vineyards. This is the practice of intentionally water-stressing the vines between veraison and harvest to improve berry quality. The model simulates this by applying only 60 percent of the vineyard ET demand during July-September (Pritchard, 2009).

Because irrigation is assumed to completely refill soil moisture storage and is less than 100 percent efficient, simulated soil moisture exceeds capacity immediately following an irrigation event. The excess is assumed to become deep percolation beneath the root zone.

## 7.8. Deep Percolation from Root Zone to Shallow Groundwater

The surface hydrology model updates soil moisture storage each day to reflect inflows and outflows. Rainfall infiltration and applied irrigation water are added to the ending storage of the previous day, and ET is subtracted. If the resulting soil moisture storage exceeds the root zone storage capacity, all of the excess is assumed to percolate down from the root zone to shallow groundwater on that day.

## 7.9. Movement of Shallow Groundwater to Deep Recharge and Stream Base Flow

A shallow groundwater storage component may not be part of all groundwater systems, but its presence is sometimes indicated by groundwater hydrographs and stream base flow. In upland watersheds, for example, the shallow groundwater reservoir is what supplies base flow to streams. Without it, simulated stream flow consists of large flows occurring only on rainy days. Physically, it represents the overall permeability and storage capacity of deep soil horizons and bedrock fractures beneath hillsides bordering a gaining stream. It is the integration of shallow and deep, fast and slow flow paths between the point of rainfall infiltration and the stream. In valley floor areas with flat terrain and deep deposits of unconsolidated basin fill, the presence of a shallow groundwater system is sometimes evident in a lack of response of deep well hydrographs to rainfall recharge events or even wet versus dry years. The shallow zone in that case attenuates the pulses of recharge percolating beneath the root zone into a relatively steady recharge flux, and there may be little outflow to streams.

In the surface hydrology model, the only inflow to shallow groundwater storage is deep percolation from the root zone. There are two outflows: laterally to a nearby creek and downward to the regional groundwater flow system. Outflow to streams is specified as a certain percentage of current groundwater storage, which results in a first-order logarithmic recession of stream base flow, consistent with gaged stream flows. Outflow to the regional groundwater system is simulated as a constant downward flux. This is consistent with flow across confining layers in which the vertical head gradient is near unity. Both outflows are calculated and subtracted from shallow groundwater storage each day. They continue until the storage has been exhausted, resuming whenever a new influx of deep percolation from the root zone arrives. There is no assumed maximum capacity of shallow groundwater storage.

The two parameters defining shallow groundwater flow are the recession constant for flow to streams and the constant downward flow rate for deep recharge. Both of these are obtained by calibration. The recession constant can generally be calibrated by matching simulated to measured stream base flow in gaged watersheds. The deep recharge rate can be used to adjust the long-term partitioning of shallow groundwater mass into base flow versus recharge.

The shallow groundwater component of the surface hydrology model is simple but adequate to capture the fundamental behaviors of logarithmic stream base flow and attenuated deep recharge. Other watershed models invoke more complex systems of storage and flow to simulate these processes. For example, the Precipitation and Runoff Modeling System (PRMS) developed by the U.S. Geological Survey includes a total of seven storage components between the point where a rain drop reaches the ground and the stream into which it ultimately flows (Markstrom and others, 2015). This larger number of components and parameters enables relatively detailed matching of observed stream flow hydrographs but is unnecessarily complex for the purposes of groundwater modeling.

## 7.10. CALIBRATION OF RAINFALL-RUNOFF-RECHARGE MODEL

The primary basis for calibrating the rainfall-runoff-recharge model was a comparison of measured and simulated daily stream flow at four gauge locations: Tres Pinos Creek, Cedar Creek, Pacheco Creek near Dunneville, and Pescadero Creek near Chittenden. The locations of the gauges are shown in **Figure G-7**, and the period of record for each gauge at least partially overlaps the calibration period. Hydrographs of measured daily flows and simulated daily and monthly flows are shown in **Figure G-9**. A comparison of daily flows shows that the number and timing of simulated flow events generally correspond with measured events. The peak flows for individual events do not match well for many individual events, but simulated peaks do not consistently over- or underestimate measured peaks. Some of the differences are probably due to differences in rainfall intensity between the watershed and the rain gauge location during individual storms. The model under-simulates the duration of base flow recession in most cases. This is partly necessary to decrease annual simulated discharge—a key parameter for groundwater recharge opportunity—to match measured annual discharge. The Pacheco Creek near Dunneville gauge and the Tres Pinos Creek near Tres Pinos gauge are in the interior of the Basin, where flows are affected by gains and losses along the valley floor reach upstream of the gauge. The gains and losses are simulated by the groundwater model but not the rainfall-runoff-recharge model. Simulated monthly flows from the groundwater model are also shown on the hydrographs for those two locations. For the Pacheco Creek gauge, simulated monthly flows correspond reasonably well to the measured and simulated daily flows, after allowing for monthly averaging. The model under-simulates low flows at the

Tres Pinos Creek gauge, probably by shunting slightly too much water into the groundwater system, which also flows toward the main Basin area.

## 8. STREAM-AQUIFER INTERACTION

The groundwater model dynamically simulates groundwater recharge from stream percolation and groundwater discharge into streams. Percolation from streams is a function of stream flow and—where the water table is equal to or higher than the stream bed elevation—the difference in water level between the creek and water table. The MODFLOW stream flow routing (SFR) module is used to simulate these processes. Each stream in the basin is simulated as a sequence of reaches, each of which is a model grid cell along the alignment of the channel. Flow is specified at the upstream end of each stream segment and routed down the reaches, with flow to or from the aquifer calculated on the basis of wetted channel area, channel bed hydraulic conductivity and the difference in elevation between the stream surface and the simulated groundwater level in model layer 1 at that reach. By this means conservation of mass is applied concurrently to the stream and the aquifer. Streams can dry up completely as they cross the basin; and conversely, groundwater discharge can create stream flow in a segment that is dry farther upstream. The stream flow routing module allows for a network of channel segments, with multiple inflows or diversions at the start of each segment.

The San Benito model includes a network of 52 stream segments containing a total of 1,133 stream reaches (**Figure G-3**). The simulated waterways are Pacheco Creek, Arroyo de las Viboras, Arroyo Dos Picachos, Santa Ana Creek, an unnamed channel along Highway 25 southeast of Hollister, Tres Pinos Creek, the San Benito River, San Juan Creek, Miller Canal and the Pajaro River. There are three sources of surface inflow to the stream network: surface flow where the creek first enters the groundwater model domain, releases of imported CVP water for percolation (groundwater recharge), and simulated runoff from within the model domain simulated by the surface hydrology model. In addition, a number of stream segments gain flow from groundwater. For each creek that enters the groundwater basin, monthly surface inflow for the groundwater model was set equal to the sum of surface runoff and base flow simulated by the rainfall-runoff-recharge model, subtotaled for each monthly stress period. Historical monthly releases of CVP water into creeks for percolation during the dry season were obtained from District records and added to the stream segments at the corresponding locations and dates. Finally, simulated runoff from valley floor areas was also subtotaled to monthly values and added as inflow to the nearest stream segment.

Two of the variables used to calculate flow between the stream and aquifer—stream width and stage—are functions of stream flow. Based on field measurements of flow by the USGS at gauge locations and by the District at a number of small stream sites, functions relating depth and width to flow for small, medium and large channels were entered into the MODFLOW stream flow routing package as lookup tables.

## 9. GROUNDWATER INFLOW

Groundwater inflow into the basin from adjacent uplands—also called mountain front recharge—is very difficult to estimate. If the basin is bounded by igneous or metamorphic rocks with very limited groundwater flow through fractures, it can be reasonable to assume that inflow from bedrock is negligibly small. In the case of the North San Benito Basin, however, sedimentary rocks adjacent to the basin might have some primary porosity. Tributary watersheds in these upland areas were included in the rainfall-runoff-recharge model in order to enforce conservation of mass in the watersheds and and produce reasonable groundwater flow rates from the watersheds into the basin. The resulting estimates are still highly uncertain, however, because groundwater outflow from the watersheds—and surface outflow, too, for that matter—are both small compared to the two largest flows in the watershed water balances: rainfall and evapotranspiration. Thus, a small error in the estimate of either of those flows can result in a large error in groundwater outflow.

Ultimately, groundwater flows produced by the rainfall-runoff-recharge model were calibrated based on their effect on simulated groundwater levels at nearby wells within the basin. In almost all cases, the initial groundwater inflow estimates were too high. The estimates were lowered primarily by increasing the estimated root depth of natural vegetation in the watersheds, which is highly uncertain due to the effects of shallow bedrock on rooting depth.

Groundwater inflow from tributary watersheds was smoothed over time to reflect attenuation of recharge pulses that occur during wet months and wet years as they gradually flow through long, relatively slow flow pathways. Smoothing was accomplished by a moving average of simulated groundwater recharge in the tributary areas over the preceding 2-10 years. This range represents local variability that was indicated by rates of recession in stream base flow and groundwater levels near the basin boundary during prolonged droughts.

The final estimate of average annual groundwater inflow during the calibration period was 5,400-7,200 AFY under normal climatic conditions. Bedrock inflow was represented in the groundwater model as a number of "injection wells" along the margin of the basin. The inflow from each tributary watershed was divided among several model cells along the boundary between the model and watershed. These are indicated by red cells along the margin of the active model flow region in **Figure G-3**.

## 10. ARTIFICIAL RECHARGE

Four programs have been implemented over the years to augment natural recharge of the groundwater basin. One is percolation of water released from Hernandez Reservoir (45 miles southeast of Hollister) along the channels of Tres Pinos Creek and the San Benito River. In the early years of operation, the target reaches for percolation were the reach of Tres Pinos Creek between the town of Tres Pinos and the San Benito River and the reach of the San Benito River from approximately the model boundary downstream to near Bixby Road in the San Juan Valley. Following the widespread recovery of groundwater levels in the 1990s, both of those target reaches were shortened. The second program consisted of releasing imported CVP water into local stream channels during the dry season. This was done at 13 locations in the early 1990s, but the number of locations and the amounts released were also substantially curtailed by the late 1990s. Percolation releases commenced in 1987, peaked at 10,000-11,000 AFY in 1996-1997 and were ramped down to zero by 2009. Discharge of CVP water to local creek channels is no longer permitted because of the risk of introducing non-native zebra mussels. Both of these recharge programs were included in the groundwater model by adding the historical percolation releases to the natural flows in the affected streams and allowing the MODFLOW stream package to calculate the amount and location of percolation downstream of the discharge points.

The third recharge program also involves percolation of CVP water, but in off-channel ponds instead in creek channels. That program commenced in 2017 and and achieved 2,500-5,000 AFY of recharge since then. The fourth recharge program is percolation of municipal wastewater at six locations. The Hollister

Industrial Wastewater Treatment Plant ponds and the eastern and western sets of ponds for the Hollister Domestic Wastewater Treatment Plant are located next to the San Benito River near San Juan Road. Sunnyslope County Water District operates two smaller sets of wastewater percolation ponds in the Ridgemark development at the southeast edge of Hollister. Finally, wastewater from the town of Tres Pinos is percolated at a pond adjacent to the San Benito River. All of these locations are shown as red model cells in **Figure G-3**. Annual percolation at the facilities has evolved in response to increasing population and decreasing per-capita indoor water use. Annual percolation increased from about 1,400 AFY to over 4,400 AFY during 1975-2001, then fluctuated in the 2,0000-4,000 AFY range through 2017. Wastewater from San Juan Bautista is discharged to a small creek channel that has little interaction with the groundwater basin because it is on the southwest side of the San Andreas Fault along most of its length. It is not included in the model.

## 11. GROUNDWATER PUMPING

Groundwater pumping from agricultural, municipal and rural domestic wells is included in the model at locations defined by geographic coordinates rather than by model grid row and column. This simplifies modification of the grid, if needed. Agriculture has historically accounted for 60-90 percent of water use as tabulated by the District. The District estimates agricultural pumping by means of hour meters installed on large irrigation wells. The discharge rate of the well is periodically measured, and the duration of pumping is multiplied by the discharge rate to obtain the volume of water pumped. An alternative estimate of total irrigation water use can be obtained by simulating crop water demand based on ETo, crop coefficient and irrigation efficiency, as is done in the surface hydrology model. Groundwater use is then estimated as total irrigation demand minus the amount of imported water or recycled water used for irrigation, which are metered. Past comparisons of the two estimates have consistently found that the hour meter estimate is much smaller than the crop water demand estimate. For consistency with the estimate of groundwater recharge, the crop water demand estimate from the surface hydrology model is used in the groundwater model.

Agricultural pumping averaged about 26,000 AFY during 1988-1992 (the first 5 years of the District's hour-meter program) and gradually declined to about 16,000 AFY in recent normal and wet years. Pumping increases when imported water supplies are curtailed. In 2009, 2013 and 2014, for example, agricultural groundwater pumping was 21,000-25,000 AFY, according to District hour-meter estimates.

The location of agricultural pumping is assigned to the center of each recharge zone. This was found to produce better calibration results than attempts to link zonal irrigation demand to physical well locations. One exception to this method was in the southeastern part of the San Juan Valley, where irrigation is supplied by off-site wells near the San Benito River. In the model, all recharge zones south of Highway 156 and east of Bixby Road were assumed to be supplied by wells along the San Benito River between Mitchell and Flint Roads.

The distribution of pumping among model layers was assumed to be the same for all irrigation wells. In order to obtain high rates of output, irrigation wells are typically relatively deep and have long screened intervals. Irrigation pumping was divided between model layers 3 and 4 (60 and 40 percent, respectively). This reduced problems with model cells going dry when pumping was assigned to layers 1 and 2, which are much thinner. Vertical gradients within the interval of maximum pumping (about 150-600 feet below ground surface) are unknown but probably small, given that the boreholes themselves allow equalization of water levels when the pumps are off. Also, the zonal pattern of aquifer characteristics is the same for model layers 3, 4 and 5 (with a few local exceptions), which means that differences in estimated hydraulic conductivity between layers would not be a likely cause of vertical variations in groundwater extraction. The calibrated model produced water levels for layers 3, 4 and 5 that were typically within a few tenths of a foot of each other. Larger gradients—mostly downward, but upward in recent years at two locations—were present between layers 1 and 3.

Groundwater pumping at municipal supply wells is metered and recorded by the water purveyors. The City of Hollister, Sunnyslope County Water District and the City of San Juan Bautista were supplied by six, eight and three wells during the calibration period, respectively. Municipal pumping totaled 5,000-7,500 AFY during 1988-2002. When the Lessalt Water Treatment plant was completed in 2003, some use shifted to imported water and municipal pumping dropped to around 5,000 AFY. Further decreases occurred due to conservation during the 2013-2015 drought and completion of the West Hills Water Treatment Plant in 2017. Municipal groundwater pumping has been less than about 3,000 AFY since then. Municipal pumping during 1975-1987 was projected backward from more recent data based on population trends. Metered pumping was assigned to the actual well locations with the same depth distribution as irrigation pumping. There are 50 commercial and industrial supply wells that pumped more than 20 AFY (according to the District's estimate), and their production was included individually in the model according to their respective locations and volumes reported to the District.

Domestic pumping at rural residences amounts to 2-3 percent of total basin-wide groundwater production. Rather than include hundreds of domestic wells in the model individually, total rural domestic pumping was divided among 130 hypothetical well locations that were scattered throughout areas where there are large numbers of rural residences. The District's estimates of rural domestic pumping during 2006-2008 (which averaged 490 AFY) was extrapolated backward and forward in time based on countywide population trends. Rural domestic pumping was assigned to model layers 2 and 3, reflecting the relatively shallow depth of typical domestic wells.

## 11.1. Evapotranspiration by Riparian Vegetation

In locations where the water table is shallow, some plants (phreatophytes) can extract water directly from the water table to meet evaporative demand. In northern San Benito County, this occurs along some stream reaches where riparian vegetation includes phreatophytes such as willow, cottonwood and sycamore trees. Phreatophytic vegetation uses rainfall in preference to groundwater, and the consumptive use of groundwater was roughly estimated as annual ETo (48 inches) minus annual rainfall (14 inches), or 34 inches per year. This same differencing approach was applied monthly throughout 1975-2017 to create a complete time series of one-dimensional riparian ET demand.

Evapotranspiration of groundwater by phreatophytes was not included in the 2014 version of the groundwater model. However, effects of pumping on groundwater dependent ecosystems—including riparian vegetation—must be addressed in groundwater sustainability plans. Accordingly, the MODFLOW evapotranspiration (EVT) module was added to the 2019 version of the model. For each stream cell in the model, the total canopy width of the riparian vegetation corridor was estimated from inspection of recent aerial photographs (Google Earth). Utilization of groundwater by phreatophytes was assumed to decrease linearly with water table depth, reaching zero when the water table is more than 15 feet below the stream bed elevation.

## 11.2. DRAINS

The model successfully simulated upward head gradients in areas where flowing wells have historically been observed: along the lower end of Pacheco Creek and in the San Juan Valley west of San Juan Bautista. By definition, the groundwater elevation at a flowing well is higher than the ground surface. In reality, the water that flows out of wells or discharges from seeps does not pond to any significant depth, but rather flows via ditches to a nearby creek channel. In the San Juan Valley, agricultural tile drains are common in the shallow groundwater area, and most of the drain sumps discharge to San Juan Creek. Drains are less common along lower Pacheco Creek. In that area, the MODFLOW drain package was used to represent surface runoff of discharging groundwater and thereby prevent simulated water levels from rising above the ground surface, which could alter the amount of groundwater discharge simulated by the model. The area with drain cells is shown in **Figure G-3**.

# 12. MODEL CALIBRATION

Model calibration is a process in which inputs to the model and parameters within the model are adjusted until the model is able to simulate historically observed groundwater levels and flows with a reasonable level of accuracy. The calibration period for the San Benito model was water years 1975-2017 (water years in this case begin October 1 of the preceding calendar year and end September 30). The District has systematically monitored groundwater elevations since 1976. A total of 8,480 measured water levels at 84 well locations were used for calibrating the model and statistically evaluating its accuracy. Stream flow at three gauge locations within the basin—the San Benito River at San Juan Road, Tres Pinos Creek near Tres Pinos and Pacheco Creek at Walnut Avenue—was also compared with stream flows simulated by the model.

## 12.1. METHOD

Joint calibration of the surface hydrology model and groundwater flow model was achieved by trial-and-error adjustments of selected variables, as informed by the timing and location of model residuals. The residual for each water-level measurement equals the observed water level minus the simulated water level at that location and date. All inputs to a model are estimates that are subject to errors or uncertainty, but some are better known than others. Also, some have relatively pronounced effects on simulation results. For example, the amount of water pumped by municipal wells is metered and is considered highly accurate compared to most model inputs. Accordingly, the amount of municipal pumping was not adjusted during calibration. Conversely, the rate of leakage from the shallow groundwater zone to the principal water supply aquifer is highly speculative, and plausible values cover a wide range. Variables were selected for adjustment during calibration based on their relative uncertainty, the sensitivity of results to that variable, and whether the variable might logically be connected to an observed pattern of residuals based on hydrologic processes. In practice, most of the calibration effort focused on adjustments to horizontal and vertical hydraulic conductivity, the locations and conductances of faults, stream bed vertical hydraulic conductivity, and several tributary watershed parameters: root depths of natural vegetation, rainfall-runoff thresholds and slopes, and the leakage and recession rates for shallow groundwater. Variables that were not adjusted during calibration include land use, crop root depths, pumping locations, and groundwater pumping (agricultural, municipal, commercial-industrial or rural domestic).

The measured water levels that served as the basis for calibration are themselves subject to substantial uncertainty stemming from wellhead elevation errors, effects of recent pumping at the measured well, and wells that for unknown reasons have water levels inconsistent with water levels at nearby wells. Wellhead elevations were estimated by District staff from U.S. Geological Survey topographic maps with a contour interval of 10 feet. Almost all of the wells used to monitor water levels are active water supply wells. If a well was pumping shortly before the water level is measured, the water level will be much lower (by feet to tens of feet) than if the well had been idle for a day or more. In some hydrographs, pumping-affected water levels stand out as obvious anomalies. A number of those points were removed from the calibration data set. In other cases, water levels fluctuate over a wide range seasonally and between measurements, and pumping effects could not be systematically identified and eliminated. This was particularly true for wells in the Bolsa area, where the degree of aquifer confinement is high and the magnitude of short-term water-level fluctuations is consequently greater. In two wells (12S/5E-22N1 and 13S/5E-3H1) the measured hydrographs exhibited large intermediate-term fluctuations completely unlike the water-level patterns at nearby wells. These appeared to be situations where pumping at the well was discontinued for several years, then later resumed. These wells were omitted from the statistical evaluation of calibration accuracy.

Model performance during the calibration process was evaluated primarily by visual inspection of superimposed measured and simulated water-level hydrographs. Adjustments to model inputs and parameters were made only if two or more wells in a given area exhibited similar patterns of discrepancies between measured and simulated water levels. In accordance with the principle of parsimony in modeling, calibration began with a small number of broad zones for hydraulic conductivity and storativity. Zones were subdivided during calibration if a pattern of residuals at multiple wells warranted it. Although storativity and hydraulic conductivity are not necessarily correlated, in practice they often are to some degree. Thus, for simplicity, the same zonation pattern was used for both variables.

The process of manually calibrating a groundwater model produces considerable insight into the groundwater flow system and the factors that influence it. Water levels for some wells were easy to reproduce with the model, while others were more difficult.

## 12.2. RESULTS

### 12.2.1. Aquifer Characteristics

The groundwater model represents the basin fill materials in terms of their ability to store and transmit groundwater. Horizontal and vertical hydraulic conductivity define the permeability of the aquifer, which is its ability to transmit groundwater flow. The ability to store water consists of two components. At the water table, storage of water associated with filling or draining the empty (air-filled) interstices between mineral grains is represented by the specific yield of the aquifer. In deep aquifers, there is a much smaller ability to store and release groundwater that derives from the compressibility of the water and aquifer materials (specific storativity). Thus, the initial response to pumping from a deep aquifer is a large drop in water level (head) within that aquifer. With sufficient time, however, the decrease in head creates downward movement of groundwater that eventually accesses the storage capacity at the water table. In other words, the storage response of the aquifer depends partly on the duration of pumping and observation. For groundwater management purposes, storage responses over periods of months to decades are usually the most relevant.

Aquifer characteristics can be estimated in two ways. The first is by means of an aquifer test in which one well is pumped while water levels are measured at a nearby well. This approach typically measures horizontal hydraulic conductivity over distances of tens to hundreds of feet and storage responses over periods of 1-3 days. The second approach is to calibrate a groundwater flow model such that the aquifer characteristics reproduce measured historical water levels throughout the basin given estimates of historical recharge and pumping. The latter approach produces estimates of aquifer characteristics averaged over spatial scales of thousands to tens of thousands of feet and time scales of months to decades. The estimates account for preferential flow through localized sand and gravel lenses in the basin fill materials and for delayed water-table responses to deep pumping. Also, model calibration provides estimates of vertical hydraulic conductivity across the layers of alluvial deposits, which is rarely measured by aquifer tests. The temporal and spatial scales represented by the model calibration approach are better for addressing most long-term groundwater management questions. Calibration of hydraulic conductivity and specific yield values for the San Benito model were guided by the range of reasonable values for various sediment textures indicated by aquifer tests and calibrated groundwater models in other areas.

**Figure G-10** shows the distribution of aquifer characteristics derived from model calibration in model layer 1 (upper left), model layer 2 (upper right) and model layers 3, 4, and 5, which have the same characteristics. The distribution consists of a mosaic of zones of uniform characteristics. A total of 24 zones were delineated, with horizontal and hydraulic conductivities ranging from 0.2 to 120 feet per day (ft/d), vertical hydraulic conductivities from 0.005 to 5 ft/d, specific storativity ranging from 0.000005 to 0.0002 per foot, and specific yield ranging from 0.02 to 0.18.

Horizontal hydraulic conductivity naturally ranges over several orders of magnitude: from 0.01 to 1,000 ft/d for the range of silt, sand and gravel textures found in the basin aquifers (Fetter, 1994). Therefore, the range in the model is reasonable. It should be noted that in flow systems where hydraulic conductivity varies by more than an order of magnitude, almost all of the groundwater movement will be through the relatively permeable zones.

The distribution of horizontal hydraulic conductivity is also reasonably consistent with expected depositional patterns. Coarse, permeable deposits are expected to be relatively abundant where large creeks and the San Benito River enter the basin, and along their present channel alignments in model layer 1. Sediment grain size and permeability are expected to decrease toward the center of the basin due to lower stream gradients and velocities. Also, relatively continuous silt-clay layers must be present at lower elevations in the basin to produce the flowing artesian wells that were widespread prior to 1920 (Clark, 1924) and reappeared in similar locations following groundwater recovery in the 1990s. Hydraulic conductivity in hilly upland areas is also relatively low, partly due to the finer average grain size and greater degree of consolidation of those geologic formations and partly due to folding and local faulting that act to impede horizontal groundwater flow.

The hydraulic conductivity values across faults included in the model are shown in **Figure G-11**. The values assume a fault plane thickness of 1 foot and were obtained entirely by calibration to match the observed difference in water levels across the fault. Faults can obstruct groundwater flow by offsetting permeable layers within the basin fill and by creating a shear zone of crushed material (fault gouge) that has relatively low permeability.

### 12.2.2. Water Levels

Hydrographs comparing simulated with measured water levels during water years 1975-2017 were prepared for the 84 well locations shown in **Figure G-12**. The hydrographs are shown in **Figure G-13 a through f** according to township/range location or generally west to east. At most wells, the model reproduces the water level history reasonably well, including the long-term recovery from overdraft, water-level declines during the 1987-1992 drought, subsequent rapid recovery during the 1990s, the leveling off of water levels at wells that recovered to the elevation of a nearby stream, and another cycle of decline during the 2013-2015 drought.

The difference between each measured water level and the corresponding simulated water level is the residual. Residuals can be summarized statistically to obtain an objective measure of model performance. The model calibration guidelines presented in ASTM D-5490-93 recommends that these statistical summaries be calculated. The residuals statistics are not a completely objective measure of model performance because some water-level measurements were omitted or assigned a low weight based on a subjective conclusion that they were not representative of ambient groundwater conditions (such as a measurement made while the well pump was operating). Measurements that clearly appeared to be affected by pumping (much lower than prior and subsequent measurements at that well) were omitted from the calibration set in this case, but most were retained even if they seemed "noisy".

Deciding whether model performance is "good enough" based on residuals statistics is also subjective. A common rule of thumb is to consider model performance acceptable if the root-mean-squared residual is less than 10 percent of the total range of measured water levels (Environmental Simulations, Inc., 2011). In the present case, the total elevation range of the 8,480 water-level observations was 780 feet. The mean residual was -8.68 feet, which indicates a slight bias toward simulated water levels that are higher than measured water levels. Most of this bias is in the Bolsa area, where simulated water levels are generally near the upper part of the broad spread of measured water levels (many of which are probably low due to recent or nearby pumping). In other cases, large discrepancies were associated with localized patterns that calibration adjustments were simply unable to reproduce. For example, measured water levels in several wells in the area around McCloskey, Fallon and Fairview Roads (wells 12S/5E-36B20, -24N1, and to a lesser degree -14N1 and -23A20) stayed flat or declined during 1976-1984 then rose during 1985-1992, which was opposite of the simulated trends and the observed trends at most wells. No combination of model parameters and inputs was able to reproduce this local pattern.

The root-mean-squared error (RMSE) was 3.5 percent of the range of water levels. **Figure G-14** shows a scatterplot of simulated versus observed water levels. Although there is some spread to the data cluster, it is fairly centered on the 1:1 line throughout the range of water levels. The RMSE is most sensitive to the largest discrepancies between measured and simulated water levels. Simulated water levels are mostly higher than measured water levels in the Bolsa area at the low end of the elevation range. This is because most of the measured water levels are probably affected by pumping. At the high end of the elevation range, the model had difficulty simulating a water level profile along Paicines Valley as flat as the measured profile, so many simulated water levels at the upstream end of the valley are consistently higher than the measured water levels.

Contours of simulated groundwater levels are shown in **Figure G-15** for October 1992 and in **Figure G-16** for March 2012. Measured water levels on those dates are posted as points. The fall 1992 contours represent a condition of drought-related low water levels prior to the importation of significant quantities of water. The spring 2012 water levels represent the basin in a near fully-recovered state under normal climatic conditions. Faults cause conspicuous stair-steps in the water-level surface in both maps. On the earlier date, water levels in the Hollister Subbasin east of the Calaveras Fault had yet to recover from overdraft during prior decades. A broad pumping trough in that area was centered around the airport. By 2012, water levels in that area had mostly recovered, and a northwesterly gradient prevailed throughout that area.

### 12.2.3. Stream Flow

Simulated stream flow was compared with measured stream flow at three locations within the basin where stream gauges were operating during all or part of the calibration period. To be consistent with model output, measured daily flows were averaged to monthly values. **Figure G-17** shows flows in Pacheco Creek at Walnut Avenue, Tres Pinos Creek near Tres Pinos and the San Benito River at San Juan Road. At the Pacheco Creek gauge, the simulated pattern of high and low flows generally matched the measured pattern, although the model tended to slightly more small flow events. At the Tres Pinos Creek gauge, simulated stream flows were generally smaller and less frequent than measured flows. The model probably slightly overestimates subsurface flow at that location. At the San Benito River gauge near San Juan Road, the model consistently produces too much base flow, on the order of 10-20 cfs. This is the opposite of the Tres Pinos Creek bias and likely is associated with an underestimate of subsurface flow along the river corridor at that location. Relatively small changes in aquifer hydraulic conductivity can noticeably change the amount of flow shunted from groundwater to surface water or vice versa.

### 12.2.4. Water Balance

The ZoneBudget post-processing program was used to extract annual water balances from the model for the four management areas in the basin. **Figures G-18 through G-21** show annual inflows and outflows during 1975-2017 as stacked bars for each of the four management areas. Annual storage change is not included in the stacked bars; rather, cumulative storage change is shown as a line.

In the Southern MA, inflows were dominated by large amounts of stream percolation and rainfall recharge in exceptionally wet years. That recharge raised groundwater levels, which concurrently increased groundwater discharge back to the streams along gaining reaches. The apparent long-term increase in storage is mostly an artifact of selecting initial water levels in upland areas (where no data are available) that were too low, and partly the result of average annual rainfall during 1975-2017 that was slightly higher than the longer-term average.

In the Hollister MA, rainfall and stream recharge are also large during wet years, but other inflows—including irrigation deep percolation, bedrock inflows and inflows from other management areas—is relatively steady. Outflows are dominated by agricultural groundwater pumping, followed by relatively steady outflows to other management areas. The cumulative increase in storage during 1975-2017 was real. Importation of CVP water beginning in the early 1990s resulted in rapid recovery from prior decades of groundwater overdraft. The pattern of inflows and outflows was generally similar in the San Juan MA, which also received CVP water.

In the Bolsa MA, relatively steady subsurface inflows of groundwater from other MAs and the Llagas Subbasin comprise a substantial part of total inflows. Recharge from rainfall and streams are significant but vary greatly from year to year. Agricultural pumping is by far the largest outflow, followed by groundwater discharge to the Pajaro River when groundwater levels are relatively high. There was little long-term change in storage in the Bolsa MA.

## 13. SIMULATION OF FUTURE CONDITIONS

The historical period used for model calibration consisted of only 43 years (water years 1975-2017). Longer periods were needed to simulate future conditions. To comply with the Sustainable Groundwater Management Act, future simulations needed to include at least 50 years, and design work for possible expansion of Pacheco Reservoir was based on the 1922-2003 period simulated by DWR's CalSim2 model. These needs were met by simulating water years 1922-2007 as two back-to-back 43-year simulations (1922-1964 followed by 1965-2007). This period takes advantage of DWR's CalSim2 simulations of CVP availability, which cover the period 1922-2003. It also includes the two largest droughts in the historical record: 1923-1935 and 1987-1992.

The future baseline simulation serves as a reference condition against which to compare alternative management scenarios. Data and assumptions used in the future baseline simulation are described in Section 5 of the GSP ("Water Budget"). Inputs and results of the "climate change" and "future growth" scenarios are described in Section 8 ("Management Actions"). Other scenarios related to specific management actions recommended in the GSP are also described in Section 8.

## 14. MODEL LIMITATIONS

The groundwater flow model is an appropriate tool for evaluating groundwater conditions at the basin and subarea scale over periods of months to decades. Given its reasonable calibration under a wide range of historical hydrologic and water management conditions, it should produce reliable results under a similar range of future conditions. However, some aspects of the model and some types of applications may be less reliable. Limitations in model accuracy and in types of applications include the following:

- As with any regional model, the model cannot simulate details of water levels and flow at spatial scales smaller than one model cell. It cannot, for example, simulate drawdown within a pumping well. It can only simulate the average effect of that pumping on the average water level of the cell in which the well is located.
- The monthly stress periods of the model preclude simulation of brief hydrologic stresses. For example, the model cannot simulate the effects of daily pumping cycles on water levels, or the amount of recharge associated with peak stream flow events.
- The vertical dimension of the model is relatively crudely implemented, and its accuracy is unknown due to lack of depth-specific water-level data. With a few local exceptions, model layers do not correspond to known geologic horizons. The distribution of pumping among layers is by fixed percentages that bear some relation to layer thickness but not transmissivity. Given the lack of depth-specific water-level data within the main production interval (roughly 150-600 feet below ground surface) it was not possible to calibrate vertical hydraulic conductivity in most areas. An exception was the constraint on vertical hydraulic conductivity imposed by the occurrence of flowing wells in two areas.
- Surface and subsurface inflows from tributary watersheds around the perimeter of the basin remain uncertain. The new rainfall-runoff-recharge model simulates watershed hydrology explicitly but flows from the watersheds to the groundwater basin are small compared to rainfall and ET. Accurate data for those variables within the watershed areas are not available, and a small error in rainfall or ET can result in a large error in simulated watershed outflow.

- Model calibration is better in some parts of the basin than others. For any future model application that focuses on a particular subarea, it would be prudent to evaluate the quality of model calibration for that area before conducting simulations of alternative conditions.

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## Table G-1. 2014 Land Use by Management Area (acres)

| | 1 | 2 | 3 | 4 | 5 | |
|---|---|---|---|---|---|---|
| **Land Use** | **Bolsa** | **Hollister** | **San Juan** | **Southern** | **Watersheds** | **Total** |
| Subtropical | 0 | 42 | 17 | 0 | 0 | 59 |
| Deciduous orchard | 452 | 4,976 | 797 | 240 | 125 | 6,590 |
| Field crops, irrigated | 953 | 2,316 | 581 | 330 | 60 | 4,240 |
| Grain, nonirrigated | 2,510 | 4,612 | 342 | 847 | 3,552 | 11,863 |
| Idle | 218 | 437 | 628 | 831 | 403 | 2,517 |
| NV-riparian | 161 | 318 | 460 | 478 | 112 | 1,530 |
| Not surveyed | 0 | 0 | 0 | 0 | 0 | 0 |
| NV-grass | 7,977 | 22,950 | 14,732 | 48,877 | 218,682 | 313,218 |
| NV-brush | 0 | 411 | 0 | 226 | 64,445 | 65,083 |
| NV-brush/trees | 6 | 63 | 0 | 0 | 56,665 | 56,734 |
| Water | 195 | 22 | 264 | 175 | 155 | 811 |
| Pasture, nonirrigated | 5,708 | 564 | 60 | 123 | 420 | 6,874 |
| Rural residential | 56 | 1,740 | 82 | 53 | 110 | 2,041 |
| Semiagricultural | 379 | 536 | 56 | 92 | 312 | 1,375 |
| Small vegetables | 951 | 7,378 | 5,756 | 820 | 4,665 | 19,570 |
| Small vegetables, Bolsa | 3,370 | 764 | 0 | 0 | 0 | 4,134 |
| Urban commercial | 0 | 712 | 62 | 13 | 73 | 861 |
| Urban industrial | 14 | 297 | 424 | 36 | 105 | 876 |
| Urban turf | 0 | 522 | 343 | 91 | 1 | 958 |
| Urban residential | 5 | 3,370 | 251 | 6 | 90 | 3,722 |
| Urban vacant | 0 | 367 | 0 | 0 | 40 | 408 |
| Vineyard | 0 | 163 | 0 | 1,743 | 1,252 | 3,158 |
| **Total** | 22,955 | 52,560 | 24,857 | 54,979 | 351,268 | 506,620 |

**Table G-2. Monthly Crop Coefficients for Vegetation Types Simulated by the Recharge Program**

| Agricultural | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subtropical[1] | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.63 | 0.91 | 0.82 | 0.49 | 0.46 | 0.50 | 0.50 |
| Deciduous orchard[2] | 0.20 | 0.20 | 0.25 | 0.35 | 0.50 | 1.10 | 1.10 | 1.10 | 1.10 | 0.65 | 0.20 | 0.20 |
| Field crops, irrigated[3] | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 | 0.63 | 0.91 | 0.82 | 0.49 | 0.46 | 0.50 | 0.50 |
| Grain, nonirrigated[4] | 0.90 | 1.05 | 1.05 | 0.90 | 0.50 | 0.20 | 0.20 | 0.20 | 0.20 | 0.24 | 0.33 | 0.65 |
| Idle (bare soil)[5] | 0.90 | 0.80 | 0.50 | 0.30 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.30 | 0.50 | 0.90 |
| Pasture, nonirrigated[6] | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Small vegetables[7] | 0.50 | 0.50 | 0.50 | 0.60 | 0.80 | 0.95 | 0.95 | 0.95 | 0.85 | 0.60 | 0.50 | 0.50 |
| Small vegetables - Bolsa | 0.50 | 0.50 | 0.50 | 0.50 | 0.40 | 0.65 | 0.90 | 0.95 | 0.85 | 0.60 | 0.50 | 0.50 |
| Vineyard[8] | 0.81 | 1.05 | 1.05 | 0.90 | 0.50 | 0.35 | 0.45 | 0.50 | 0.50 | 0.20 | 0.33 | 0.57 |
| **Natural** | | | | | | | | | | | | |
| Riparian phreatophytes[9] | 0.75 | 0.75 | 0.75 | 0.75 | 0.85 | 1.00 | 1.10 | 1.10 | 1.10 | 0.95 | 0.85 | 0.75 |
| Grass[10] | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Brush[11] | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Trees[11] | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Water[12] | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 | 1.13 |
| **Urban[13]** | | | | | | | | | | | | |
| Rural residential | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Semiagricultural | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Commercial | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Industrial | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Lawn, golf course, sod farm | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Residential | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |
| Vacant or paved | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 | 0.80 |

Sources and Assumptions

Note: FAO 56 = U.N. Food and Agriculture Organization Publication 56 (2006). BIS = Basic Irrigation Scheduling computer program by Snyder and others (2007). Bulletin 113-3 = DWR (1975). ITRC = Irrigation Training and Research Center (2003).

Kc = crop coefficient.

1 FAO 56, Table 12 (single Kc by growth stage). The low-Kc season is assumed to be winter in CA.

2 Kc for walnuts from FAO 56 Table 12 for May-Oct; bare soil (0.2) for other months plus some cover crop ET Mar-Apr.

3 ITRC values shifted to summer season. Assume bare soil = $K_{ini}$ from FAO 56 (typically 0.20).

4 BIS Kc for winter grains. Assume other months are bare soil at Kc=0.20

5 Assume similar to reference ET conditions in winter. Automatically depletes soil moisture in summer until soil is dry (nonirrigated), so summer Kc not important.

6 Most areas mapped as pasture are not irrigated. ET in winter is close to ETo. Soil moisture depletion in summer reduces Kc.

7 Assume these are cool season crops (e.g. lettuce, broccoli, celery) grown March-November (April-November in Bolsa) with staggered plantings. Full-canopy Kc is 0.90-1.0. Time-weighted average Kc over the entire crop growing period was calculated for 10 cool-season truck crops from FAO 56 growth-stage Kc values (Kc as % of growing season). Average was 0.78. Decreased slightly here to reflect brief idle periods between crops (bare soil at Kc=0.20).

8 Assume 3-ft-wide canopy and 10-foot row spacings, using equations from Williams (2001). With winter cover crop of grasses simulated as nonirrigated grain.

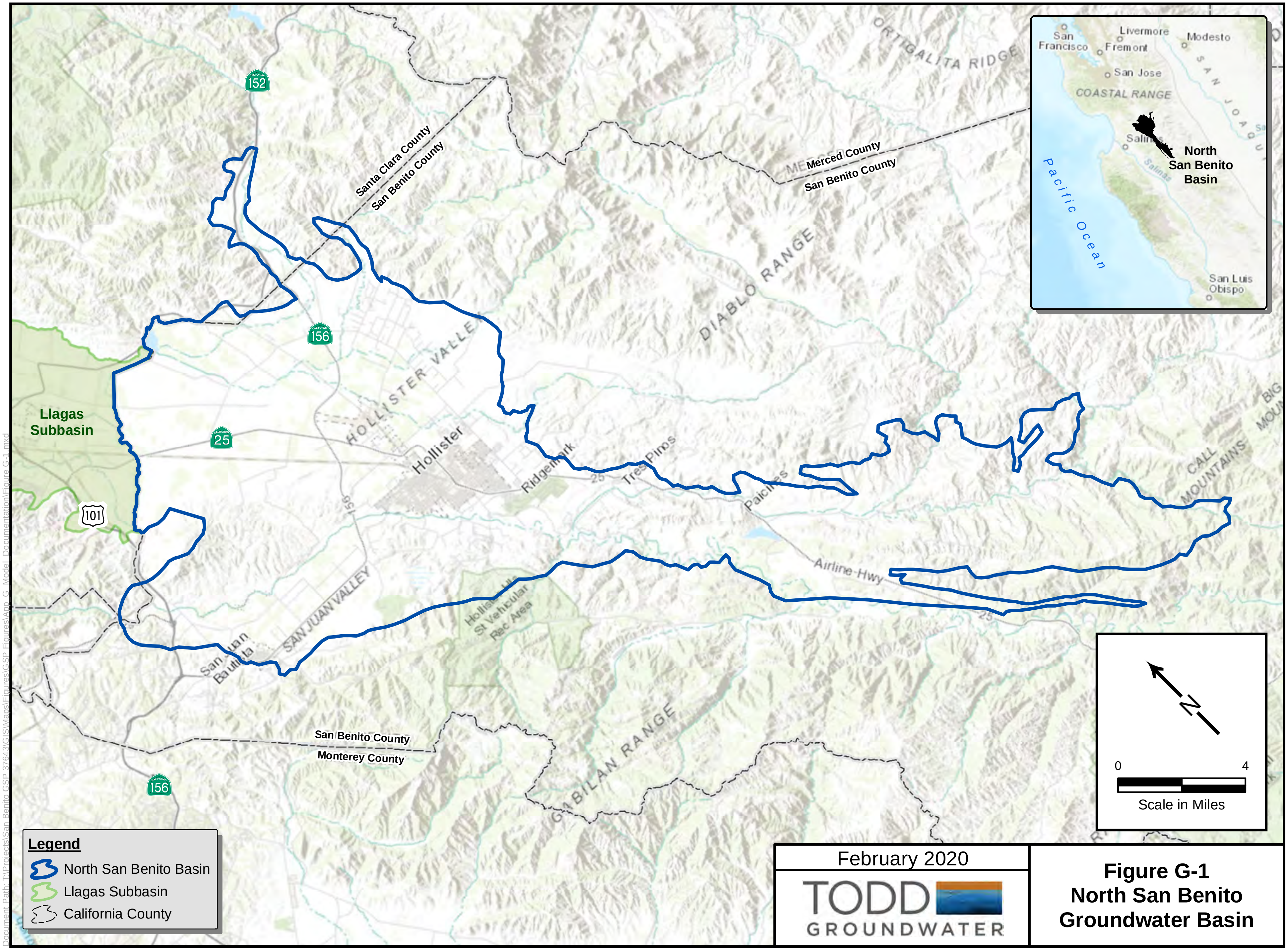
9 Assume mostly trees (cottonwood, sycamore, willow), deciduous with shrub willow understory (willow Kc in winter). Monthly Kc values reflect total canopy leaf area and unrestricted root access to water.

10 Similar to reference ET conditions in winter. Annual grasses deplete soil moisture in summer until soil is dry, so summer Kc not important.

11 Kc less that 1.0 because of drought-tolerant adaptation to carry some soil moisture over to following year (Blaney and others, 1964). Soil moisture depletion in summer is not as extreme as for annual grasses.

12 Farm ponds (e.g. for vineyard frost protection). Evaporation estimated as average ratio of pan evaporation to ETo (1.26) multiplied by a pan-to-lake coefficient of 0.9 (for a pond or small lake).

13 Irrigation in all urban land use categories assumed to be for turf. Turf Kc from BIS.




February 2020

**Figure G-1**
**North San Benito Groundwater Basin**

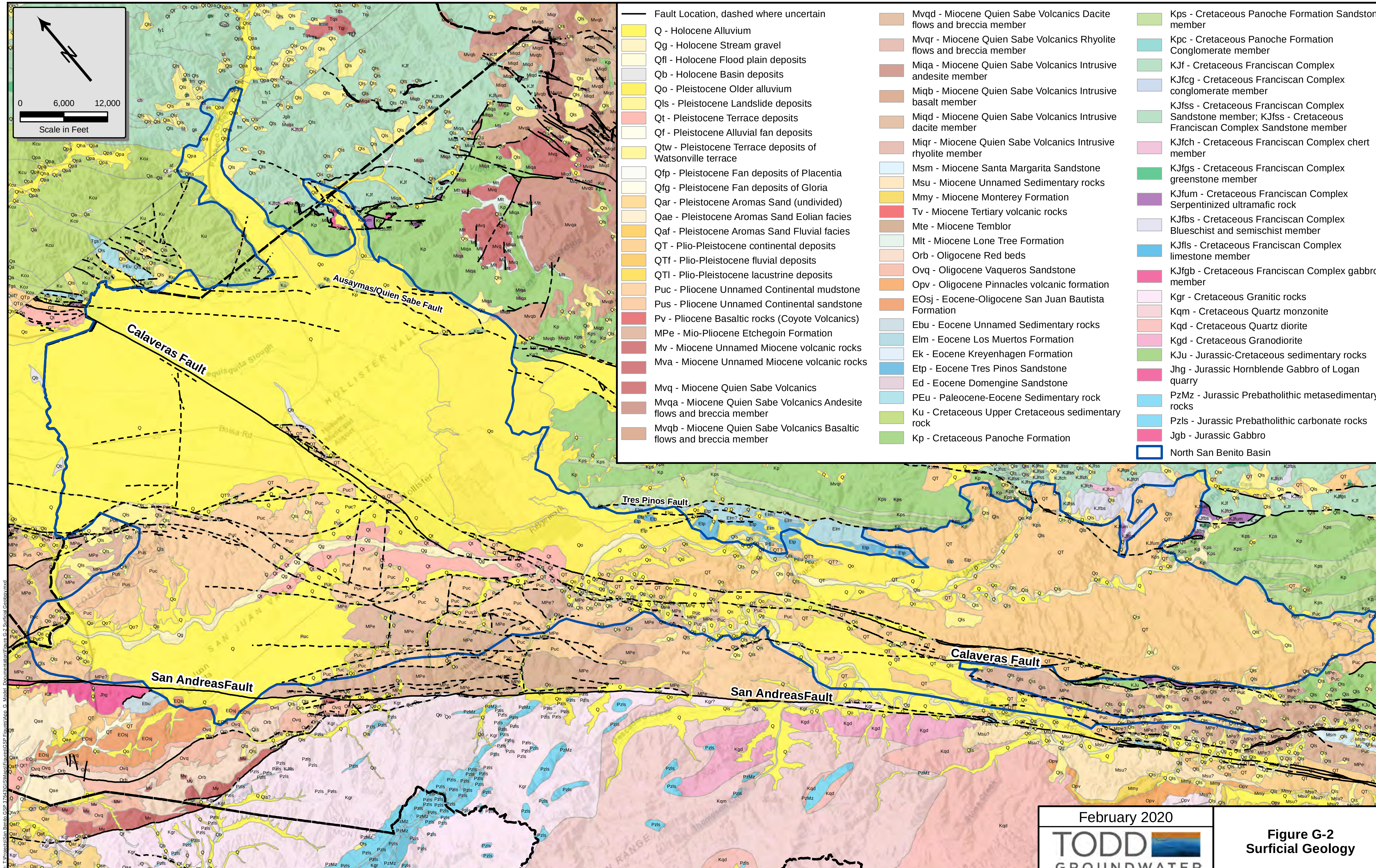



**Figure G-2**
**Surficial Geology**

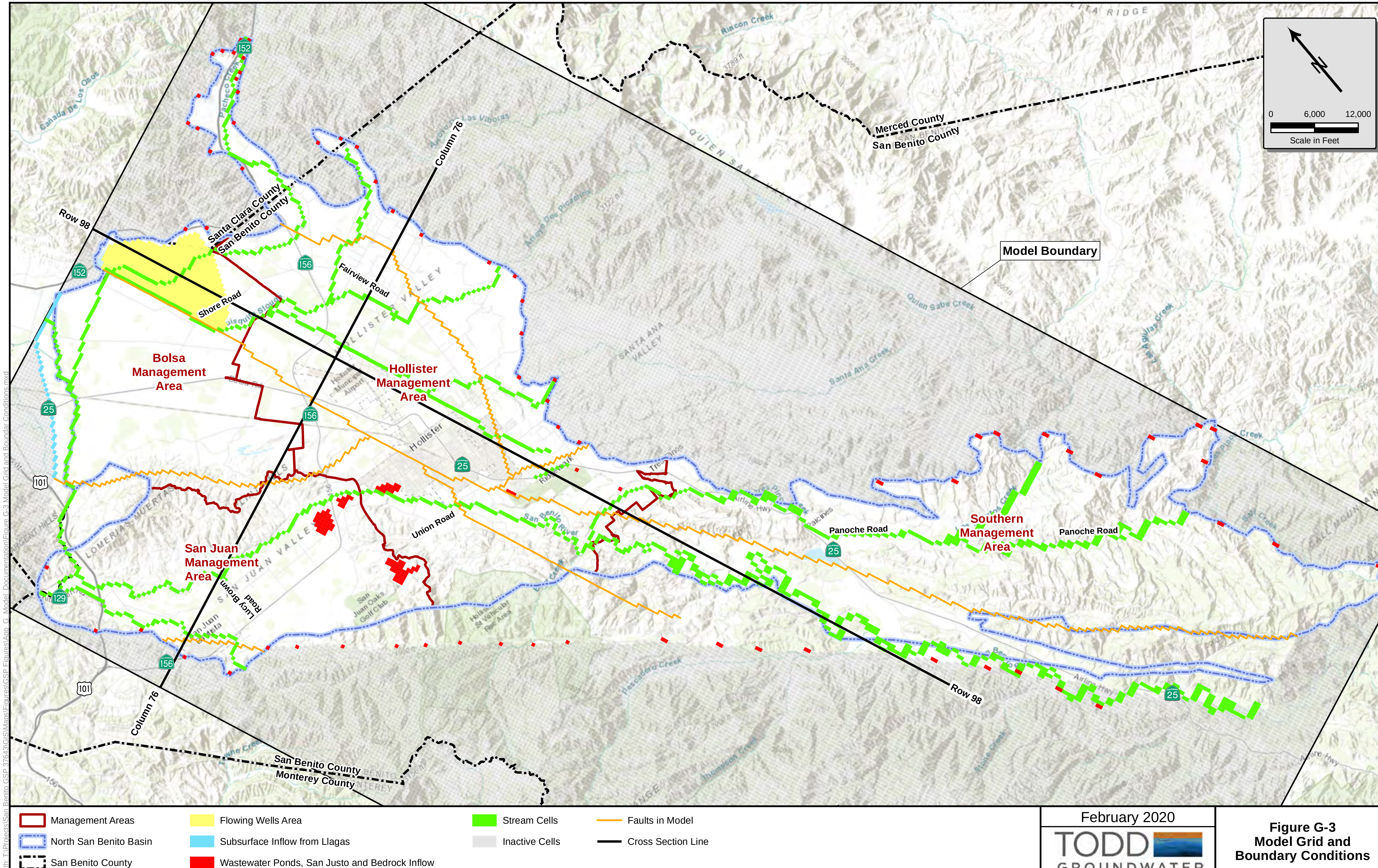
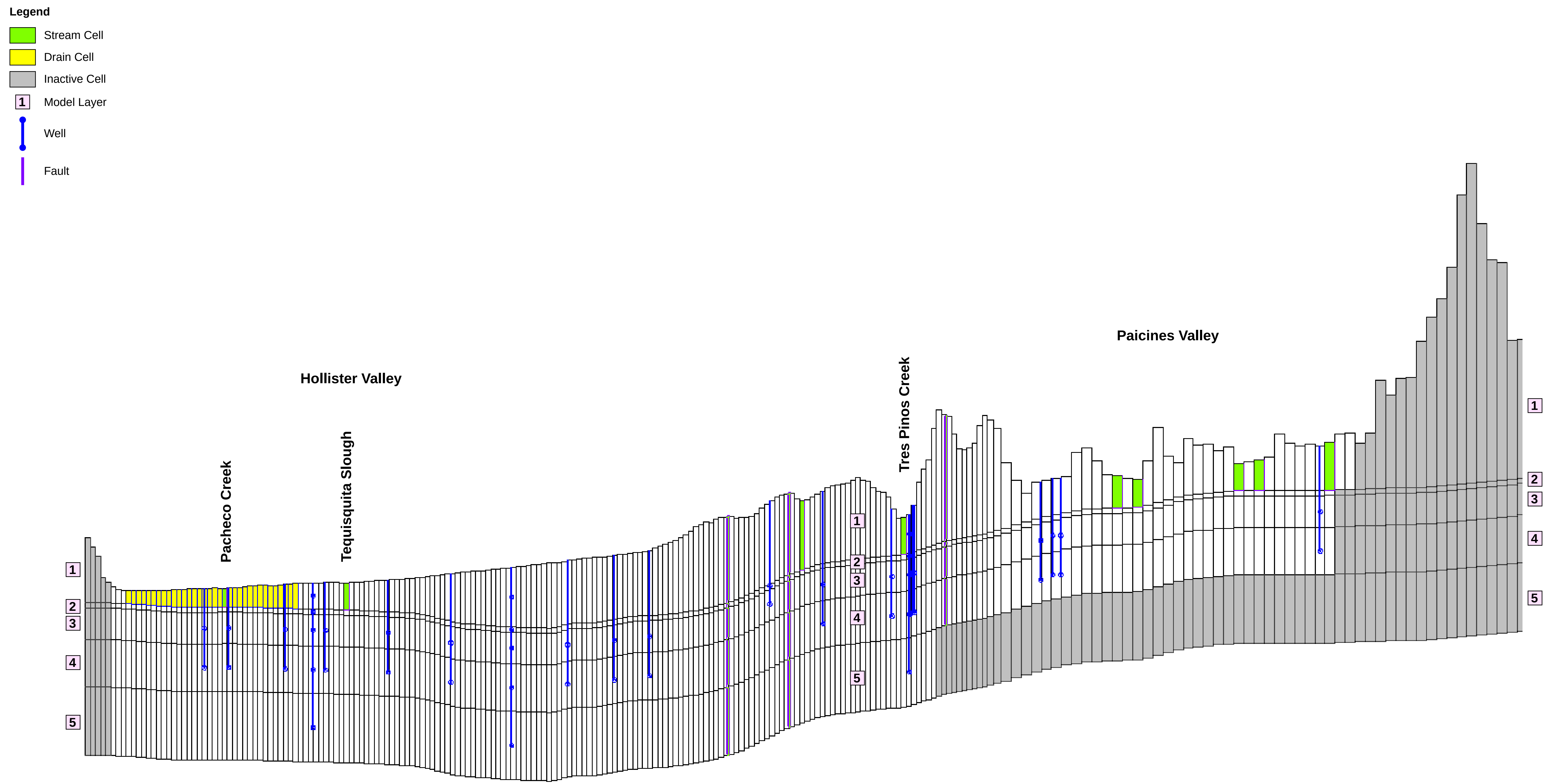



Figure G-3
Model Grid and Boundary Conditions

Path: T:\Projects\San Benito GSP 37643\GIS\Maps\Figures\GSP Figures\App_G_Model_Documentation\Figure G-3 Model Grid and Boundary Conditions.mxd




February 2020

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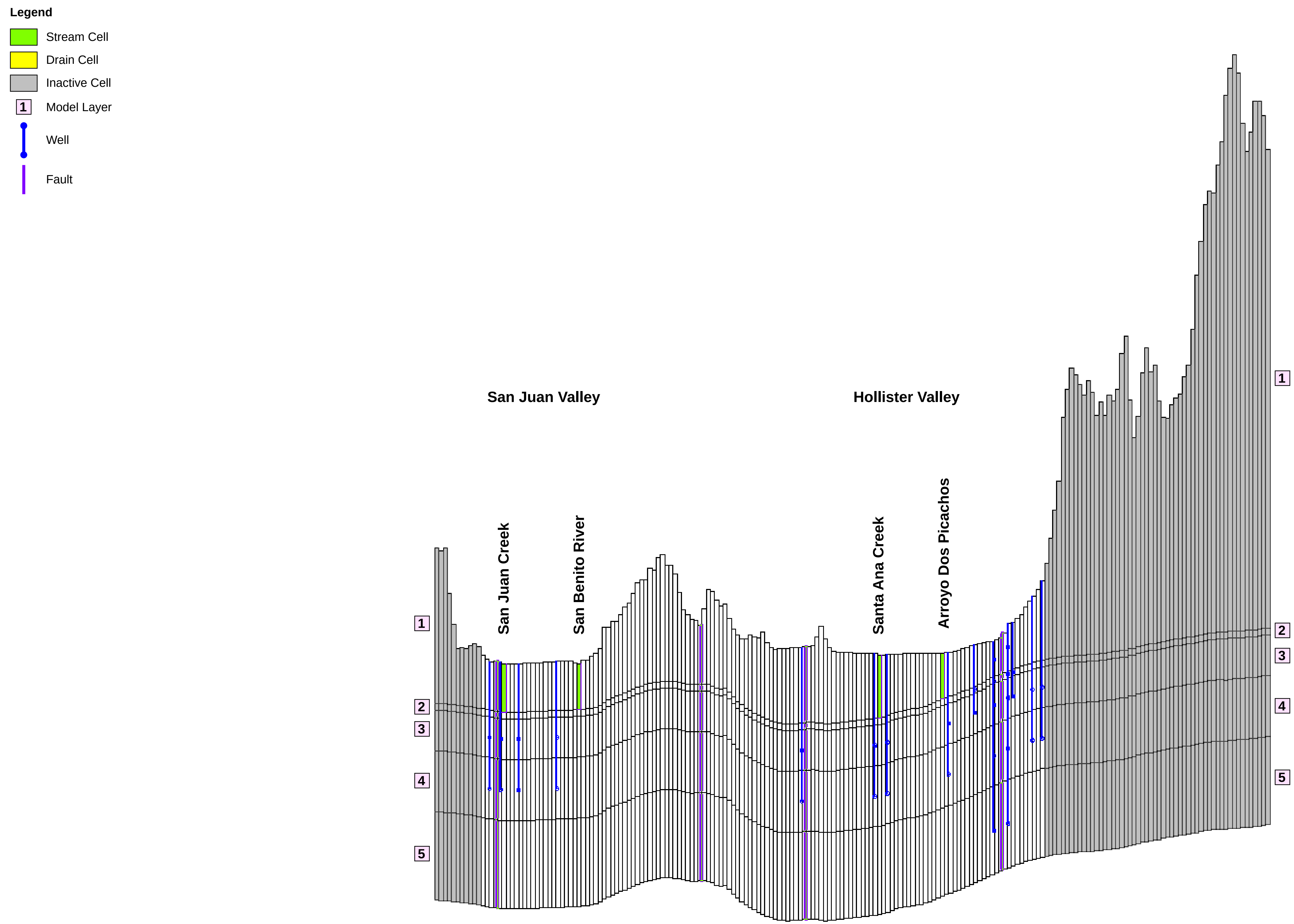
**Figure G-4**
**Cross Section of Model Grid Along Row 98**




February 2020

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**Figure G-5**
**Cross Section of Model Grid Along Column 76**

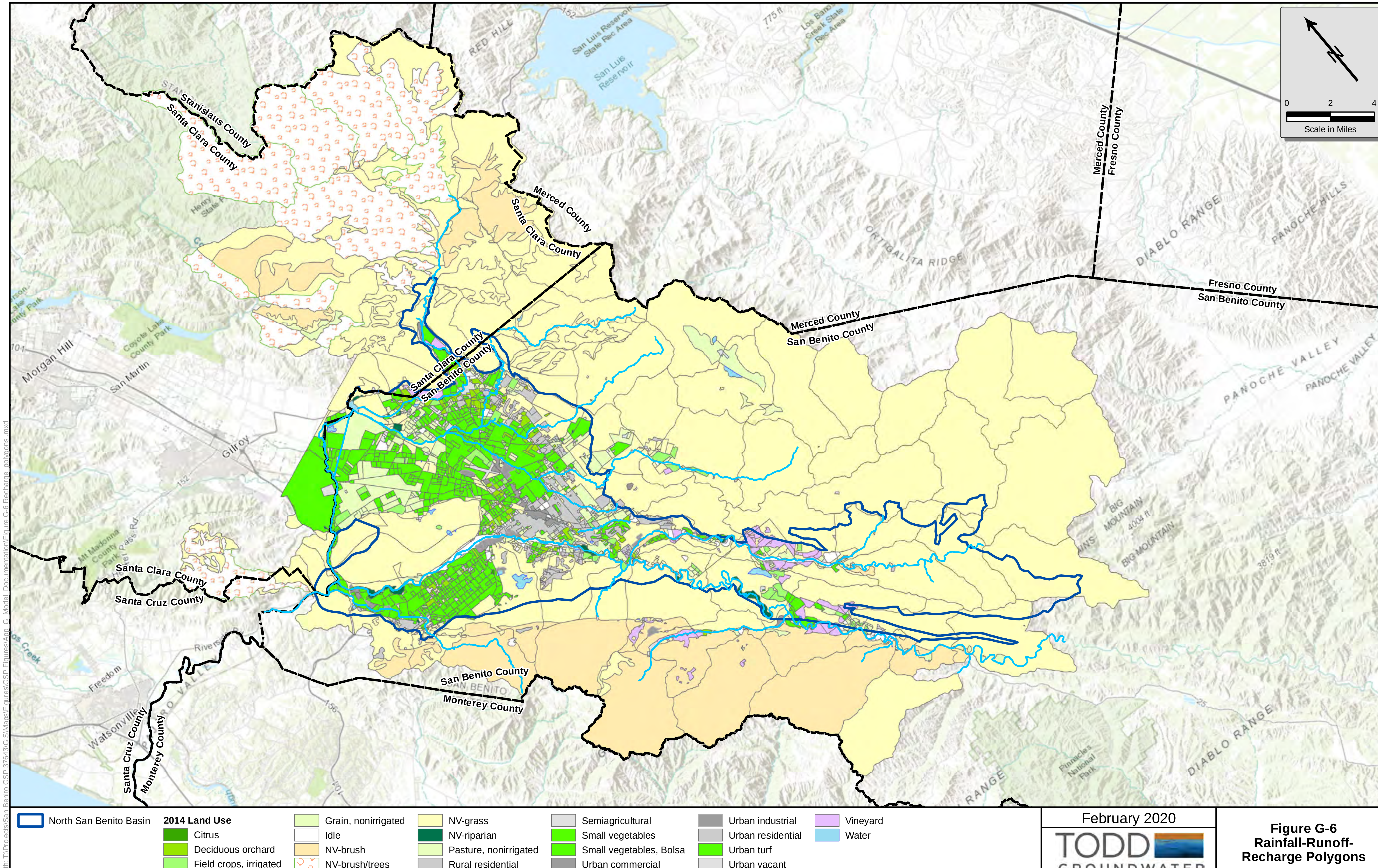


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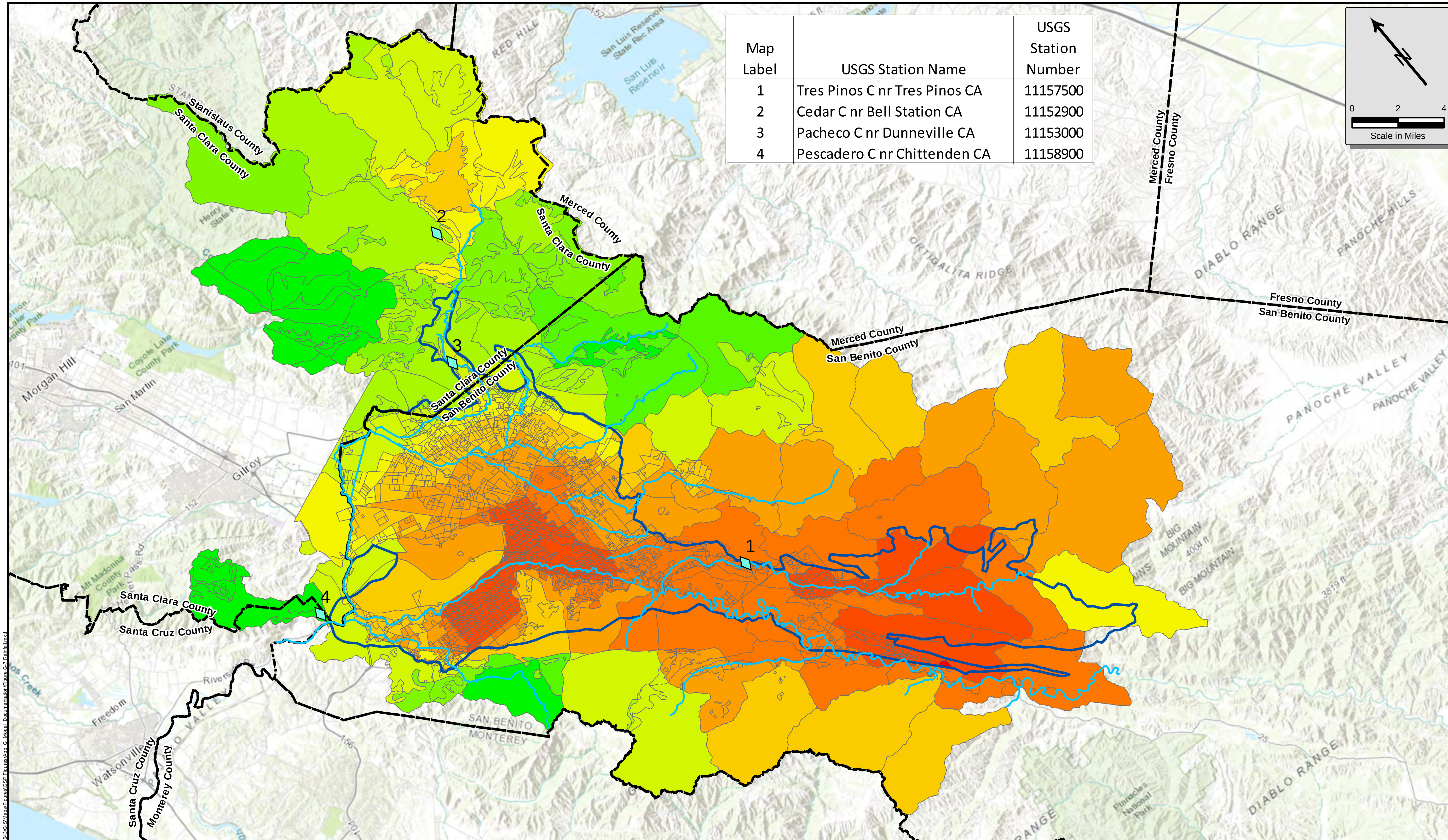
**Figure G-6**
**Rainfall-Runoff-Recharge Polygons**




| Map Label | USGS Station Name | USGS Station Number |
|---|---|---|
| 1 | Tres Pinos C nr Tres Pinos CA | 11157500 |
| 2 | Cedar C nr Bell Station CA | 11152900 |
| 3 | Pacheco C nr Dunneville CA | 11153000 |
| 4 | Pescadero C nr Chittenden CA | 11158900 |

Stream Gauge

North San Benito Basin

**Average Annual Precipitation (inches)**

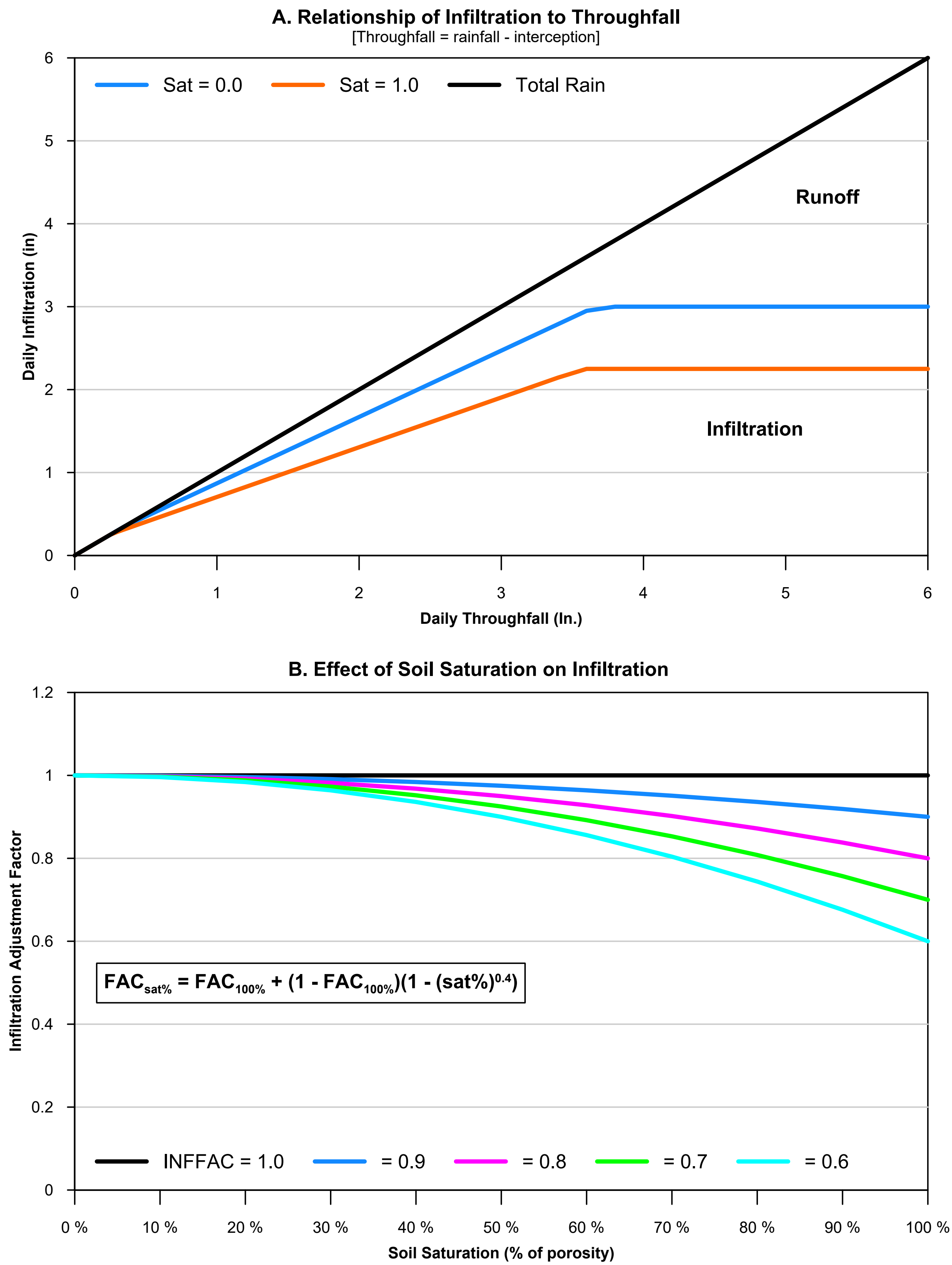
14
14 - 15
15 - 16
16 - 17
17 - 18
18 - 19
19 - 20
20 - 21
21 - 22
22 - 23
23 - 26

Source: PRISM_ppt_30yr_normal_4kmM2_annual_bil

February 2020

TODD GROUNDWATER

**Figure G-7**
**Average Annual Precipitation**




Data:
T:\Projects\San Benito GSP 37643\Model\RCH\Antecedent_moisture_adjustment.xls Sheet1

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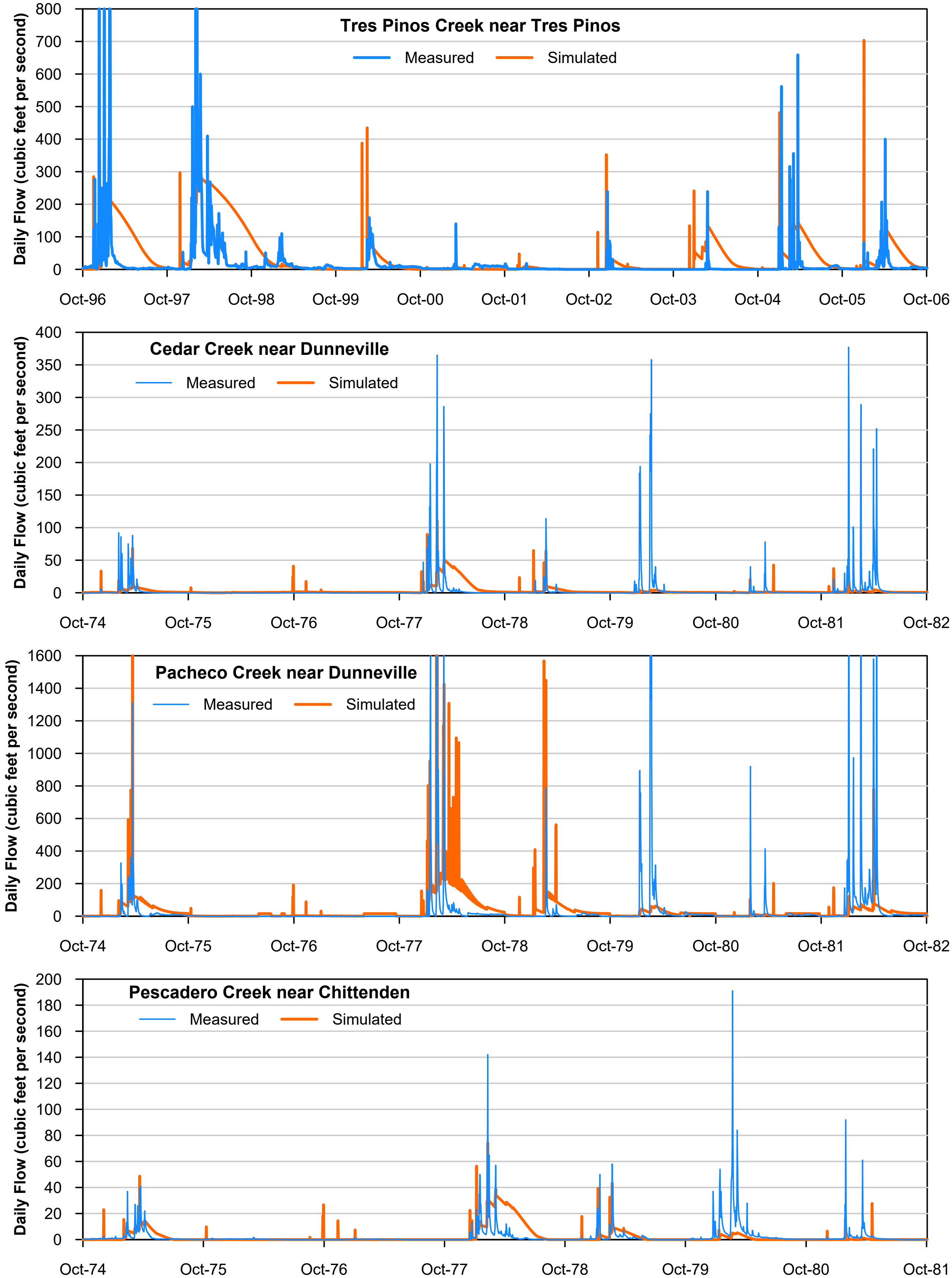
TODD GROUNDWATER

**Figure G-8**
**Relationship of Infiltration to Throughfall and Soil Saturation**

Path: T:\Projects\San Benito GSP 37643\GRAPHICS\SanBenitoGSP\Figure G-8 Relationship of Infiltration to Throughfall and Soil Saturation.gpj



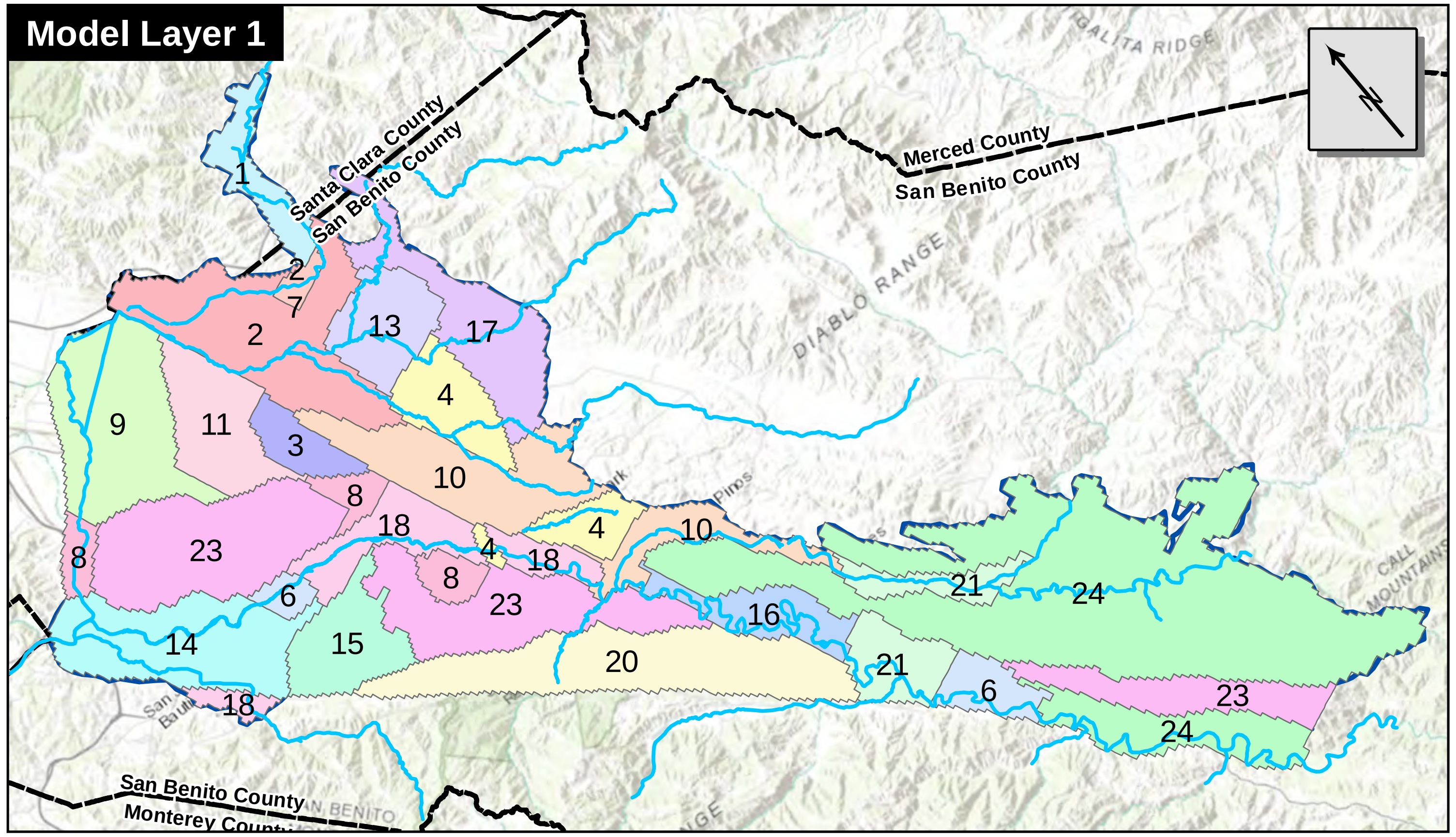

Data:
T:\Projects\San Benito GSP 37643\Model\RCH\RechargeSimStreamQ.xlsx
Sheet: RechargeSimstreamQ
Columns: BL-BV

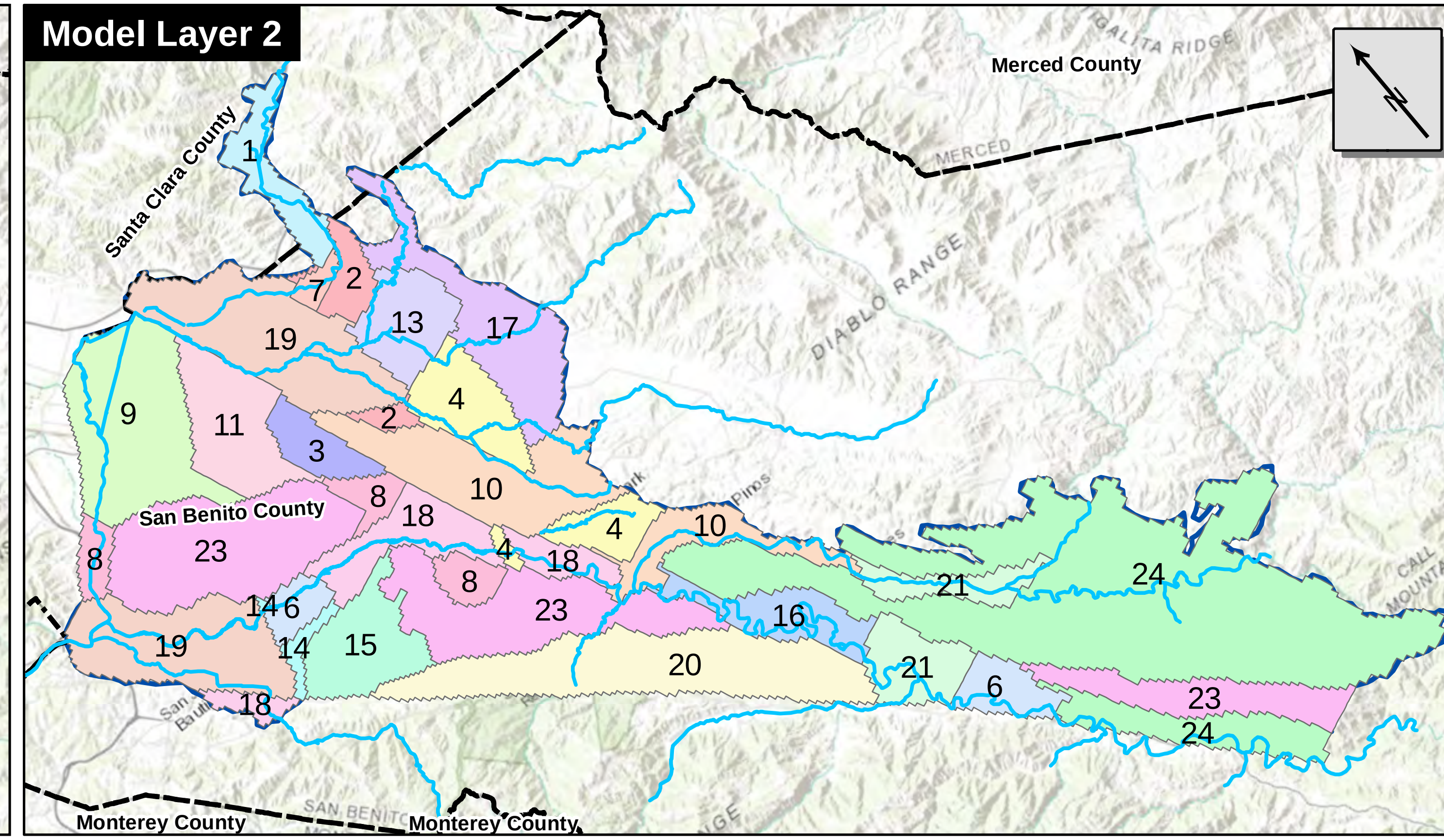
February 2020

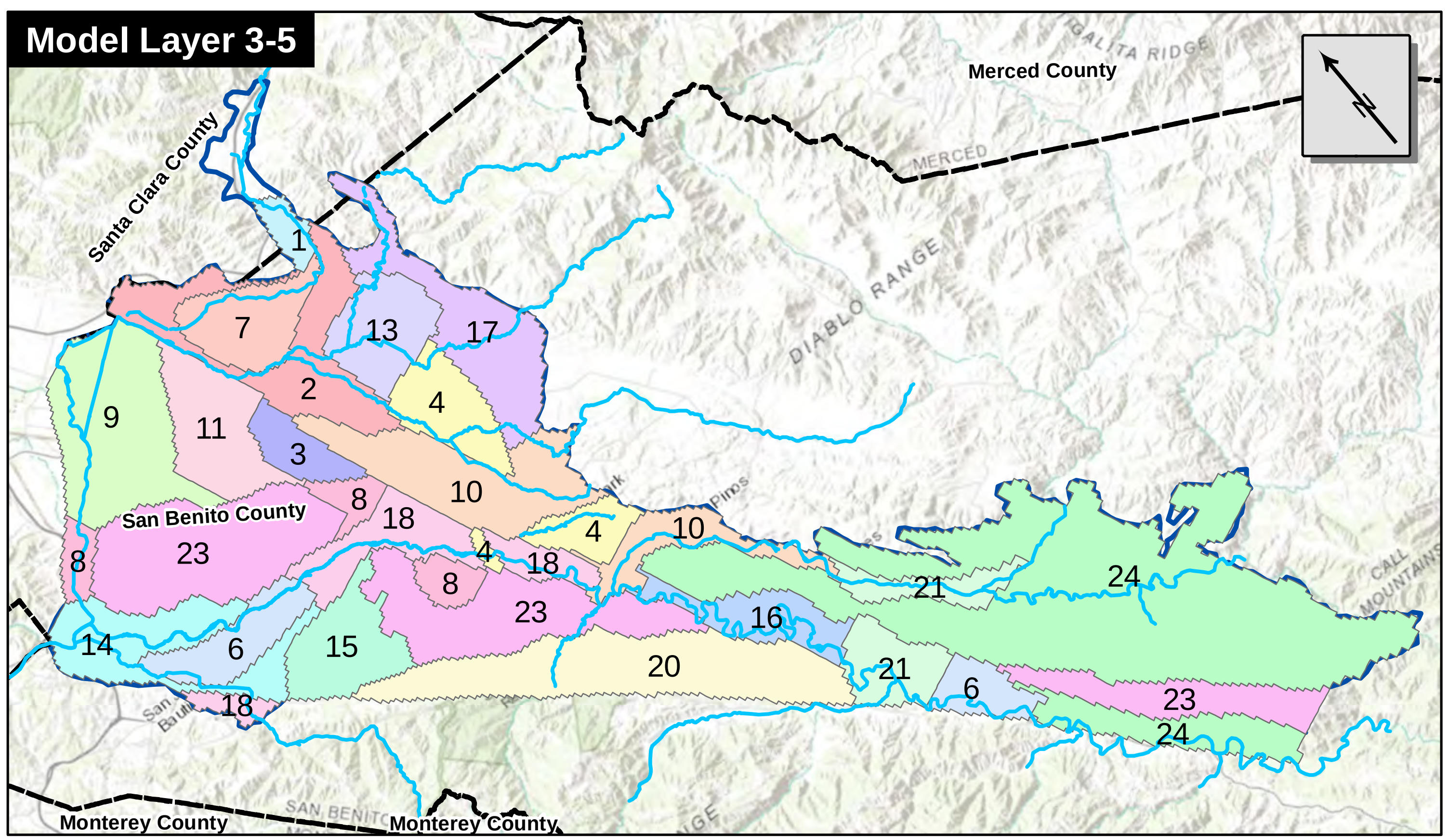
TODD GROUNDWATER

**Figure G-9**
**Measured and Simulated Daily Stream Flows**

Path: T:\Projects\San Benito GSP 37643\GRAPHICS\SanBenitoGSP\Figure G-9 Measured and Simulated Stream Flows.gpj




| Map No. | Kh | Kv | $S_0$ | Sy | Map No. | Kh | Kv | $S_0$ | Sy |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 140 | 2 | 7.00E-05 | 0.07 | 13 | 11 | 0.5 | 5.00E-05 | 0.1 |
| 2 | 4 | 0.05 | 2.00E-05 | 0.1 | 14 | 4 | 0.02 | 7.00E-05 | 0.15 |
| 3 | 60 | 0.5 | 5.00E-06 | 0.02 | 15 | 1.5 | 0.3 | 7.00E-05 | 0.15 |
| 4 | 4 | 0.5 | 7.00E-05 | 0.07 | 16 | 4 | 0.5 | 7.00E-05 | 0.1 |
| 5 | 60 | 0.05 | 7.00E-05 | 0.15 | 17 | 4 | 0.5 | 5.00E-05 | 0.1 |
| 6 | 120 | 5 | 7.00E-05 | 0.15 | 18 | 70 | 0.1 | 1.00E-04 | 0.18 |
| 7 | 100 | 0.5 | 1.00E-05 | 0.01 | 19 | 1 | 0.005 | 5.00E-05 | 0.1 |
| 8 | 3 | 0.1 | 2.00E-04 | 0.1 | 20 | 1 | 0.01 | 5.00E-05 | 0.1 |
| 9 | 20 | 1 | 5.00E-06 | 0.02 | 21 | 80 | 0.05 | 5.00E-05 | 0.12 |
| 10 | 6 | 0.5 | 7.00E-05 | 0.1 | 22 | 4 | 0.2 | 5.00E-05 | 0.15 |
| 11 | 6 | 0.1 | 5.00E-06 | 0.02 | 23 | 0.2 | 0.02 | 1.50E-05 | 0.05 |
| 12 | 100 | 1 | 2.00E-05 | 0.1 | 24 | 0.8 | 0.08 | 5.00E-05 | 0.1 |

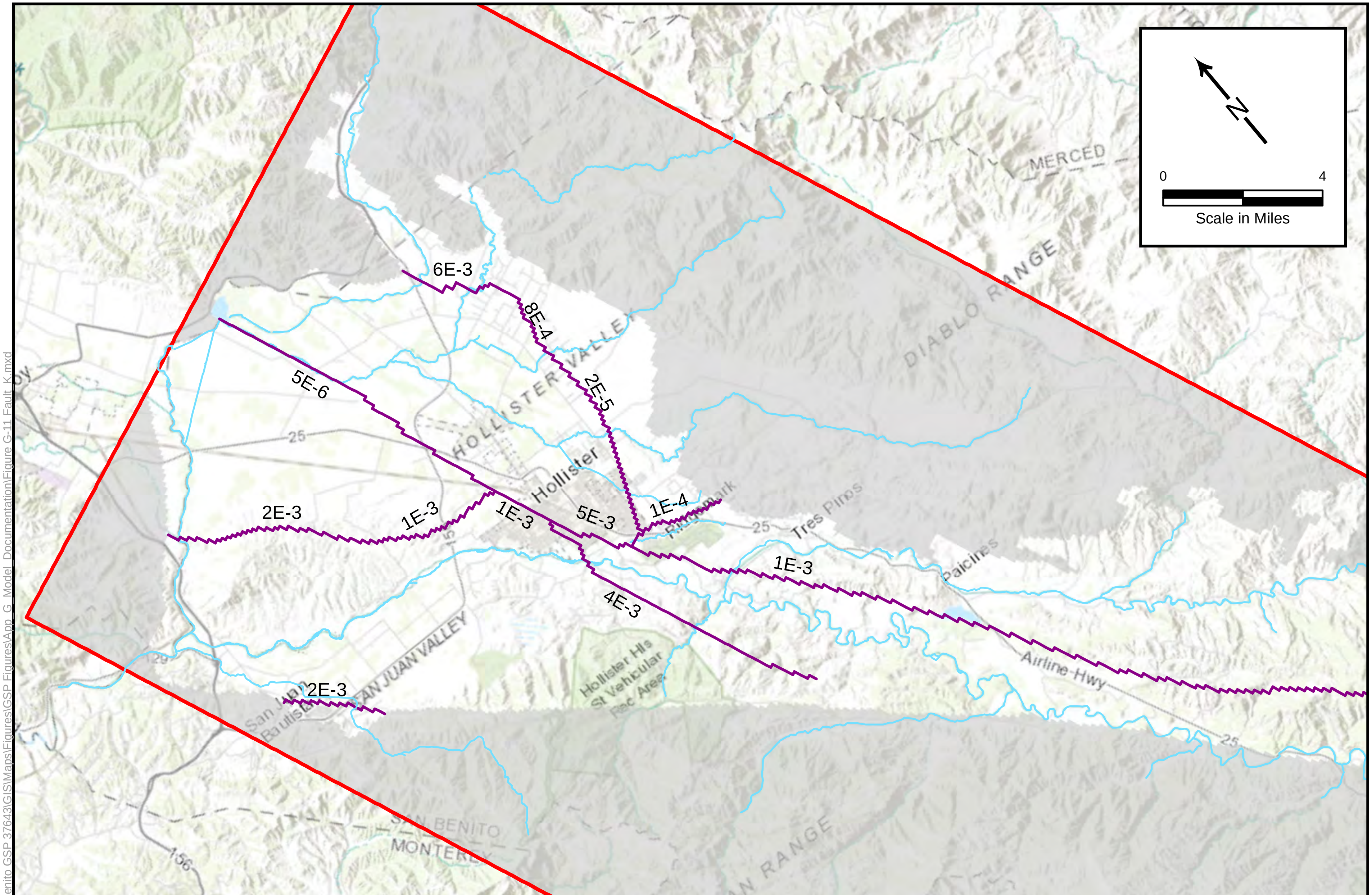
Kh = horizontal hydraulic conductivity (feet per day)
Kv = vertical hydraulic conductivity (feet per day)
So = Specific storativity (per foot)
Sy = Specific yield (dimensionless)

0 2 4
Scale in Miles

February 2020

TODD GROUNDWATER

**Figure G-10**
**Calibrated Aquifer Characteristics**




2E-3 Fault cells with hydraulic conductivity in feet per day assuming fault plane is 1 foot thick

Model grid outline

Inactive cells

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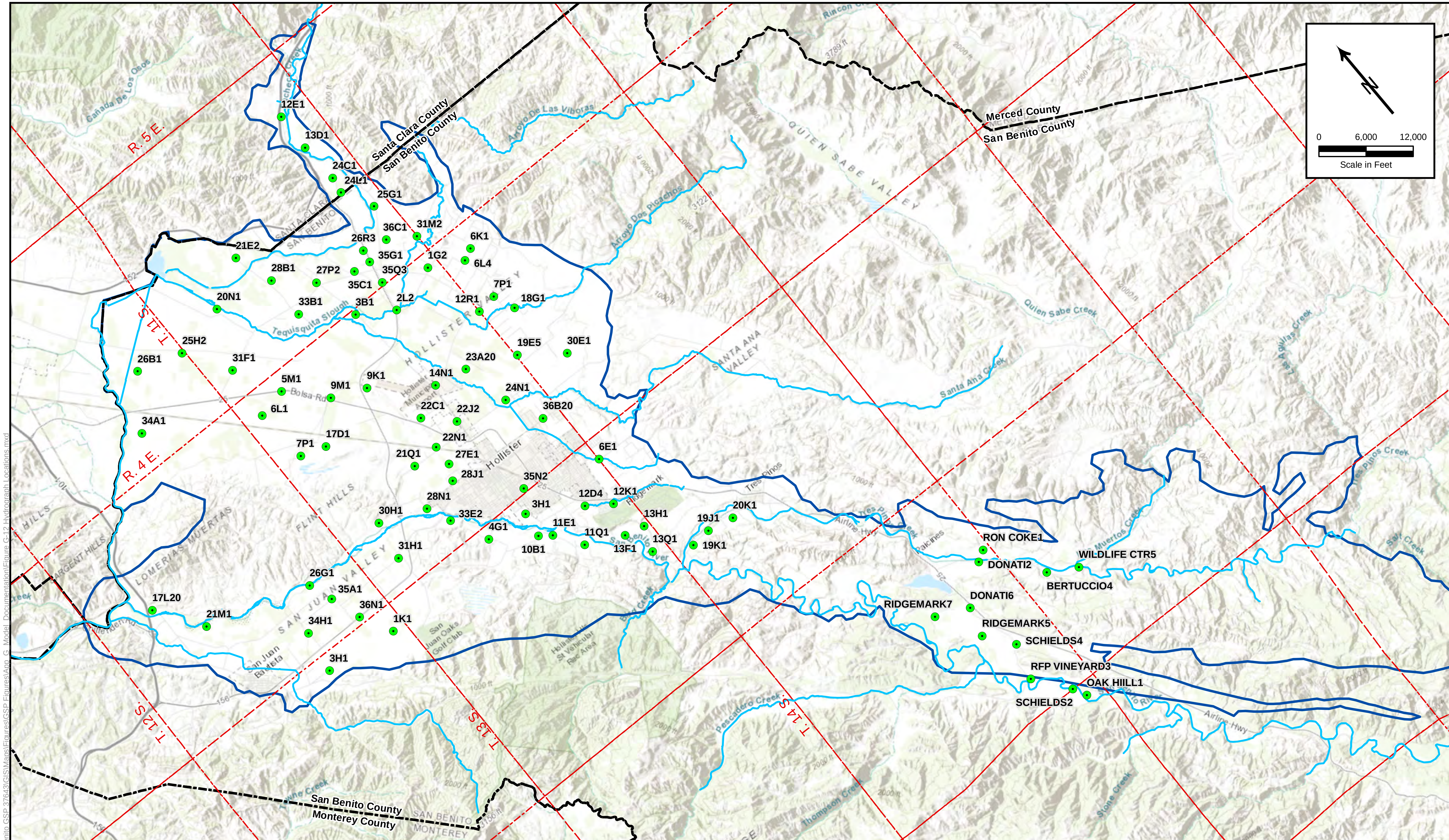
TODD GROUNDWATER

**Figure G-11**
**Fault Plane Permeabilities**

Path: T:\Projects\San Benito GSP 37643\GIS\Maps\Figures\GSP Figures\App_G_Model_Documentation\Figure G-11 Fault_K.mxd



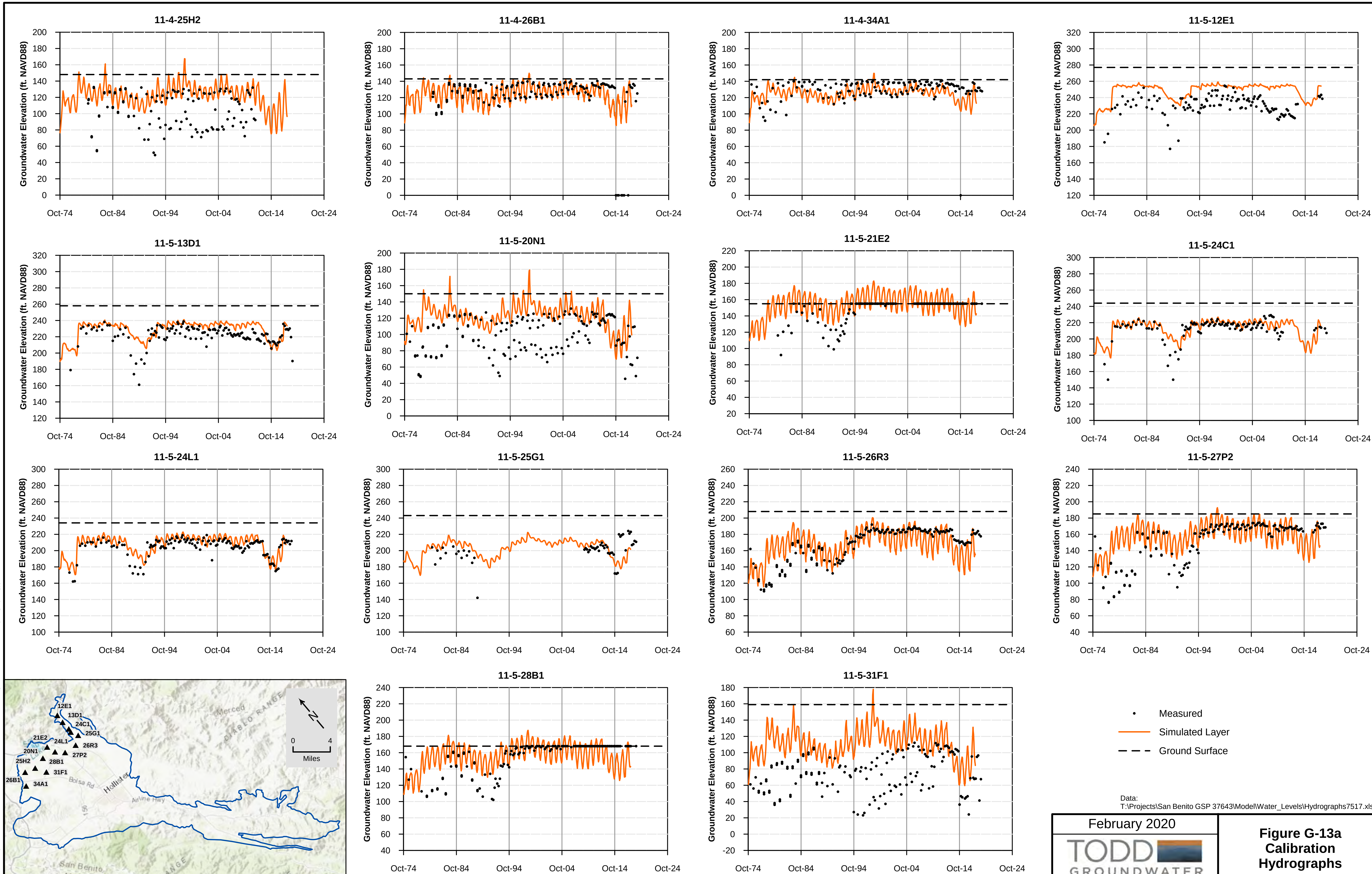

Hydrograph Well
Township
North San Benito Basin

February 2020

TODD GROUNDWATER

**Figure G-12**
**Locations of Hydrograph Wells**

Path: T:\Projects\San Benito GSP 37643\GIS\Maps\Figures\GSP Figures\App_G_Model_Documentation\Figure G-12 Hydrograph Locations.mxd



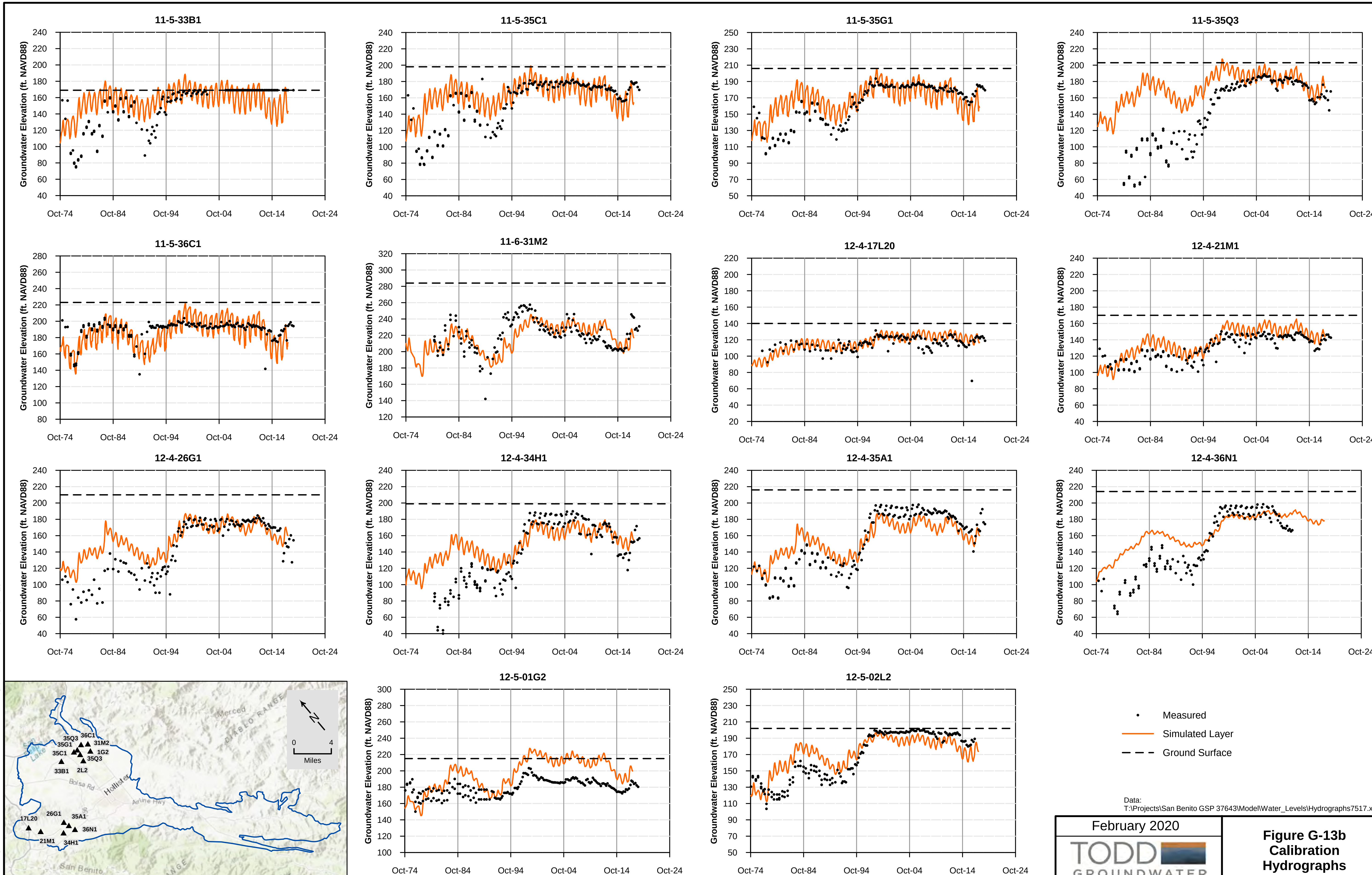

Data:
T:\Projects\San Benito GSP 37643\Model\Water_Levels\Hydrographs7517.xlsm

Path: T:\Projects\San Benito GSP 37643\GRAPHICS\SanBenitoGSP\Figure G-13a Calibration Hydrographs.gpj

February 2020

TODD GROUNDWATER

**Figure G-13a**
**Calibration Hydrographs**



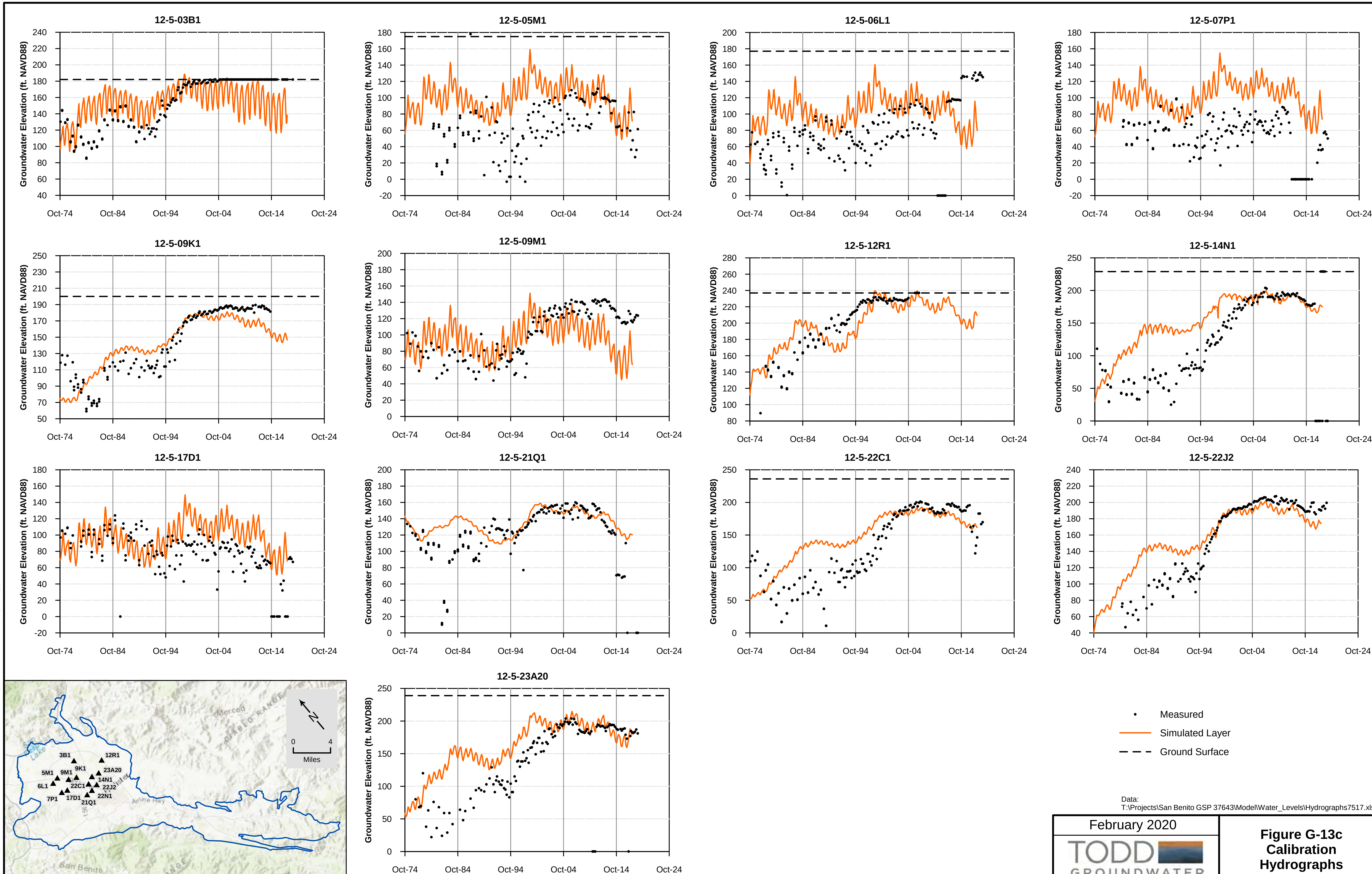

Data:
T:\Projects\San Benito GSP 37643\Model\Water_Levels\Hydrographs7517.xlsm

February 2020

TODD GROUNDWATER

**Figure G-13b**
**Calibration Hydrographs**

Path: T:\Projects\San Benito GSP 37643\GRAPHICS\SanBenitoGSP\Figure G-13b Calibration Hydrographs.gpj

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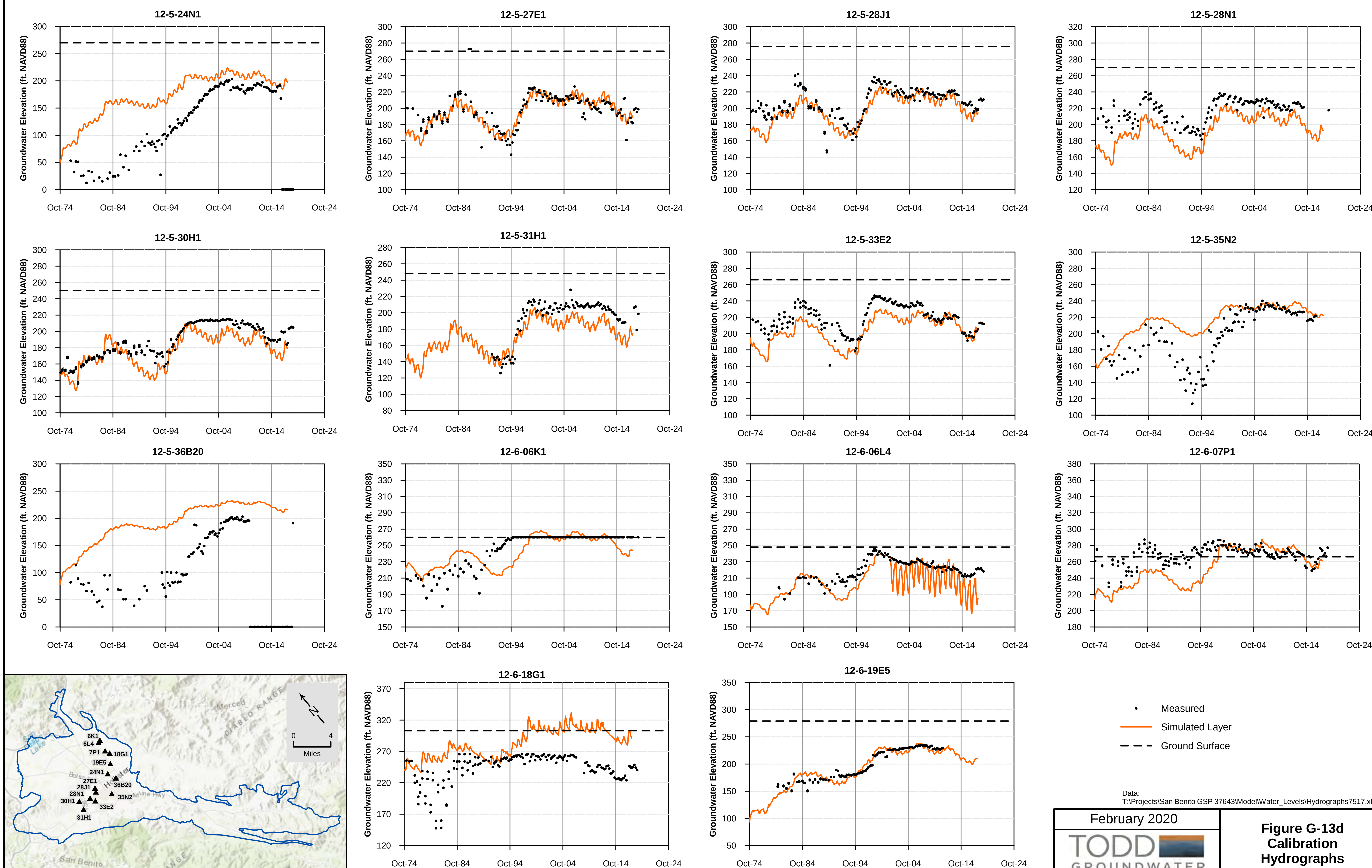
TODD GROUNDWATER

**Figure G-13c Calibration Hydrographs**

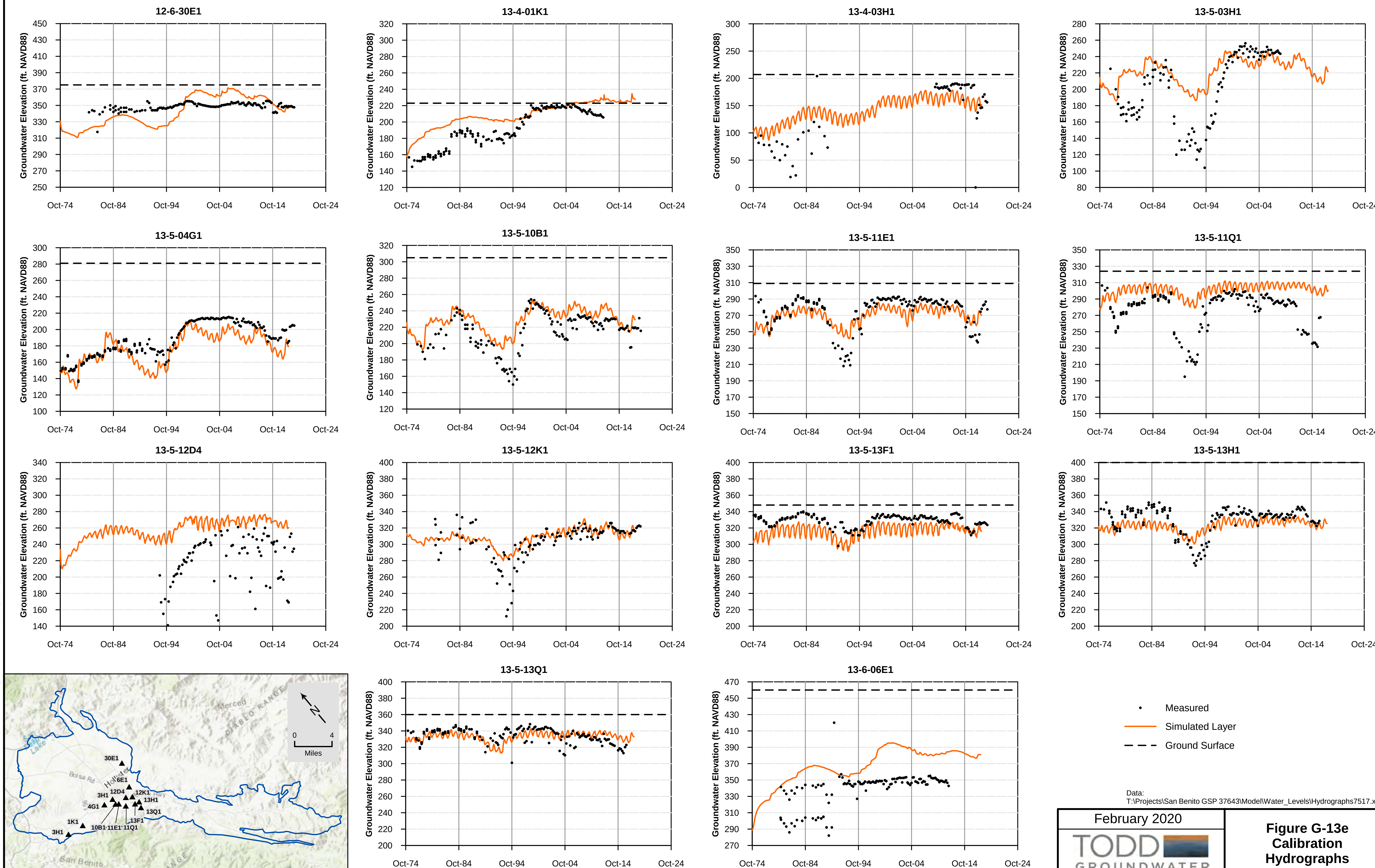



Data:
T:\Projects\San Benito GSP 37643\Model\Water_Levels\Hydrographs7517.xlsm

February 2020

TODD GROUNDWATER

**Figure G-13d**
**Calibration Hydrographs**



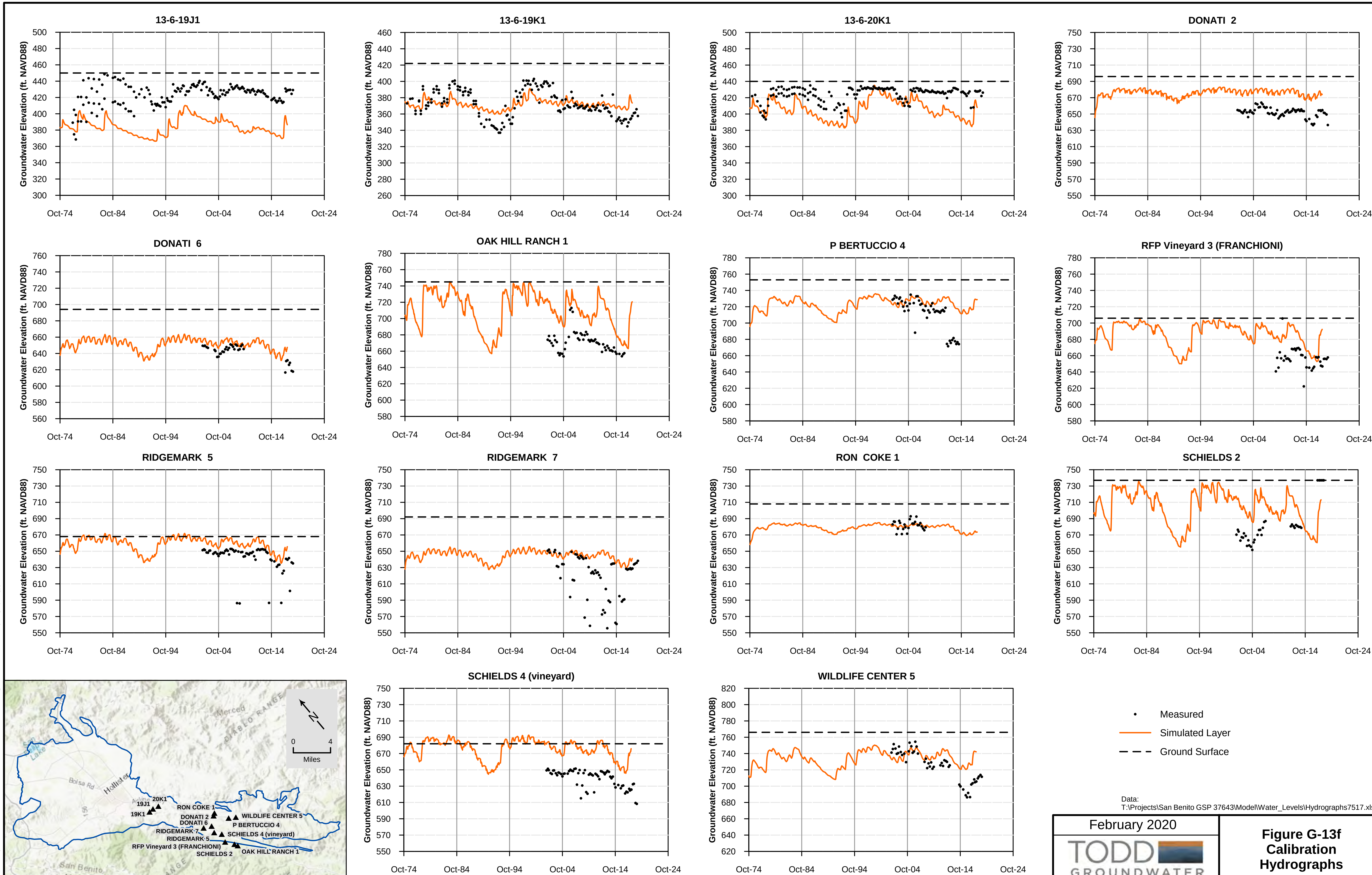

Data:
T:\Projects\San Benito GSP 37643\Model\Water_Levels\Hydrographs7517.xlsm

Path: T:\Projects\San Benito GSP 37643\GRAPHICS\SanBenitoGSP\Figure G-13e Calibration Hydrographs.gpj

February 2020

TODD GROUNDWATER

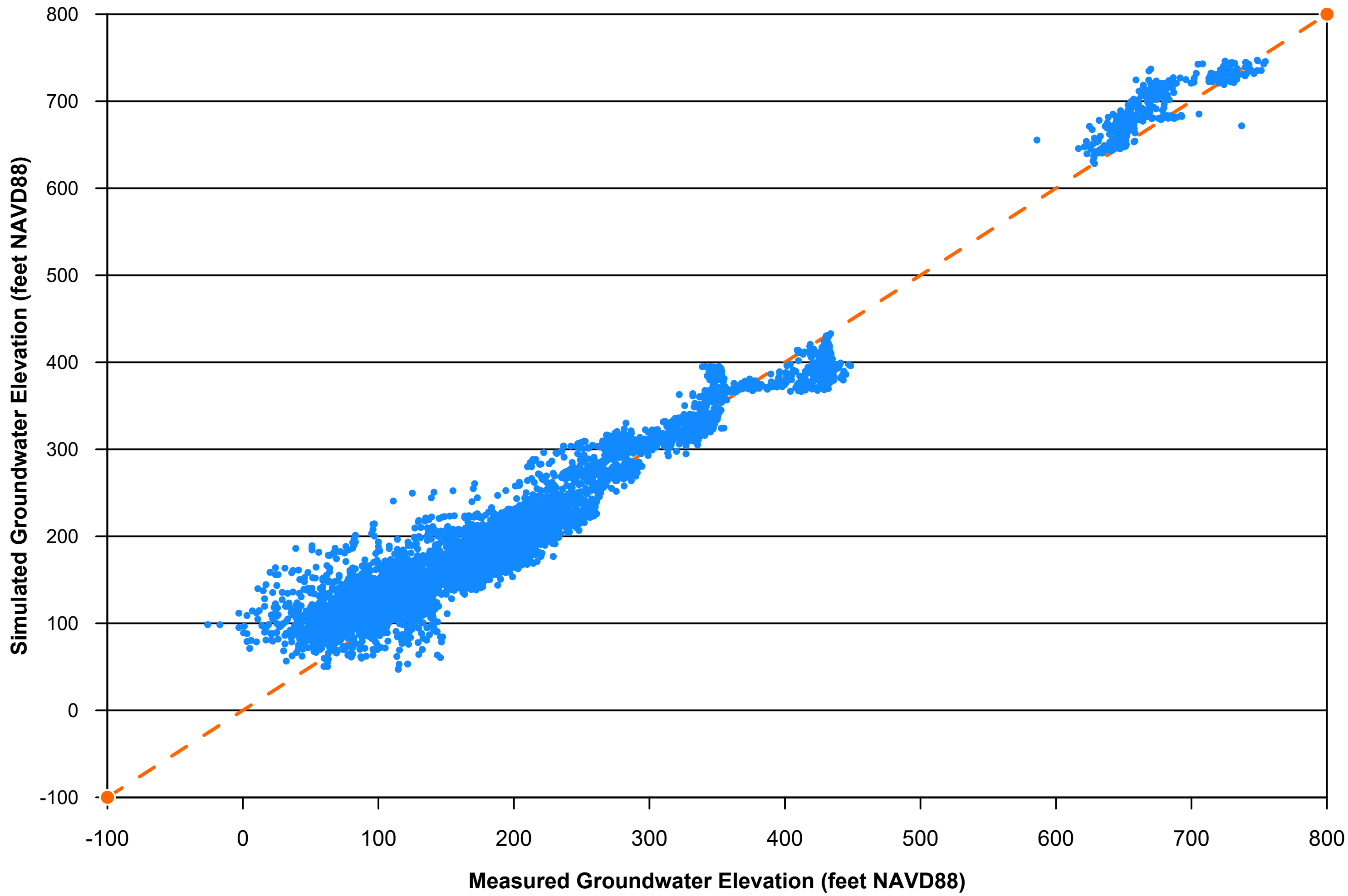
**Figure G-13e**
**Calibration Hydrographs**




February 2020

TODD GROUNDWATER

**Figure G-13f**
**Calibration Hydrographs**



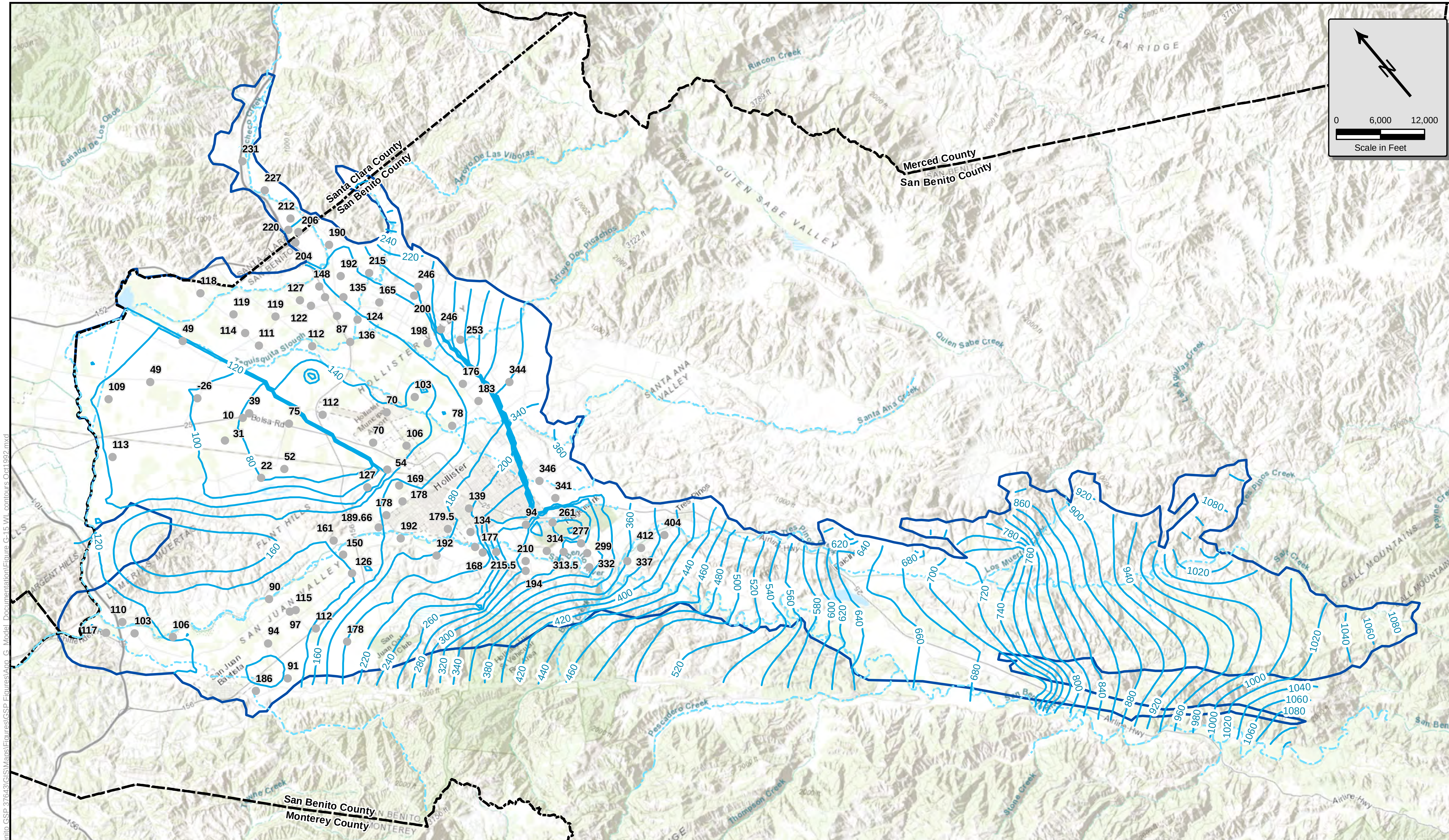

Path: T:\Projects\San Benito GSP 37643\GRAPHICS\SanBenitoGSP\Figure G-14 Scatterplot of Simulated versus Measured Water Levels.grf

Data:
T:\Projects\San Benito GSP 37643\Model\Water_Levels\Run054c_Calibration.xlsx Run054c_Calibration

February 2020

TODD GROUNDWATER

**Figure G-14**
**Scatterplot of Simulated versus Measured Water Levels**



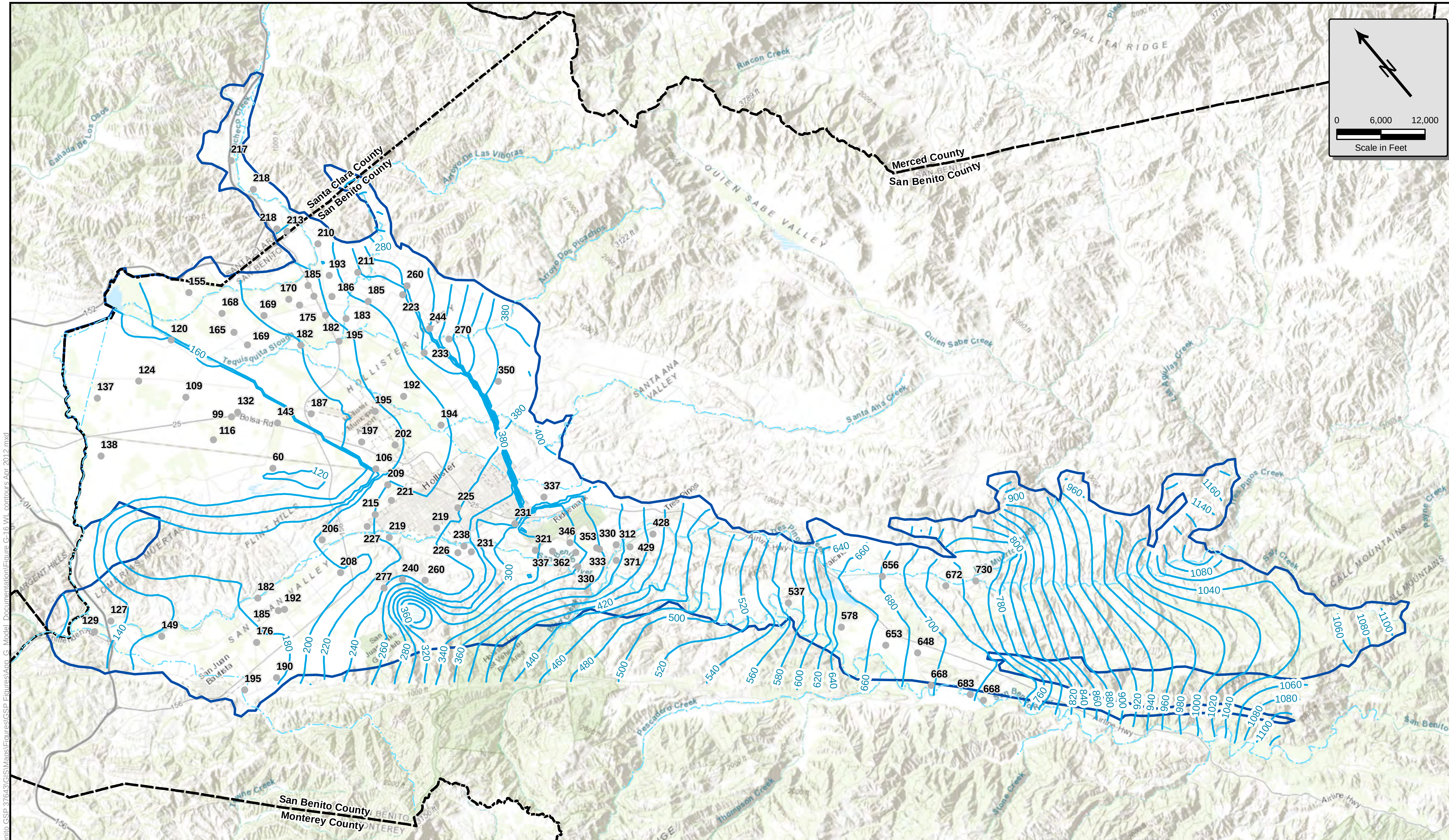

Measured Groundwater Elevation (feet NAVD88)
Simulated Groundwater Elevation (feet NAVD88)
North San Benito Basin

February 2020

TODD GROUNDWATER

**Figure G-15**
**Simulated Groundwater Elevation October 1992**

Path: T:\Projects\San Benito GSP 37643\GIS\Maps\Figures\GSP Figures\App_G_Model_Documentation\Figure G-15 WL contours Oct1992.mxd

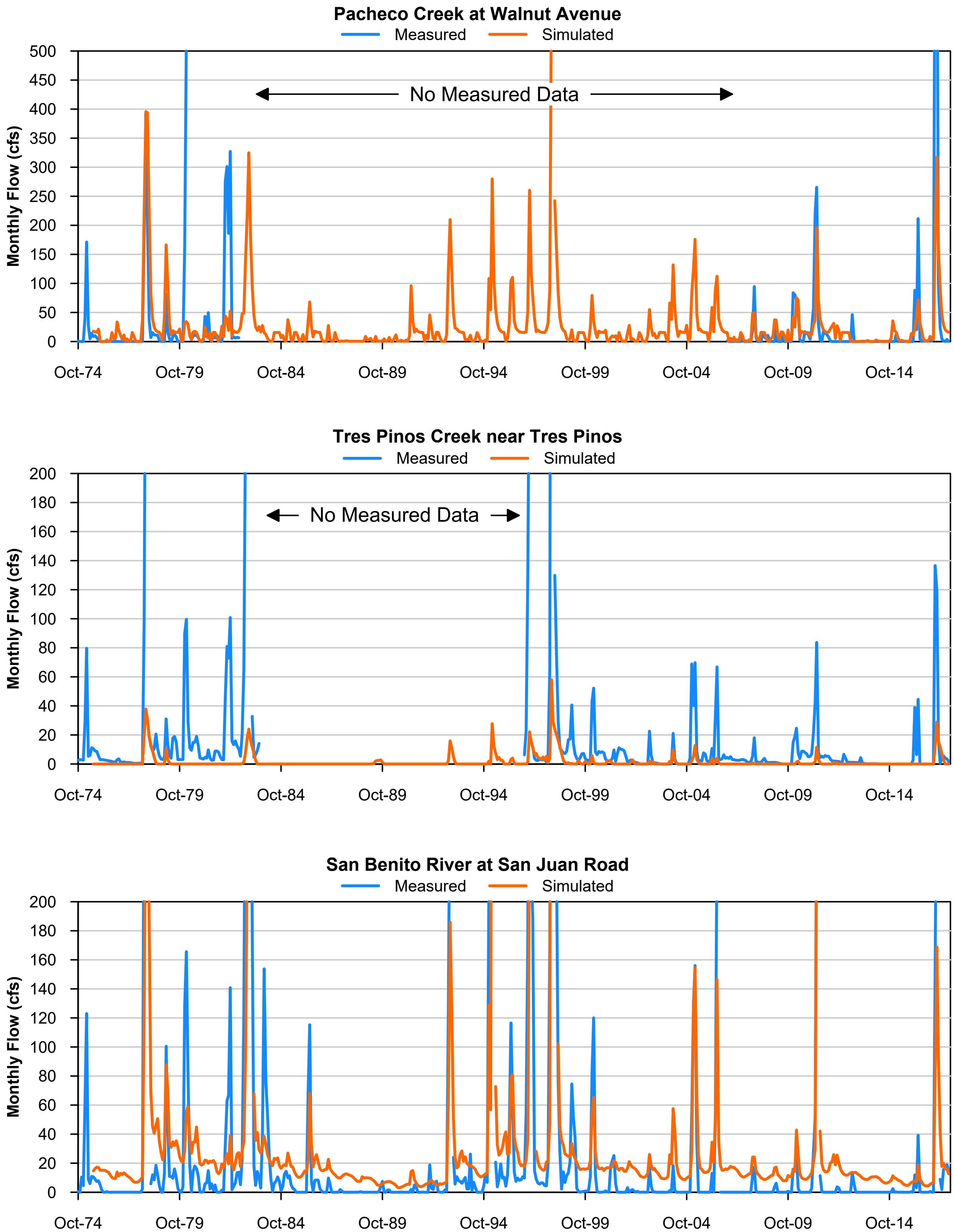



Measured Groundwater Elevation (feet NAVD88)
Simulated Groundwater Elevation (feet NAVD88)
North San Benito Basin

February 2020

TODD GROUNDWATER

**Figure G-16**
**Simulated Groundwater Elevation**
**April 2012**



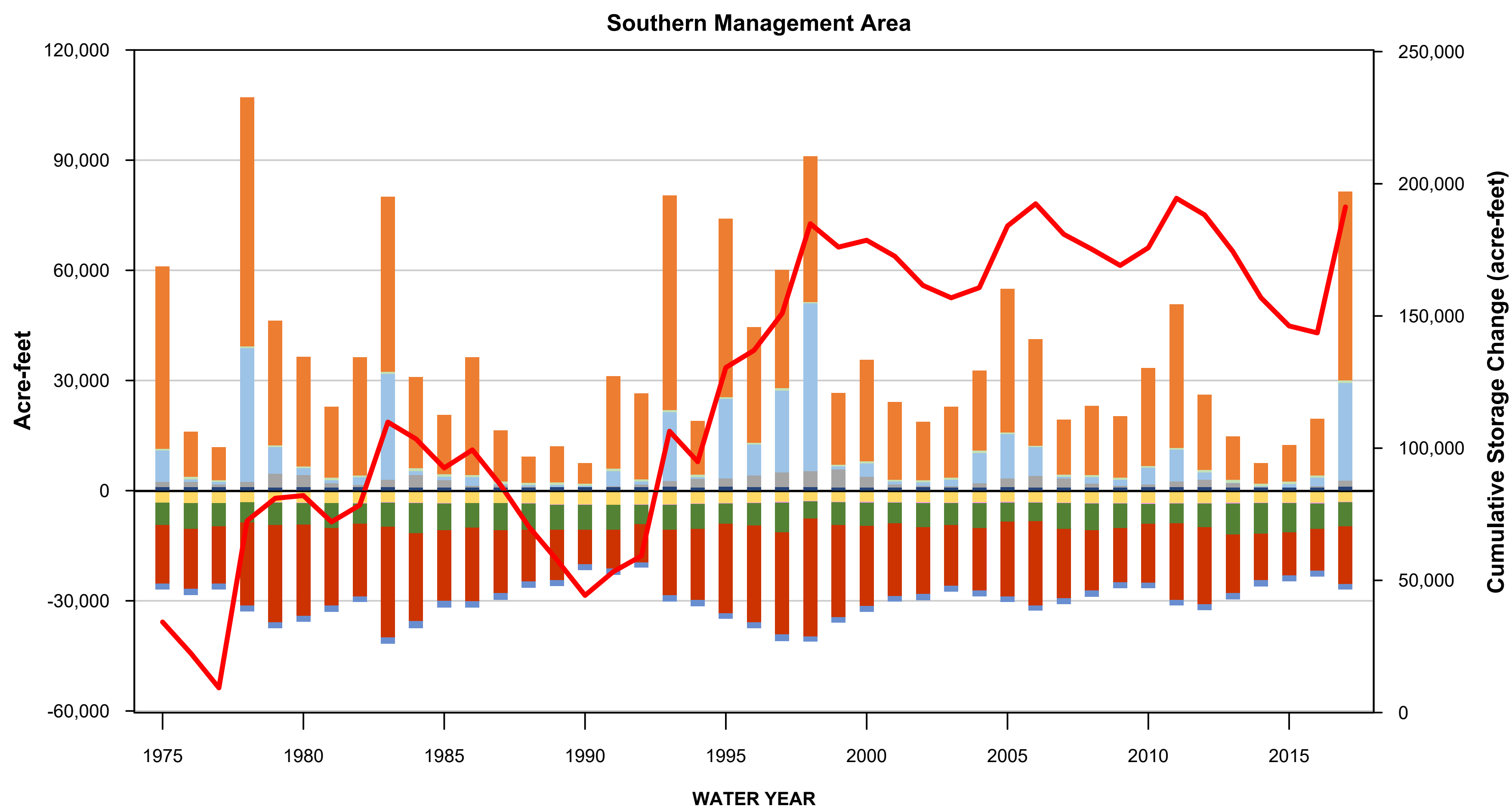

Data:
T:\Projects\San Benito GSP 37643\Model\GWV\SB7517_gage_str_35locations.xlsx Measured

February 2020

TODD GROUNDWATER

**Figure G-17**
**Simulated and Measured Monthly Stream Flows**

Path: T:\Projects\San Benito GSP 37643\GRAPHICS\SanBenitoGSP\Figure G-17 Simulated and Measured Monthly Stream Flows.gpj

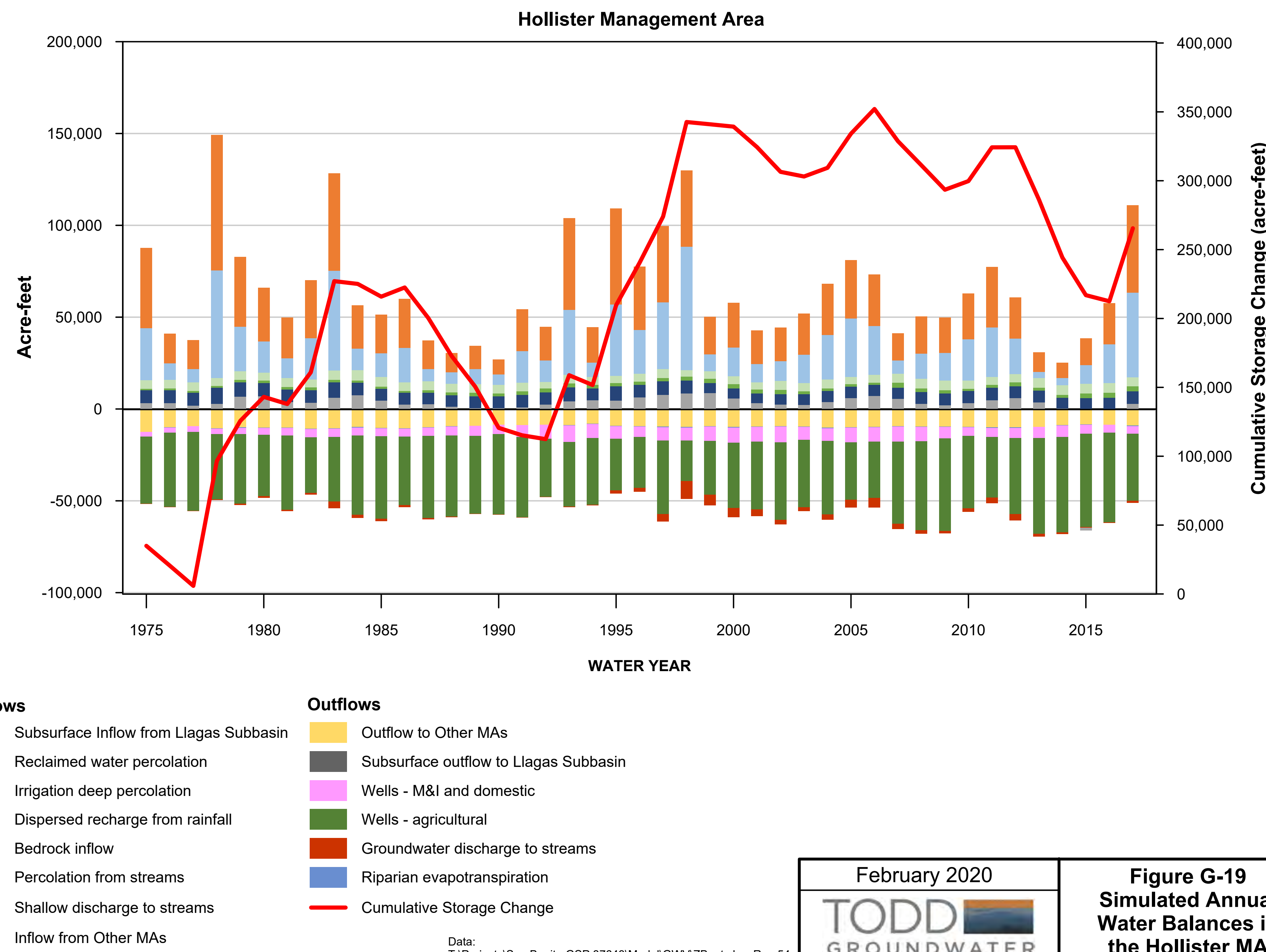



Data:
T:\Projects\San Benito GSP 37643\Model\GWV\ZBout.xlsx Run 54c

February 2020

TODD GROUNDWATER

**Figure G-18**
**Simulated Annual Water Balances in the Southern MA**



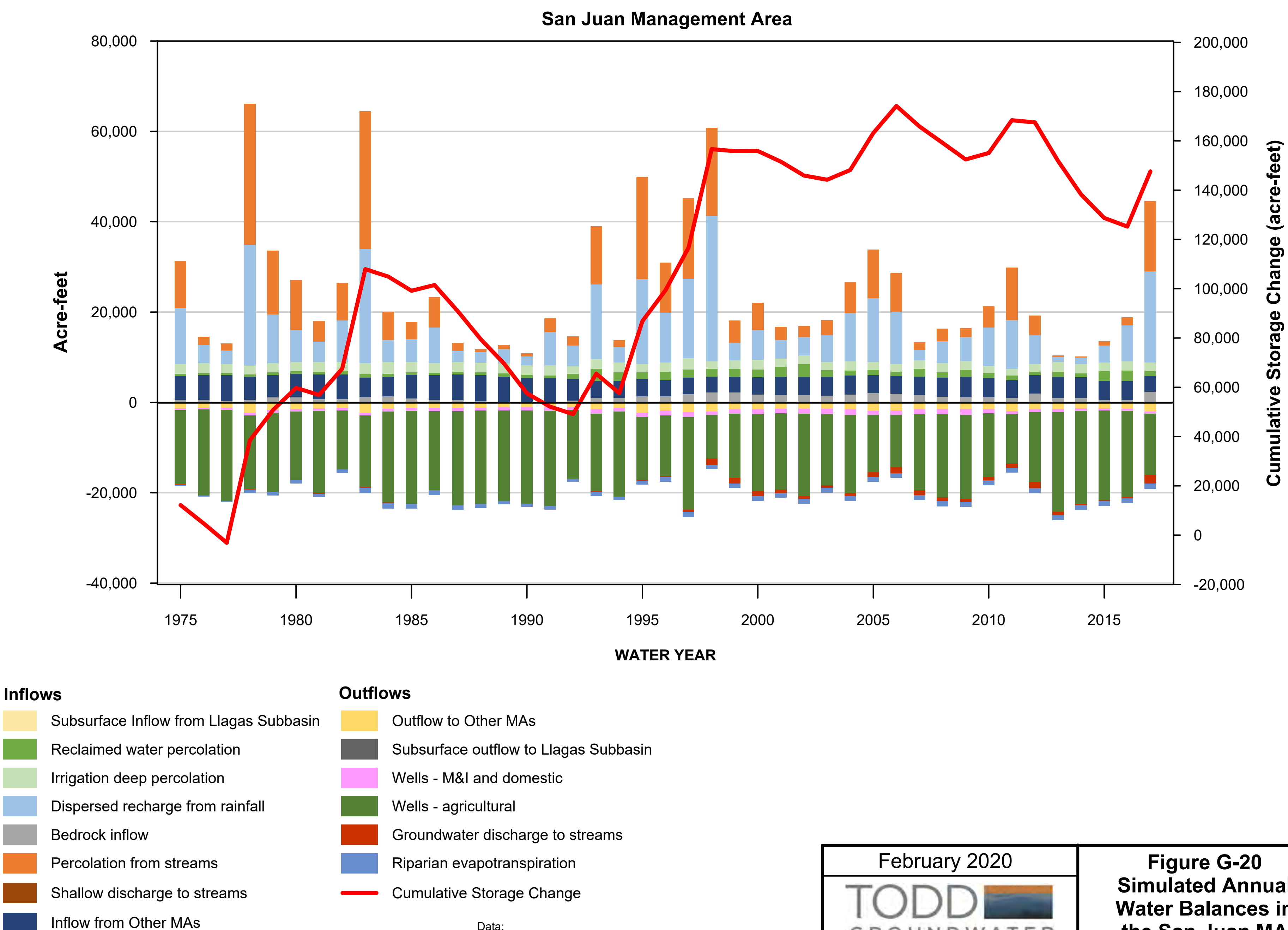

Data:
T:\Projects\San Benito GSP 37643\Model\GWV\ZBout.xlsx Run 54c

February 2020

TODD GROUNDWATER

**Figure G-19**
**Simulated Annual Water Balances in the Hollister MA**

Path: T:\Projects\San Benito GSP 37643\GRAPHICS\SanBenitoGSP\Figure G-19 Simulated Annual Water Balances in the Hollister MA.gpj



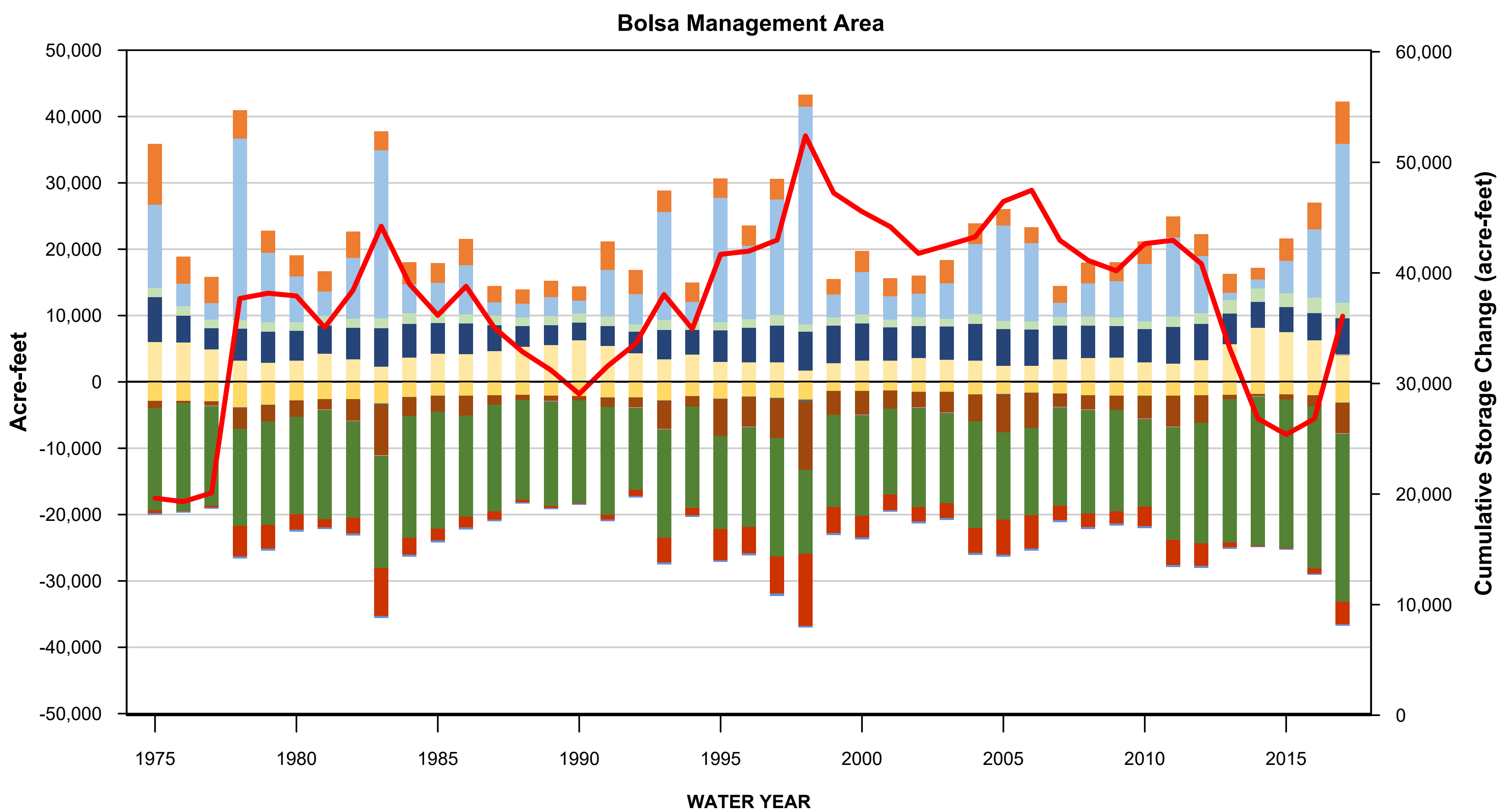

Data:
T:\Projects\San Benito GSP 37643\Model\GWV\ZBout.xlsx Run 54c

February 2020

TODD GROUNDWATER

**Figure G-20**
**Simulated Annual Water Balances in the San Juan MA**

Path: T:\Projects\San Benito GSP 37643\GRAPHICS\SanBenitoGSP\Figure G-20 Simulated Annual Water Balances in the San Juan MA.gpj




**Inflows**

- Subsurface Inflow from Llagas Subbasin
- Reclaimed water percolation
- Irrigation deep percolation
- Dispersed recharge from rainfall
- Bedrock inflow
- Percolation from streams
- Shallow discharge to streams
- Inflow from Other MAs

**Outflows**

- Outflow to Other MAs
- Subsurface outflow to Llagas Subbasin
- Wells - M&I and domestic
- Wells - agricultural
- Groundwater discharge to streams
- Riparian evapotranspiration
- Cumulative Storage Change

Data:
T:\Projects\San Benito GSP 37643\Model\GWV\ZBout.xlsx Run 54c

February 2020

TODD GROUNDWATER

**Figure G-21
Simulated Annual Water Balances in the Bolsa MA**

Path: T:\Projects\San Benito GSP 37643\GRAPHICS\SanBenitoGSP\Figure G-21 Simulated Annual Water Balances in the Bolsa MA.gpj

# APPENDIX H

# Dedicated Monitoring Well Program Report

TODD GROUNDWATER

June 29, 2021

TECHNICAL MEMORANDUM

**To:** Jeff Cattaneo, San Benito County Water District

**From:** Amber Ritchie, PG, CHG
Arden Wells, GIT
Chad Taylor, PG, CHG

**Re:** Identification of Dedicated Monitoring Well Sites, North San Benito Basin

Additional collection of hydrogeologic data and new dedicated monitoring wells are needed for Groundwater Sustainability Plan (GSP) preparation. This reflects the fact that the new North San Benito Basin (Basin) has a greater extent than previously monitored areas, especially in the Southern Management Area. In addition, specific data gaps and uncertainties have been identified during preparation of GSP chapters. Objectives for siting new dedicated monitoring wells are to fill gaps in the existing monitoring network and provide a groundwater monitoring framework to support GSP implementation.

## APPROACH

Achieving these objectives has required detailed analysis, including development and implementation of a geographically-based index overlay methodology. This indexed overlay method has included development of geographic information system (GIS) datasets and subsequent mapping of these datasets together to find locations that fill multiple data gaps. The areas where new monitoring wells are needed were identified and classified with feedback from San Benito County Water District (SBCWD) staff based on existing monitored well locations, data gaps identified in the GSP, the hydrogeologic conceptual model, and other factors. This process identified and delineated areas where new wells should be located and prioritized them into two categories (Priority A and Priority B). These areas were then combined with Assessor's Parcel maps to identify properties and property owners to contact regarding new monitoring well installation access agreements. This Technical Memorandum summarizes the preliminary siting of six deep monitoring wells and six shallow wells (for monitoring surface water-groundwater interactions).

## DEEP MONITORING WELLS

Siting for new dedicated deep monitoring wells involved the following steps:

**Identification of Existing Wells in Groundwater Level Monitoring Program**

A preliminary step involved identifying wells recently used for water level monitoring, and then delineating regions with and without well coverage. A query of the SBCWD water level database identified 100 wells in the San Benito Basin with measurements in 2018 and 2019. In 2019 and 2020, additional existing wells were identified for incorporation into the SBCWD groundwater level monitoring program. **Figure 1** shows these wells, along with the identified disadvantaged community (DAC) and severely disadvantaged community (SDAC) areas within Basin and the location of the Hollister Test Well installed in January 2021 that also will be used for monitoring.

**Review of Existing Water Quality Monitoring Wells**

Twenty-two wells in the North San Benito Basin are regularly sampled by SBCWD for water quality but do not have recent water level measurements. Six of these wells (highlighted on Figure 1) are in areas with a low density of water level monitoring wells. These six wells and the other water quality monitoring wells should be added to the water level monitoring network.

**Delineation of Search Areas for Siting New Deep Monitoring Wells**

To delineate areas with local water level monitoring, a one-mile radius was defined around each existing monitoring well. Most of the North San Benito Basin is within one mile of an existing monitoring well. As shown in **Figure 2**, eleven areas beyond one mile from a monitoring well were identified as Search Areas for new well sites. Also shown on **Figure 2** are upland areas with steep topography, semi-consolidated geologic materials, and potential for groundwater production. These were excluded from Search Areas because these areas contain few to no wells. In addition, groundwater levels are largely dependent on ground surface elevation and these areas are too rugged for meaningful monitoring. The remaining areas were categorized as Priority A (highest priority) and Priority B (lower priority). Areas on basin margins were assigned lower priority as groundwater levels may not be reliable indicators of basin conditions.

The Search Areas were numbered, and parcels within each Search Area were identified and listed.

**New Monitoring Well Site Selection**

SBCWD led the site selection effort and handled all coordination with property owners. They first attempted to contact each of the property owners within the Search Areas through a combination of mailed correspondence, phone calls, and field canvassing. This process focused on identifying drilling locations with landowners open to access agreements, and physical accessibility for drilling equipment and future monitoring.

The initial site selection efforts led by SBCWD identified multiple property owners open to allowing the construction of new wells. These were reviewed and refined to find the locations best suited to new monitoring well construction, which resulted in the six deep dedicated monitoring well locations shown on **Figure 2**. As shown, each was assigned a unique well name identifier as follows: NSBDW-X (North San Benito Deep Well) with X as the well number 1 through 6, numbered in a general west to east direction across the basin. The six deep planned monitoring wells are identified below.

- ***North San Benito Deep Well 1 (NSBDW-1)*** This drilling site is located on Frazier Lake Road west of Highway 25 and Hollister. It is located on the northwest corner of APN 018-010-009-000.
- ***North San Benito Deep Well 2 (NSBDW-2)*** The drilling site is located on Highway 25 just southeast of the intersection with Highway 156, northwest of Hollister. It is located on the northern edge of APN 014-800-050-000.
- ***North San Benito Deep Well 3 (NSBDW-3)*** This drilling site is located on the northeastern edge of APN 019-600-006-000, east of Aubrey Lane, off McCloskey Road, north of Hollister.
- ***North San Benito Deep Well 4 (NSBDW-4)*** The drilling site is located on the northern edge of APN 017-180-005-000, just east of Fairview Road in northeast Hollister.
- ***North San Benito Deep Well 5 (NSBDW-5)*** The drilling site is located south of Murphy Road on the western edge of APN 026-080-044-000 in Paicines.
- ***North San Benito Deep Well 6 (NSBDW-6)*** The drilling site is located west of Highway 25 off Live Oak Road in Paicines, just east of the stream on APN 027-080-057-000.

**Deep Well Construction**

To determine preliminary drilling depth and well construction estimates for each deep monitoring well, nearby wells were identified and available well logs were reviewed. The well depth and screen interval information from these wells was tabulated and reviewed to define a preliminary well depth and screen length for the respective deep monitoring well. Key well design objectives for the monitoring wells are to drill as deep or deeper than existing nearby wells to account for possible future water level declines and to have representative well screen length and placement to appropriately track local groundwater level changes.

The six deep wells will be drilled using mud rotary methods. Each will be drilled with a 10-inch borehole to accommodate a 4-inch diameter monitoring well. The wells will be constructed with Schedule 80 PVC casing and Schedule 80 PVC 0.040-inch slotted PVC screen. No. 3 sand filter pack and a bentonite transition seal and a neat cement seal will be placed in each well. Surface completions will consist of an above ground concrete pad and protective stovepipe cover with locking cap. The table below summarizes the preliminary construction of the six deep groundwater monitoring wells. Construction of the wells may be altered depending on materials or conditions encountered in the field.

**Table 1. Preliminary Deep Monitoring Well Depths and Construction**

| Well Name | NSBDW-1 | NSBDW-2 | NSBDW-3 | NSBDW-4 | NSBDW-5 | NSBDW-6 |
|---|---|---|---|---|---|---|
| **Borehole Depth (feet bgs)** | 800 | 700 | 500 | 500 | 500 | 300 |
| **Blank Casing Intervals (feet bgs)** | 0 to 490, 790 to 800 | 0 to 440, 690 to 700 | 0 to 290, 490 to 500 | 0 to 290, 490 to 500 | 0 to 290, 490 to 500 | 0 to 190, 290 to 300 |
| **Screen Interval (feet bgs)** | 490 to 790 | 440 to 690 | 290 to 490 | 290 to 490 | 290 to 490 | 190 to 290 |
| **Filter Pack Interval (feet bgs)** | 210 to 800 | 210 to 700 | 210 to 500 | 210 to 500 | 210 to 500 | 150 to 300 |
| **Bentonite Seal Interval (feet bgs)** | 200 to 210 | 200 to 210 | 200 to 210 | 200 to 210 | 200 to 210 | 140 to 150 |
| **Cement Seal Interval (feet bgs)** | 0 to 200 | 0 to 200 | 0 to 200 | 0 to 200 | 0 to 200 | 0 to 140 |

## SHALLOW MONITORING WATER WELLS

Preliminary siting of new dedicated shallow monitoring wells involved the following steps:

### Designation of Key Wells for Monitoring Interconnected Surface Water and Groundwater

Nineteen existing wells have been identified to serve as Key Wells for evaluating and tracking groundwater/surface water interactions relative to defined Minimum Thresholds (see GSP Section 6). These wells are located within one mile of a stream reach where springtime depth to water is typically 20 feet or less and the well is not separated from the stream reach by a fault. **Figure 3** shows the identified stream reaches where groundwater/surface water interactions are likely to occur and the associated Key Well locations.

### Identification of Sites for New Shallow Monitoring Wells

While providing best available information, the currently-selected key wells are all water supply wells with relatively deep screens that do not provide adequate vertical coverage. Accordingly, six sites have been selected for installation of new dedicated shallow wells (**Figure 3**). The rationale for selecting these sites includes location close to stream reaches with shallow groundwater and distribution among the major streams (Pajaro River, Pacheco Creek, San Benito River, and Tres Pinos Creek) with in-stream or riparian habitat. Field canvassing along the identified stream reaches was completed in order to identify drilling locations based on landowner agreement, drill rig access, and accessibility for future monitoring.

As with the deep wells, each of the six shallow wells was assigned a unique identifier, as follows: NSBSW-X (North San Benito Shallow Well) with X as the well number 1 through 6, numbered in a general west to east direction across the basin. The six shallow planned monitoring wells are identified below.

- ***North San Benito Shallow Well 1 (NSBSW-1)*** This site is on the eastern stretch of the unmonitored stretch of the Pajaro River in the triangular plot of land bounded by the river, Highway 25, and the railroad track. The site can be accessed via Highway 25 directly to the south. The well will be in the southwest corner of APN 013-030-032-000.
- ***North San Benito Shallow Well 2 (NSBSW-2)*** This site is located on the northern bank of the Pacheco Creek just southwest of the intersection of San Felipe Rd and Dunne St. The site can be accessed by San Felipe Rd and is located near the eastern edge of APN 015-020-018-000.
- ***North San Benito Shallow Well 3 (NSBSW-3)*** The site is located at the northern terminus of Lucy Brown Lane on the southern bank of the San Benito River. The well will be on the western edge of Lucy Brown Lane in the northeast corner of APN 018-070-001-000.
- ***North San Benito Shallow Well 4 (NSBSW-4)*** This drilling site is located on the plot of land just southwest of the intersection of Hospital Road and Truckee Way on the northern bank of the San Benito River. The site can be accessed via Hospital Road and is located on the southeastern edge of APN 021-110-001-000.
- ***North San Benito Shallow Well 5 (NSBSW-5)*** This drilling site is located on the northern bank of the Tres Pinos Creek in the vegetated area just south of an agricultural field. The site can be accessed via the unnamed private farm road to the northwest. The site is located on the northern edge of APN 022-160-038-000.
- ***North San Benito Shallow Well 6 (NSBSW-6)*** This drilling site is located on the upper end of the northern bank of the Paicines Creek and can be accessed via the unnamed private farm road from the north. The site is located on the western edge of APN 023-100-041-000.

**Shallow Well Construction**

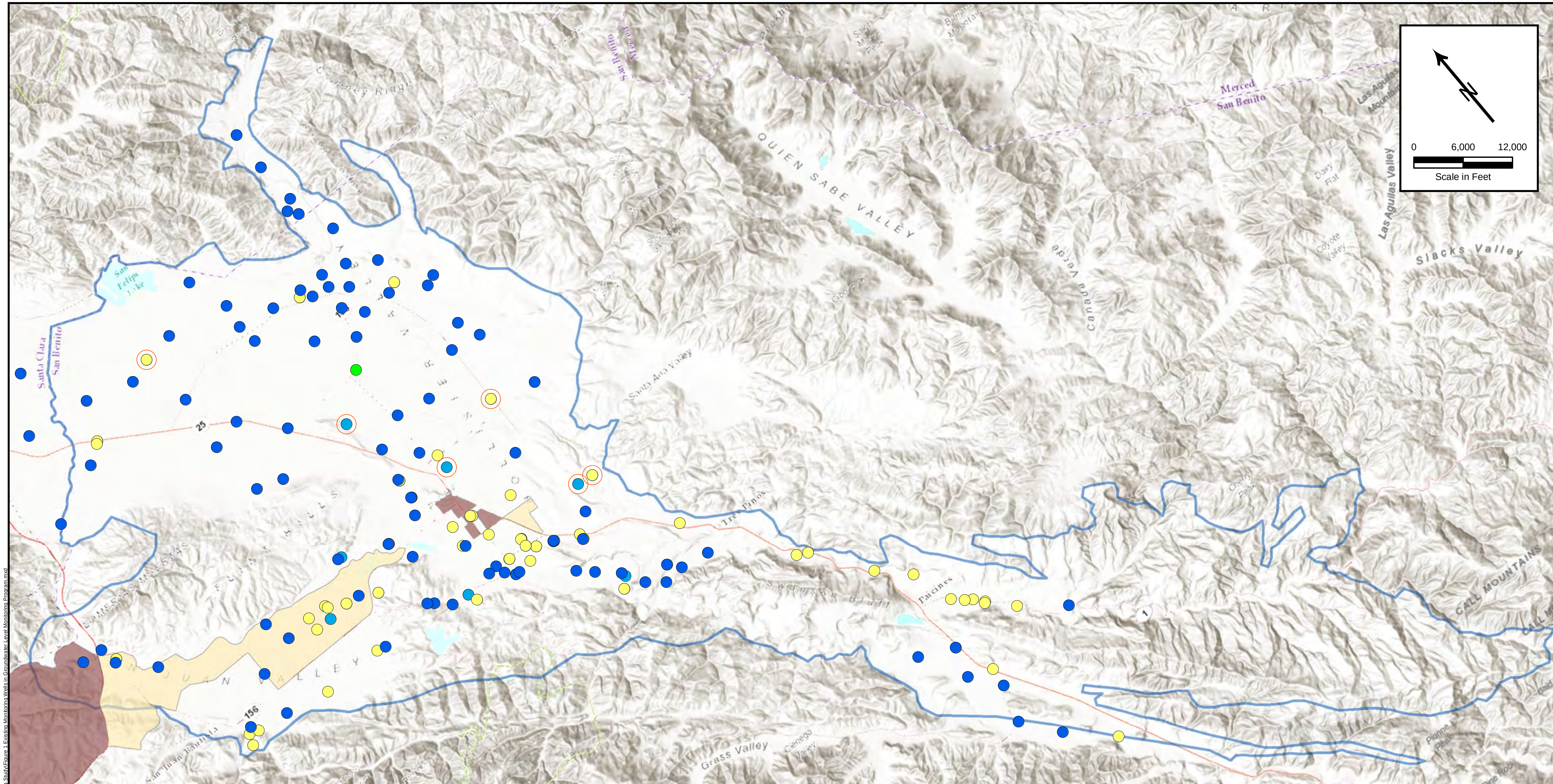
The shallow monitoring wells will be drilled to a depth of between 50 and 60 feet, dependent upon local groundwater levels. Preliminary well design should account for seasonal variations in shallow groundwater near each stream reach.

The six shallow wells will be drilled with by hollow stem auger methods. Each will be drilled with an 8-inch borehole to accommodate a 2-inch diameter monitoring well. The wells will be constructed with Schedule 40 PVC casing and Schedule 40 PVC 0.040-inch slotted PVC screen. No. 3 sand filter pack and a bentonite transition seal will be installed. All wells will have a neat cement seal and surface completion will consist of an above ground concrete pad and stovepipe with locking cap. The table below summarizes the preliminary construction of the six shallow groundwater monitoring wells. Construction of the wells may be altered depending on materials encountered in the field or groundwater levels following drilling.

**Table 2. Preliminary Shallow Monitoring Well Depths and Construction**

| Well Name | NSBSW-1 | NSBSW-2 | NSBSW-3 | NSBSW-4 | NSBSW-5 | NSBSW-6 |
|---|---|---|---|---|---|---|
| **Borehole Depth (feet bgs)** | 50 | 50 | 50 | 50 | 60 | 60 |
| **Blank Casing Intervals (feet bgs)** | 0 to 15 | 0 to 15 | 0 to 15 | 0 to 15 | 0 to 15 | 0 to 15 |
| **Screen Interval (feet bgs)** | 15 to 50 | 15 to 50 | 15 to 50 | 15 to 50 | 15 to 60 | 15 to 60 |
| **Filter Pack Interval (feet bgs)** | 12 to 50 | 12 to 50 | 12 to 50 | 12 to 50 | 12 to 60 | 12 to 60 |
| **Bentonite Seal Interval (feet bgs)** | 10 to 12 | 10 to 12 | 10 to 12 | 10 to 12 | 10 to 12 | 10 to 12 |
| **Cement Seal Interval (feet bgs)** | 0 to 10 | 0 to 10 | 0 to 10 | 0 to 10 | 0 to 10 | 0 to 10 |

We appreciate the District's efforts in gaining landowner permission and access to the recommended sites and look forward to initiation of the field program. Please do not hesitate to call or email if you have questions or comments.

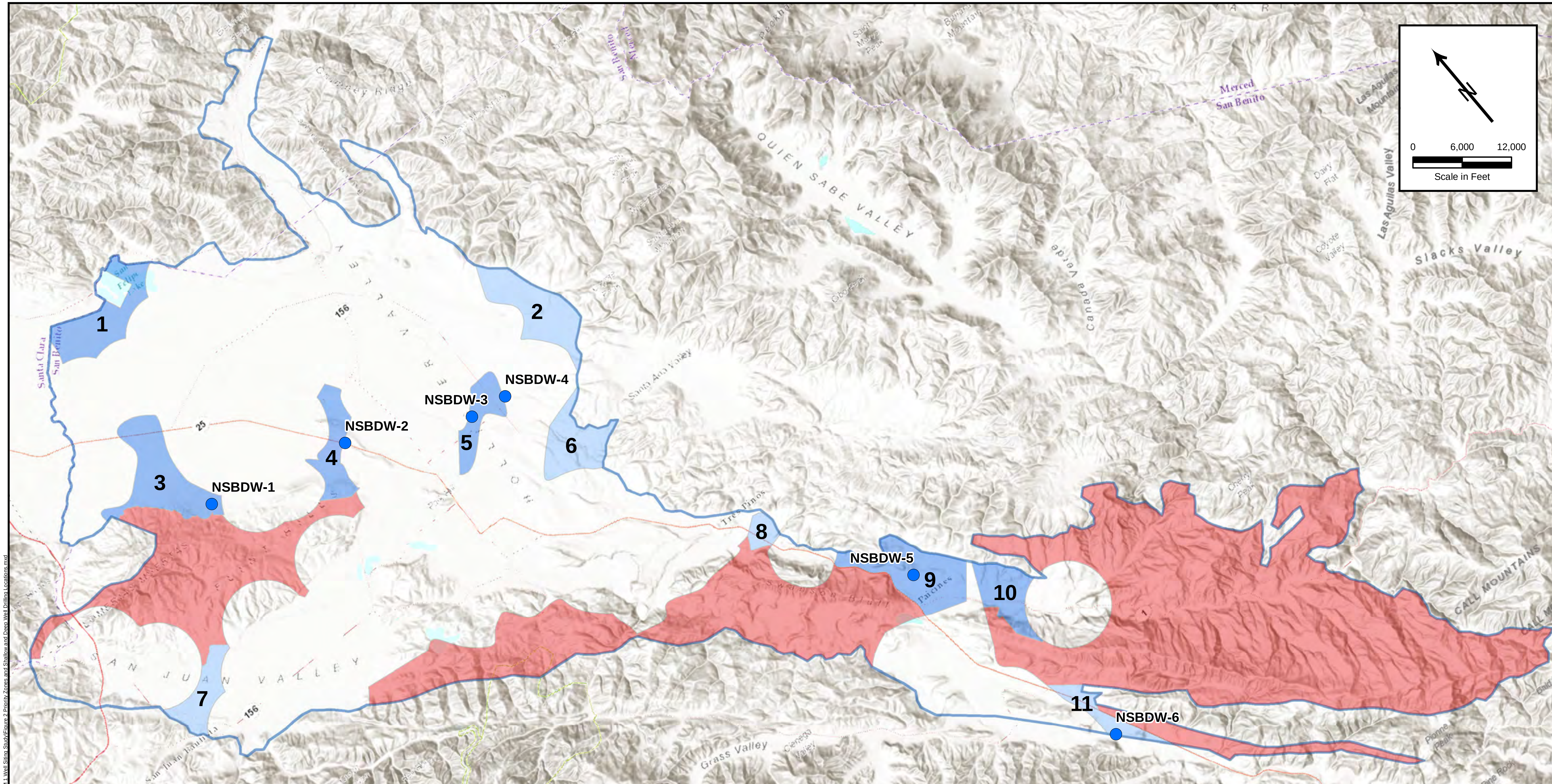



- Wells with Water Level Measurements in 2018 and 2019
- Water Quality Monitoring Wells
- Water Quality Well Recommended for Water Level Monitoring
- Water Level Monitoring Wells Added in 2019 and 2020
- Hollister Test Well
- Disadvantaged Community
- Severely Disadvantaged Community
- North San Benito Basin

June 2021

TODD GROUNDWATER

**Figure 1**
**Existing Groundwater Level Monitoring Program Wells**

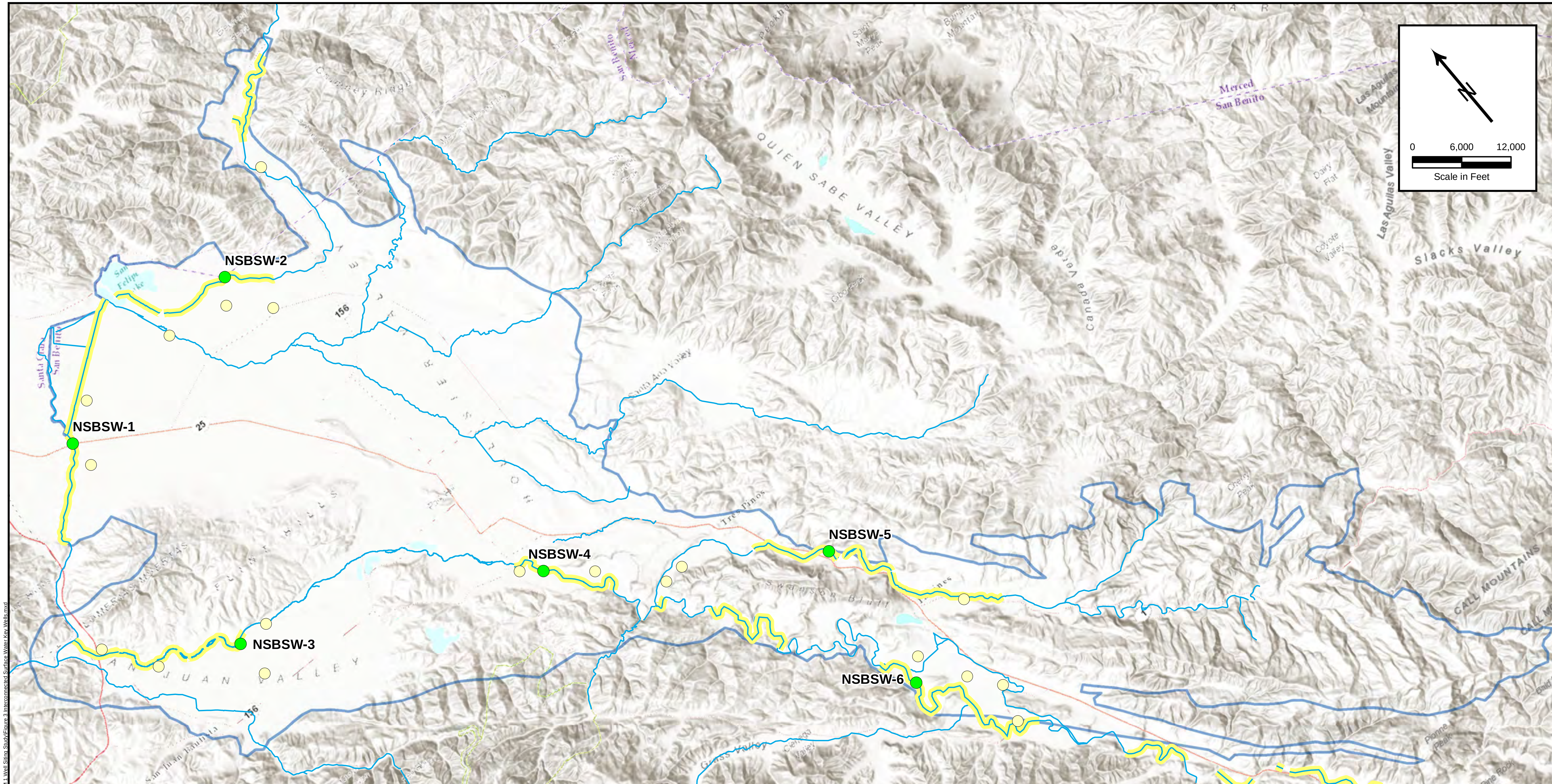



- New Deep Well Location
- Priority A Search Area
- Priority B Search Area
- Areas with Few to No Wells
- North San Benito Basin

April 2021

TODD GROUNDWATER

**Figure 2**
**Priority Zones and Shallow and Deep Well Drilling Locations**




New Shallow Well Location

Existing Interconnected Surface Water Key Well

Stream Reach Potentially Connected to Groundwater

North San Benito Basin

April 2021

TODD GROUNDWATER

**Figure 3**
**Interconnected Surface Water and Monitoring Wells**

# APPENDIX I

# List of Public Meetings and Comments on the Plan

**Table I-1. List of Public Meetings for each GSA**

| GSA | Date | Type | Major Subject |
|---|---|---|---|
| SBCWD | 8/15/2018 | TAC Meeting | Orientation and SGMA Overview |
| SBCWD | 11/7/2018 | TAC Meeting | Plan Area, Sustainability, Data |
| SBCWD | 1/14/2019 | TAC Meeting | Data Memo, Sustainability, Outreach |
| SBCWD | 4/24/2019 | TAC Meeting | HCM, Groundwater Conditions, Management Areas |
| SBCWD | 8/28/2019 | TAC Meeting | Management Areas, Sustainability Criteria |
| SBCWD | 10/30/2019 | TAC Meeting | Water Budget, Sustainability Goal |
| SBCWD | 1/13/2020 | TAC Meeting | Water Budget, Model, Water Quality |
| SBCWD | 2/24/2020 | TAC Meeting | Water Quality Sustainability |
| SBCWD | 4/29/2020 | TAC Meeting | Groundwater Levels Sustainability |
| SBCWD | 7/22/2020 | TAC Meeting | Levels and Storage Sustainability |
| SBCWD | 8/26/2020 | TAC Meeting | Subsidence and Interconnected Surface Water Sustainability |
| SBCWD | 9/29/2020 | TAC Meeting | Monitoring, Measuring Extraction |
| SBCWD | 11/4/2020 | TAC Meeting | Measuring Groundwater Extraction |
| SBCWD | 1/27/2021 | TAC Meeting | Measuring Extraction, GSP Funding |
| SBCWD | 2/24/2021 | TAC Meeting | Monitoring, Managed Aquifer Recharge, Projects and Management Actions |
| SBCWD | 4/28/2021 | TAC Meeting | Future Scenarios, Projects and Management Actions, Implementation |
| SBCWD | 6/30/2021 | TAC Meeting | GSP Overview |
| SBCWD | 11/14/2018 | Public Workshop | Sustainable Groundwater Management Act |
| SBCWD | 6/18/2019 | Public Workshop | Hydrogeological Conceptual Model (HCM)/ Groundwater Conditions |
| SBCWD | 9/23/2020 | Public Workshop | Water Budget/ Sustainability Management Criteria |
| SBCWD | 12/9/2020 | Public Workshop | Overview of GSP for Governance Council |
| SBCWD | 3/10/2021 | Public Workshop | Sustainability Management Criteria/ Monitoring/ Management Actions |
| SBCWD | 8/4/2021 | Public Workshop | Overview of GSP |
| SBCWD | 4/24/2019 | SBCWD GSA Board Presentation | Update, HCM, Groundwater Conditions |
| SBCWD | 8/28/2019 | SBCWD GSA Board Presentation | Management Areas, Budget, Sustainability |
| SBCWD | 10/30/2019 | SBCWD GSA Board Presentation | Water Budgets |
| SBCWD | 7/29/2020 | SBCWD GSA Board Presentation | Levels and Storage Sustainability Criteria |
| SBCWD | 12/16/2020 | SBCWD GSA Board Presentation | Monitoring for Sustainability |
| SBCWD | 6/30/2021 | SBCWD GSA Board Presentation | GSP Overview |
| SBCWD | 7/14/2021 | SBCWD GSA Board Presentation | Fees |
| SBCWD | 7/28/2021 | SBCWD GSA Board Presentation | Next Steps for GSP |
| SBCWD | 11/17/2021 | SBCWD GSA Board Presentation and Adoption Hearing | Adoption |

| | | | |
|---|---|---|---|
| SBCWD | 10/24/2018 | Pajaro Compass, A Network for Voluntary Conservation | Introduction to SBCWD GSP Process |
| SBCWD | 7/24/2019 | Governance Committee of San Benito County | SGMA and GSP Overview |
| SBCWD | 1/4/2021 | Annual Report WY 2020 Special Hearing | GSP Update |
| SBCWD | 1/6/2020 | Annual Report WY 2019 Special Hearing | Update, Water Budget |
| SBCWD | 1/7/2019 | Annual Report WY 2018 Special Hearing | SGMA Overview and GSP Update |
| | | | |
| Valley Water | 2/14/2017 | Valley Water Board of Directors Meeting | Sustainable Groundwater Management Act Compliance for Groundwater Basins Overlapping with San Benito County. |
| Valley Water | 5/9/2017 | Valley Water Board of Directors Meeting | Resolution Setting Time and Date of Public Hearing to Become the Groundwater Sustainability Agency for the Portions of the Hollister and San Juan Bautista Subbasins Located in Santa Clara County. |
| Valley Water | 6/13/2017 | Valley Water Board of Directors Meeting | Public Hearing and Resolution to Become the Groundwater Sustainability Agency for the Portions of the Hollister and San Juan Bautista Subbasins Located within Santa Clara County. |
| Valley Water | 1/8/2018 | Valley Water Board's Agricultural Water Advisory Committee | Sustainable Groundwater Management Act (SGMA) Update – SGMA Authority Implementation Framework Concepts (Vanessa De La Piedra) |
| Valley Water | 9/4/2019 | Valley Water Board's Joint Water Resources Committee (City of Gilroy, City of Morgan Hill, and Valley Water) | Sustainable Groundwater Management Act (SGMA) Update |
| Valley Water | 8/30/2021 | Valley Water Board's Water Conservation and Demand Management Committee | Sustainable Groundwater Management Act (SGMA) Verbal Update |
| Valley Water | 5/10/2021 | Valley Water Board's Water Conservation and Demand Management Committee | Sustainable Groundwater Management Act (SGMA) Update |
| Valley Water | 12/14/2021 | Valley Water GSA Board Presentation and Adoption Hearing | Adoption |
| | | | |

October 27, 2021

San Benito County Water District
30 Mansfield Road
Hollister, CA 95023

*Submitted via web: https://www.sbcwd.com/gsp-development/*

**Re: Public Comment Letter for North San Benito Basin Draft GSP**

Dear Jeff Cattaneo,

On behalf of the above-listed organizations, we appreciate the opportunity to comment on the Draft Groundwater Sustainability Plan (GSP) for the North San Benito Basin being prepared under the Sustainable Groundwater Management Act (SGMA). Our organizations are deeply engaged in and committed to the successful implementation of SGMA because we understand that groundwater is critical for the resilience of California's water portfolio, particularly in light of changing climate. Under the requirements of SGMA, Groundwater Sustainability Agencies (GSAs) must consider the interests of all beneficial uses and users of groundwater, such as domestic well owners, environmental users, surface water users, federal government, California Native American tribes and disadvantaged communities (Water Code 10723.2).

As stakeholder representatives for beneficial users of groundwater, our GSP review focuses on how well disadvantaged communities, drinking water users, tribes, climate change, and the environment were addressed in the GSP. While we appreciate that some basins have consulted us directly via focus groups, workshops, and working groups, we are providing public comment letters to all GSAs as a means to engage in the development of 2022 GSPs across the state. Recognizing that GSPs are complicated and resource intensive to develop, the intention of this letter is to provide constructive stakeholder feedback that can improve the GSP prior to submission to the State.

Based on our review, we have significant concerns regarding the treatment of key beneficial users in the Draft GSP and consider the GSP to be **insufficient** under SGMA. We highlight the following findings:

1. Beneficial uses and users **are not sufficiently** considered in GSP development.
    a. Human Right to Water considerations **are not sufficiently** incorporated.
    b. Public trust resources **are not sufficiently** considered.
    c. Impacts of Minimum Thresholds, Measurable Objectives and Undesirable Results on beneficial uses and users **are not sufficiently** analyzed.

2. Climate change **is not sufficiently** considered.
3. Data gaps **are not sufficiently** identified and the GSP **does not have a plan** to eliminate them.
4. Projects and Management Actions **do not sufficiently consider** potential impacts or benefits to beneficial uses and users.

Our specific comments related to the deficiencies of the North San Benito Basin Draft GSP along with recommendations on how to reconcile them, are provided in detail in **Attachment A.**

Please refer to the enclosed list of attachments for additional technical recommendations:

| | |
|---|---|
| **Attachment A** | GSP Specific Comments |
| **Attachment B** | SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users |
| **Attachment C** | Freshwater species located in the basin |
| **Attachment D** | The Nature Conservancy's "Identifying GDEs under SGMA: Best Practices for using the NC Dataset" |

Thank you for fully considering our comments as you finalize your GSP.

Best Regards,

Ngodoo Atume
Water Policy Analyst
Clean Water Action/Clean Water Fund

J. Pablo Ortiz-Partida, Ph.D.
Western States Climate and Water Scientist
Union of Concerned Scientists

Samantha Arthur
Working Lands Program Director
Audubon California

Danielle V. Dolan
Water Program Director
Local Government Commission

E.J. Remson
Senior Project Director, California Water Program
The Nature Conservancy

Melissa M. Rohde
Groundwater Scientist
The Nature Conservancy

# Attachment A

**Specific Comments on the North San Benito Basin Draft Groundwater Sustainability Plan**

## 1. Consideration of Beneficial Uses and Users in GSP development

Consideration of beneficial uses and users in GSP development is contingent upon adequate identification and engagement of the appropriate stakeholders. The (A) identification, (B) engagement, and (C) consideration of disadvantaged communities, drinking water users, tribes,[1] groundwater dependent ecosystems, streams, wetlands, and freshwater species are essential for ensuring the GSP integrates existing state policies on the Human Right to Water and the Public Trust Doctrine.

### A. Identification of Key Beneficial Uses and Users

**Disadvantaged Communities and Drinking Water Users**

The identification of Disadvantaged Communities (DACs) and drinking water users is **insufficient**. The GSP provides information about DACs, including identification by name and location on a map. However, it was unclear whether DACs were identified by using US Census places, tracts, or block group data. The GSP fails to document the population of each DAC, and fails to include the population dependent on groundwater as their source of drinking water in the basin.

While the plan provides a density map of domestic wells in the basin, the GSP fails to provide depth of these wells (such as minimum well depth, average well depth, or depth range) within the basin.

These missing elements are required for the GSA to fully understand the specific interests and water demands of these beneficial users, and to support the consideration of beneficial users in the development of sustainable management criteria and selection of projects and management actions.

| **RECOMMENDATIONS** |
| --- |
| • Indicate the level of geographic boundaries for DACs (i.e., US Census places, tracts, or block groups).<br>• Describe the population of each identified DAC.<br>• Identify the sources of drinking water for DAC members, including an estimate of how many people rely on groundwater (e.g., domestic wells, state small water systems, and public water systems). |

[1] Our letter provides a review of the identification and consideration of federally recognized tribes (Data source: SGMA Data viewer) within the GSP from non-tribal members and NGOs. Based on the likely incomplete information available to our organizations for this review, we recommend that the GSA utilize the California Department of Water Resources' "Engagement with Tribal Governments" Guidance Document (https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents) to comprehensively address these important beneficial users in their GSP.

- Include a map showing domestic well locations and average well depth across the basin.

**Interconnected Surface Waters**

The identification of Interconnected Surface Waters (ISWs) is **insufficient**, due to lack of supporting information provided for the ISW analysis. The GSP describes the use of streamflow measurements from the late 1990s and early 2000s to identify the pattern of gaining and losing reaches in the basin. The GSP also describes available depth-to-groundwater data, but provides the caveat (p. 4-18): *"However, available data are of limited use for this purpose due to insufficient geographic and vertical coverage. Available data are almost entirely from water supply wells, which are typically screened 200 to 500 feet below the ground surface. The groundwater elevation (potentiometric head) at the depth of the well screen can be different from the true water table, which is the first zone of saturation reached when drilling down from the ground surface."* The GSP presents contours of depth to groundwater in fall 2017, but contours from this single date are the only data presented.

The GSP presents conflicting conclusions for the ISW analysis. Figure 4-22 (Surface Water Connected to Groundwater) shows gaining and losing reaches in the basin, implying that all reaches in the basin are interconnected. However, Figure 6-6 (Depth to Water October 1992 and April 1998) shows a smaller subset of stream reaches labeled as potentially connected to groundwater. The latter figure is presented in Chapter 6 (Sustainable Management Criteria), not Section 4.11 (Interconnection of Surface Water and Groundwater).

**RECOMMENDATIONS**

- Provide a map showing all the stream reaches in the basin, with reaches clearly labeled as interconnected (gaining and losing) or disconnected. Present this map in Section 4.11 (Interconnection of Surface Water and Groundwater), not Chapter 6 (Sustainable Management Criteria). Consider any segments with data gaps as potential ISWs and clearly mark them as such on maps provided in the GSP.

- Provide depth-to-groundwater contour maps using the best practices presented in Attachment D, to aid in the determination of ISWs. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a digital elevation model (DEM) to estimate depth to groundwater contours across the landscape. This will provide accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

- Use seasonal data over multiple water year types to capture the variability in environmental conditions inherent in California's climate, when mapping ISWs. We recommend the 10-year pre-SGMA baseline period of 2005 to 2015.

- Reconcile ISW data gaps with specific measures (shallow monitoring wells, stream gauges, and nested/clustered wells) along surface water features in the Monitoring Network section of the GSP.

**Groundwater Dependent Ecosystems**
The identification of Groundwater Dependent Ecosystems (GDEs) is **insufficient**, due to a lack of comprehensive, systematic analysis of the basin's GDEs. The GSP provides general discussion of riparian vegetation and depth to groundwater. In addition, the GSP presents an empirical method for relating vegetation health to groundwater elevations in wells, comparing aerial photographs of phreatophytic riparian vegetation before and after droughts. The GSP states (p. 4-22): *"The general conclusion that can be drawn from the pre- and post-drought aerial photograph comparison is that riparian vegetation tends to persist even when groundwater elevations in nearby water supply wells are 35 to 40 feet below the ground surface for a period of two years."* No shallow groundwater data was used to verify the NC dataset polygons, however. The GSP does not provide an overall map of the basin's GDEs illustrating the conclusions of the GDE analysis.

| **RECOMMENDATIONS** |
|---|
| • Develop and describe a systematic approach for analyzing the basin's GDEs. For example, provide a map of the NC Dataset. On the map, label polygons retained or removed from the NC dataset (and the removal reason if polygons are not considered potential GDEs). Discuss how local groundwater data was used to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.<br><br>• Use depth-to-groundwater data from multiple seasons and water year types (e.g., wet, dry, average, drought) to determine the range of depth to groundwater around NC dataset polygons. We recommend that a baseline period (10 years from 2005 to 2015) be established to characterize groundwater conditions over multiple water year types. Refer to Attachment D of this letter for best practices for using local groundwater data to verify whether polygons in the NC Dataset are supported by groundwater in an aquifer.<br><br>• Provide depth-to-groundwater contour maps, noting the best practices presented in Attachment D. Specifically, ensure that the first step is contouring groundwater elevations, and then subtracting this layer from land surface elevations from a DEM to estimate depth-to-groundwater contours across the landscape.<br><br>• If insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons as "Potential GDEs" in the GSP until data gaps are reconciled in the monitoring network.<br><br>• Provide a complete inventory, map, or description of fauna (e.g., birds, fish, amphibian) and flora (e.g., plants) species in the basin and note any threatened or endangered species (see Attachment C in this letter for a list of freshwater species located in the North San Benito Basin). The GSP text discusses plant and animal species dependent on groundwater, but does not provide a complete inventory in tabular form. |

**Native Vegetation and Managed Wetlands**
Native vegetation and managed wetlands are water use sectors that are required to be included in the water budget.[2,3] The integration of these ecosystems into the water budget is **insufficient**. The water budget did explicitly include the current, historical, and projected demands of native vegetation, but did not explicitly include the current, historical, and projected demands of managed wetlands. The GSP discusses managed wetlands, the Pajaro River Wetland Mitigation Bank, on p. 2-5 of the GSP. The omission of explicit water demands for managed wetlands is problematic because key environmental uses of groundwater are not being accounted for as water supply decisions are made using this budget, nor will they likely be considered in project and management actions.

| RECOMMENDATION |
| --- |
| • Quantify and present all water use sector demands in the historical, current, and projected water budgets with individual line items for each water use sector, including managed wetlands. |

## B. Engaging Stakeholders

**Stakeholder Engagement during GSP development**
Stakeholder engagement during GSP development is **insufficient**. SGMA's requirement for public notice and engagement of stakeholders is not fully met by the description in the Communication Plan (Appendix D).[4]

We note the following deficiencies with the overall stakeholder engagement process:

- The opportunities for public involvement and engagement with DACs are described in general terms. They include participation through a Technical Advisory Committee, scheduled meetings, updates to the Water District website, and public workshops. Preliminary ideas for engaging DACs are described, including using "food, faith, and festivals" as opportunities to educate and interact with San Benito County Water District's Spanish speaking community on critical issues, connecting with communities through existing organizations, community events, churches, and schools, and developing bilingual materials. However, it is not clear if these strategies have been implemented.

- Organizations that represent environmental uses of groundwater are mentioned in the GSP, but specific outreach targeted to these groups is not described.

- The Communication Plan does not include a plan for continual opportunities for engagement through the implementation phase of the GSP for DACs, domestic well owners, and environmental stakeholders.

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[2] "'Water use sector' refers to categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation." [23 CCR §351(al)]
[3] "The water budget shall quantify the following, either through direct measurements or estimates based on data: (3) Outflows from the groundwater system by water use sector, including evapotranspiration, groundwater extraction, groundwater discharge to surface water sources, and subsurface groundwater outflow." [23 CCR §354.18]
[4] "A communication section of the Plan shall include a requirement that the GSP identify how it encourages the active involvement of diverse social, cultural, and economic elements of the population within the basin." [23 CCR §354.10(d)(3)]

| RECOMMENDATION |
| --- |
| • In the Communication Plan, describe active and targeted outreach to engage DAC members, domestic well owners, and environmental stakeholders throughout the GSP development and implementation phases. Refer to Attachment B for specific recommendations on how to actively engage stakeholders during all phases of the GSP process.<br><br>• Utilize DWR's tribal engagement guidance to comprehensively address all tribes and tribal interests in the basin within the GSP.[5] |

## C. Considering Beneficial Uses and Users When Establishing Sustainable Management Criteria and Analyzing Impacts on Beneficial Uses and Users

The consideration of beneficial uses and users when establishing sustainable management criteria (SMC) is **insufficient**. The consideration of potential impacts on all beneficial users of groundwater in the basin are required when defining undesirable results and establishing minimum thresholds.[6,7,8]

**Disadvantaged Communities and Drinking Water Users**

For chronic lowering of groundwater levels, minimum thresholds are initially set at historical groundwater level lows and then adjusted upward to be more protective. The GSP acknowledges the impact of minimum thresholds on DACs, by stating justification of the minimum threshold levels as (p. 6-8): *"Upward adjustment to be protective in the San Juan Economically Disadvantaged Area."* The GSP does not state what the impacts of the minimum thresholds to DACs and drinking water users would be, however, when describing undesirable results.

The GSP recognizes that domestic wells could be impacted by groundwater management in the basin. The GSP states (p. 6-6): *"In North San Benito, some concern exists that some recent wells might be relatively shallow because they were constructed during a period when groundwater levels have been maintained at relatively high levels."* The GSP does not attempt to quantify this impact, however. Thus, the GSP does not sufficiently analyze direct and indirect impacts on drinking water users when defining undesirable results, or evaluate the cumulative or indirect impacts of proposed minimum thresholds on drinking water users.

The GSP identifies the constituents of concern (COCs) in the basin for which SMC have been established as total dissolved solids (TDS) and nitrate. Other potential COCs in the basin include perchlorate, selenium, hardness, boron, iron, manganese, arsenic, and chromium. The GSP states (p. 6-28): *"Sustainable criteria have not been developed in this GSP for these constituents*

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[5] Engagement with Tribal Governments Guidance Document. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/Guidance-Doc-for-SGM-Engagement-with-Tribal-Govt_ay_19.pdf

[6] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results." [23 CCR §354.26(b)(3)]

[7] "The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]

[8] "The description of minimum thresholds shall include [...] how state, federal, or local standards relate to the relevant sustainability indicator. If the minimum threshold differs from other regulatory standards, the agency shall explain the nature of and the basis for the difference." [23 CCR §354.28(b)(5)]

*because they are already managed under existing programs or because they are naturally occurring and unlikely to be affected by GSP management actions.*" However, SMC should be established for all COCs in the basin that may be impacted and/or exacerbated by groundwater use or management, in addition to coordinating with water quality regulatory programs. Naturally occurring COCs can be exacerbated as a result of groundwater use or groundwater management within the basin.

**RECOMMENDATIONS**

**Chronic Lowering of Groundwater Levels**

- Describe direct and indirect impacts on DACs and drinking water users when describing undesirable results for chronic lowering of groundwater levels.

- Consider and evaluate the impacts of selected minimum thresholds and measurable objectives on DACs and drinking water users within the basin. Further describe the impact of passing the minimum threshold for these users. For example, provide the number of domestic wells that would be de-watered at the minimum threshold.

**Degraded Water Quality**

- Describe direct and indirect impacts on DACs and drinking water users when defining undesirable results for degraded water quality. For specific guidance on how to consider these users, refer to "Guide to Protecting Water Quality Under the Sustainable Groundwater Management Act."[9]

- Evaluate the cumulative or indirect impacts of proposed minimum thresholds for degraded water quality on DACs and drinking water users.

- Set minimum thresholds and measurable objectives for water quality constituents within the basin, including naturally occurring constituents that can be exacerbated as a result of groundwater use or groundwater management. Ensure they align with drinking water standards.[10]

**Groundwater Dependent Ecosystems and Interconnected Surface Waters**

Sustainable management criteria for chronic lowering of groundwater levels provided in the GSP do not consider potential impacts to environmental beneficial users. The GSP neither describes nor analyzes direct or indirect impacts on environmental users of groundwater when defining undesirable results. This is problematic because without identifying potential impacts to GDEs, minimum thresholds may compromise, or even destroy, these environmental beneficial users. Since GDEs are present in the basin, they must be considered when developing SMC for chronic lowering of groundwater levels. Our comments above in the GDE section note that shallow groundwater data was not used to verify the NC dataset polygons, therefore the GSP may have disregarded some GDEs in the basin. After re-analyzing GDEs based on our comments above, consider potential impacts to GDEs for the chronic lowering of groundwater levels sustainability indicator.

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[9] Guide to Protecting Water Quality under the Sustainable Groundwater Management Act https://d3n8a8pro7vhmx.cloudfront.net/communitywatercenter/pages/293/attachments/original/1559328858/Guide_to_Protecting_Drinking_Water_Quality_Under_the_Sustainable_Groundwater_Management_Act.pdf?1559328858.

[10] "Degraded Water Quality [...] collect sufficient spatial and temporal data from each applicable principal aquifer to determine groundwater quality trends for water quality indicators, as determined by the Agency, to address known water quality issues." [23 CCR §354.34(c)(4)]

In the depletion of interconnected surface water SMC section of the GSP (Section 6.7), the GSP discusses impacts to beneficial users of groundwater and surface water. The GSP uses a water table depth of 20 feet as an estimate of the maximum depth accessed by riparian vegetation, citing typical rooting depths for some phreatophytes in the basin. However, valley oak (*Quercus lobata*) can access groundwater at depths as deep as 80 feet.[11,12] The GSP also does present some discussion of potential causes of undesirable results to GDEs, using aerial photos and measures of vegetative health (i.e., NDVI and NDMI). The GSP does not, however, state how this analysis helps to inform the development of SMC that are protective of terrestrial GDEs.

To establish SMC for depletion of interconnected surface water, the GSP sufficiently discusses impacts to aquatic GDEs. Section 6.7.2. Potential Causes of Undesirable Results presents a modeling analysis to determine the impacts of changes in regional groundwater pumping on passage opportunity for migrating fish. The GSP includes a description of potential impacts on instream habitats within ISWs when minimum thresholds in the subbasin are reached. The GSP states (p. 6-48): "*The minimum threshold is expected to protect beneficial uses of surface water for aquatic and riparian habitat maintenance. The few springs in the interior of the basin that could plausibly be affected by pumping (along Tequisquita Slough and San Juan Creek) are on the upgradient side of the Calaveras and San Andreas faults, where shallow water levels are relatively stable. Along stream reaches in red-legged frog habitat (San Benito River upstream of Bird Creek and Tres Pinos Creek between Tres Pinos Creek Valley and Southside Road), the lowest simulated water levels in the future baseline scenario were under 1992 conditions and were equal to or higher than historical water levels at that time.*"

**RECOMMENDATIONS**

- Analyze depth to water data and rooting depth data for GDEs in the GDE identification section of the GSP, in addition to the sustainable management criteria section. Refer to Attachment B for more information on TNC's plant rooting depth database. Deeper thresholds are necessary for plants that have reported maximum root depths that exceed the averaged 30-ft threshold, such as valley oak (*Quercus lobata*). We recommend that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to-groundwater threshold of 80 feet should be used instead of the 30-ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater.

- When defining undesirable results for chronic lowering of groundwater levels, provide specifics on what biological responses (e.g., extent of habitat, growth, recruitment rates) would best characterize a significant and unreasonable impact to GDEs. Undesirable results to environmental users occur when 'significant and unreasonable' effects on beneficial users are caused by one of the sustainability indicators (i.e., chronic lowering of groundwater levels, degraded water quality, or depletion of interconnected surface water). Thus, potential impacts on environmental beneficial uses and users need to be considered when defining undesirable results in the basin.

[11] Lewis, D.C. and Burgy, R.H. 1964. The relationship between oak tree roots and groundwater in fractured rock as determined by tritium tracing. Journal of Geophysical Research, 69(12), pp.2579-2588.
[12] Howard, Janet L. 1992. Quercus lobata. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: https://www.fs.fed.us/database/feis/plants/tree/quelob/all.html [2021, October 8].

Defining undesirable results is the crucial first step before the minimum thresholds can be determined.[13,14]

- When establishing SMC for the subbasin, consider that the SGMA statute [Water Code §10727.4(l)] specifically calls out that GSPs shall include "impacts on groundwater dependent ecosystems".

## 2. Climate Change

The SGMA statute identifies climate change as a significant threat to groundwater resources and one that must be examined and incorporated in the GSPs. The GSP Regulations require integration of climate change into the projected water budget to ensure that projects and management actions sufficiently account for the range of potential climate futures.[15] The effects of climate change will intensify the impacts of water stress on GDEs, making available shallow groundwater resources especially critical to their survival. Condon *et al.* (2020) shows that GDEs are more likely to succumb to water stress and rely more on groundwater during times of drought.[16] When shallow groundwater is unavailable, riparian forests can die off and key life processes (e.g., migration and spawning) for aquatic organisms, such as steelhead, can be impeded.

The integration of climate change into the projected water budget is **insufficient**. The GSP incorporates climate change into the projected water budget using DWR change factors for 2070. However, the plan does not consider multiple climate scenarios (e.g., the 2070 extremely wet and extremely dry climate scenarios) in the projected water budget. The GSP should clearly and transparently incorporate the extremely wet and dry scenarios provided by DWR into projected water budgets or select more appropriate extreme scenarios for the basin. While these extreme scenarios may have a lower likelihood of occurring, their consequences could be significant and their inclusion can help identify important vulnerabilities in the basin's approach to groundwater management.

The GSP includes climate change into key inputs (e.g., precipitation, evapotranspiration, and surface water flow) of the projected water budget. However, the sustainable yield is based on the projected water budget under baseline conditions. If the water budgets are incomplete, including the omission of extremely wet and dry scenarios, and sustainable yield is not calculated based on climate change projections, then there is increased uncertainty in virtually every subsequent calculation used to plan for projects, derive measurable objectives, and set minimum thresholds. Plans that do not adequately include climate change projections may underestimate future impacts on vulnerable beneficial users of groundwater such as ecosystems, DACs, and domestic well owners.

[13] "The description of undesirable results shall include [...] potential effects on the beneficial uses and users of groundwater, on land uses and property interests, and other potential effects that may occur or are occurring from undesirable results". [23 CCR §354.26(b)(3)]
[14] The description of minimum thresholds shall include [...] how minimum thresholds may affect the interests of beneficial uses and users of groundwater or land uses and property interests." [23 CCR §354.28(b)(4)]
[15] "Each Plan shall rely on the best available information and best available science to quantify the water budget for the basin in order to provide an understanding of historical and projected hydrology, water demand, water supply, land use, population, climate change, sea level rise, groundwater and surface water interaction, and subsurface groundwater flow." [23 CCR §354.18(e)]
[16] Condon et al. 2020. Evapotranspiration depletes groundwater under warming over the contiguous United States. Nature Communications. Available at: https://www.nature.com/articles/s41467-020-14688-0

**RECOMMENDATIONS**

- Integrate climate change, including extremely wet and dry scenarios, into all elements of the projected water budget to form the basis for development of sustainable management criteria and projects and management actions.
- Calculate sustainable yield based on the projected water budget with climate change incorporated.
- Incorporate climate change scenarios into projects and management actions.

## 3. Data Gaps

The consideration of beneficial users when establishing monitoring networks is **insufficient**, due to lack of specific plans to increase the Representative Monitoring Sites (RMSs) in the monitoring network that represent water quality conditions and shallow groundwater elevations around DACs and domestic wells.

Figure 7-1 (Groundwater Level Key Wells, Dedicated and Other Monitoring Wells) and Figure 7-4 (Wells in the SBCWD Water Quality Monitoring Program) show that no monitoring wells are located across portions of the basin near DACs and domestic wells. Beneficial users of groundwater may remain unprotected by the GSP without adequate monitoring and identification of data gaps in the shallow aquifer. The Plan therefore fails to meet SGMA's requirements for the monitoring network.[17]

The GSP provides discussion of data gaps for GDEs and ISWs, including proposed GDE-related biological monitoring, in Sections 6.7.7.1 (Discussion of Monitoring and Management Measures to be Implemented), Section 7.1.6 (Depletion of Interconnected Surface Water), and Section 8.10.2 (Project Implementation).

**RECOMMENDATION**

- Provide maps that overlay current and proposed monitoring well locations with the locations of DACs, domestic wells, GDEs, and ISWs to clearly identify potentially impacted areas. Increase the number of RMSs in the shallow aquifer across the basin as needed to adequately monitor all groundwater condition indicators. Prioritize proximity to DACs and domestic wells when identifying new RMSs.

## 4. Addressing Beneficial Users in Projects and Management Actions

The consideration of beneficial users when developing projects and management actions is **insufficient**, due to the failure to completely identify benefits or impacts of identified projects and management actions, including water quality impacts, to key beneficial users of groundwater such as GDEs, aquatic habitats, surface water users, DACs, and drinking water users. Therefore, potential project and management actions may not protect these beneficial users. Groundwater sustainability under SGMA is defined not just by sustainable yield, but by the avoidance of undesirable results for *all* beneficial users.

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[17] "The monitoring network objectives shall be implemented to accomplish the following: [...] (2) Monitor impacts to the beneficial uses or users of groundwater." [23 CCR §354.34(b)(2)]

**RECOMMENDATIONS**

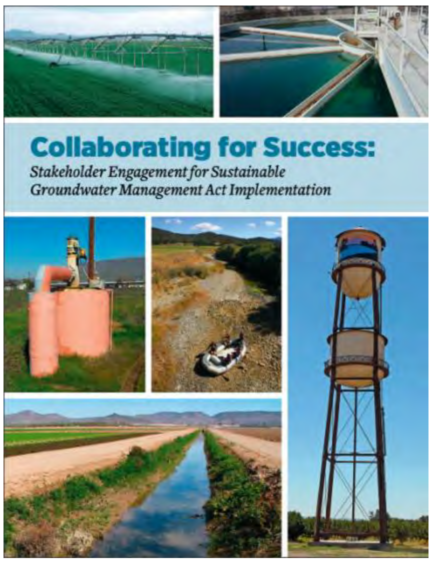
- For DACs and domestic well owners, include a drinking water well impact mitigation program to proactively monitor and protect drinking water wells through GSP implementation. Refer to Attachment B for specific recommendations on how to implement a drinking water well mitigation program.
- For DACs and domestic well owners, include a discussion of whether potential impacts to water quality from projects and management actions could occur and how the GSA plans to mitigate such impacts.
- The GSP discusses potential options for additional surface water storage. Note that recharge ponds, reservoirs, and facilities for managed aquifer recharge can be designed as multiple-benefit projects to include elements that act functionally as wetlands and provide a benefit for wildlife and aquatic species. For guidance on how to integrate multi-benefit recharge projects into your GSP, refer to the "Multi-Benefit Recharge Project Methodology Guidance Document."[18]
- Develop management actions that incorporate climate and water delivery uncertainties to address future water demand and prevent future undesirable results.

[18] The Nature Conservancy. 2021. Multi-Benefit Recharge Project Methodology for Inclusion in Groundwater Sustainability Plans. Sacramento. Available at: https://groundwaterresourcehub.org/sgma-tools/multi-benefit-recharge-project-methodology-guidance/

# Attachment B

## SGMA Tools to address DAC, drinking water, and environmental beneficial uses and users

## Stakeholder Engagement and Outreach




Clean Water Action, Community Water Center and Union of Concerned Scientists developed a guidance document called Collaborating for success: Stakeholder engagement for Sustainable Groundwater Management Act Implementation. It provides details on how to conduct targeted and broad outreach and engagement during Groundwater Sustainability Plan (GSP) development and implementation. Conducting a targeted outreach involves:

- Developing a robust Stakeholder Communication and Engagement plan that includes outreach at frequented locations (schools, farmers markets, religious settings, events) across the plan area to increase the involvement and participation of disadvantaged communities, drinking water users and the environmental stakeholders.
- Providing translation services during meetings and technical assistance to enable easy participation for non-English speaking stakeholders.
- GSP should adequately describe the process for requesting input from beneficial users and provide details on how input is incorporated into the GSP.

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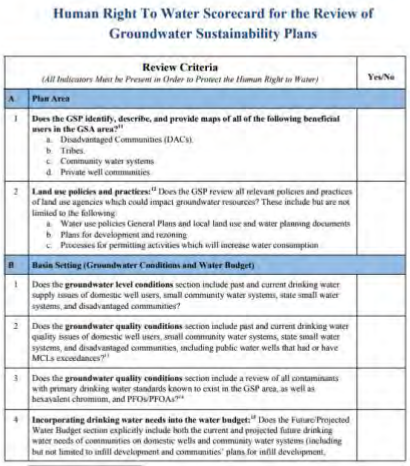
## The Human Right to Water



**Human Right To Water Scorecard for the Review of Groundwater Sustainability Plans**

| | Review Criteria *(All Indicators Must be Present in Order to Protect the Human Right to Water)* | Yes/No |
|---|---|---|
| **A** | **Plan Area** | |
| 1 | **Does the GSP identify, describe, and provide maps of all of the following beneficial users in the GSA area?**[11] a. Disadvantaged Communities (DACs). b. Tribes. c. Community water systems d. Private well communities | |
| 2 | **Land use policies and practices:**[12] Does the GSP review all relevant policies and practices of land use agencies which could impact groundwater resources? These include but are not limited to the following: a. Water use policies General Plans and local land use and water planning documents b. Plans for development and rezoning c. Processes for permitting activities which will increase water consumption | |
| **B** | **Basin Setting (Groundwater Conditions and Water Budget)** | |
| 1 | Does the **groundwater level conditions** section include past and current drinking water supply issues of domestic well users, small community water systems, state small water systems, and disadvantaged communities? | |
| 2 | Does the **groundwater quality conditions** section include past and current drinking water quality issues of domestic well users, small community water systems, state small water systems, and disadvantaged communities, including public water wells that had or have MCLs exceedances?[13] | |
| 3 | Does the **groundwater quality conditions** section include a review of all contaminants with primary drinking water standards known to exist in the GSP area, as well as hexavalent chromium, and PFOs/PFOAs?[14] | |
| 4 | **Incorporating drinking water needs into the water budget:**[15] Does the Future/Projected Water Budget section explicitly include both the current and projected future drinking water needs of communities on domestic wells and community water systems (including but not limited to infill development and communities' plans for infill development, | |

The [Human Right to Water Scorecard] was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid Groundwater Sustainability Agencies (GSAs) in prioritizing drinking water needs in SGMA. The scorecard identifies elements that must exist in GSPs to adequately protect the Human Right to Drinking water.

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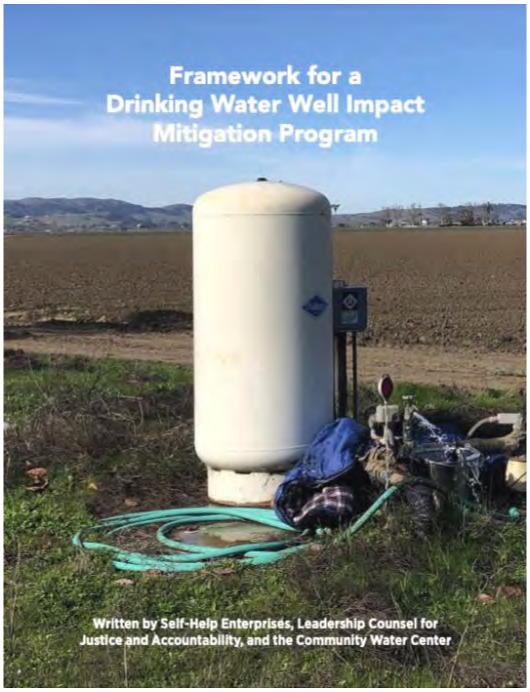
## Drinking Water Well Impact Mitigation Framework




The [Drinking Water Well Impact Mitigation Framework] was developed by Community Water Center, Leadership Counsel for Justice and Accountability and Self Help Enterprises to aid GSAs in the development and implementation of their GSPs. The framework provides a clear roadmap for how a GSA can best structure its data gathering, monitoring network and management actions to proactively monitor and protect drinking water wells and mitigate impacts should they occur.

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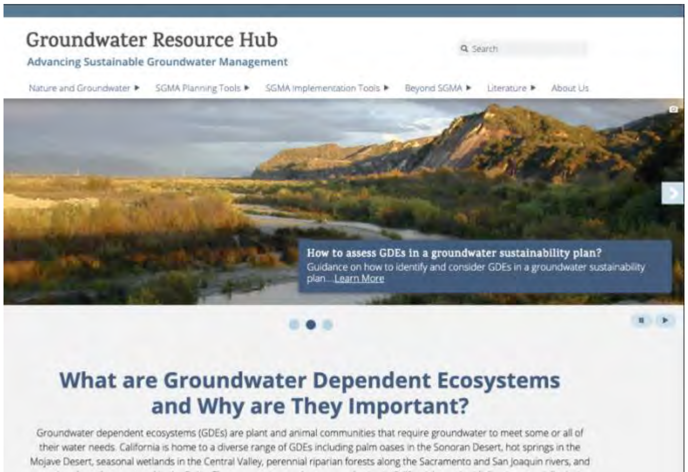
## Groundwater Resource Hub




The Nature Conservancy has developed a suite of tools based on best available science to help GSAs, consultants, and stakeholders efficiently incorporate nature into GSPs.  These tools and resources are available online at GroundwaterResourceHub.org. The Nature Conservancy's tools and resources are intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

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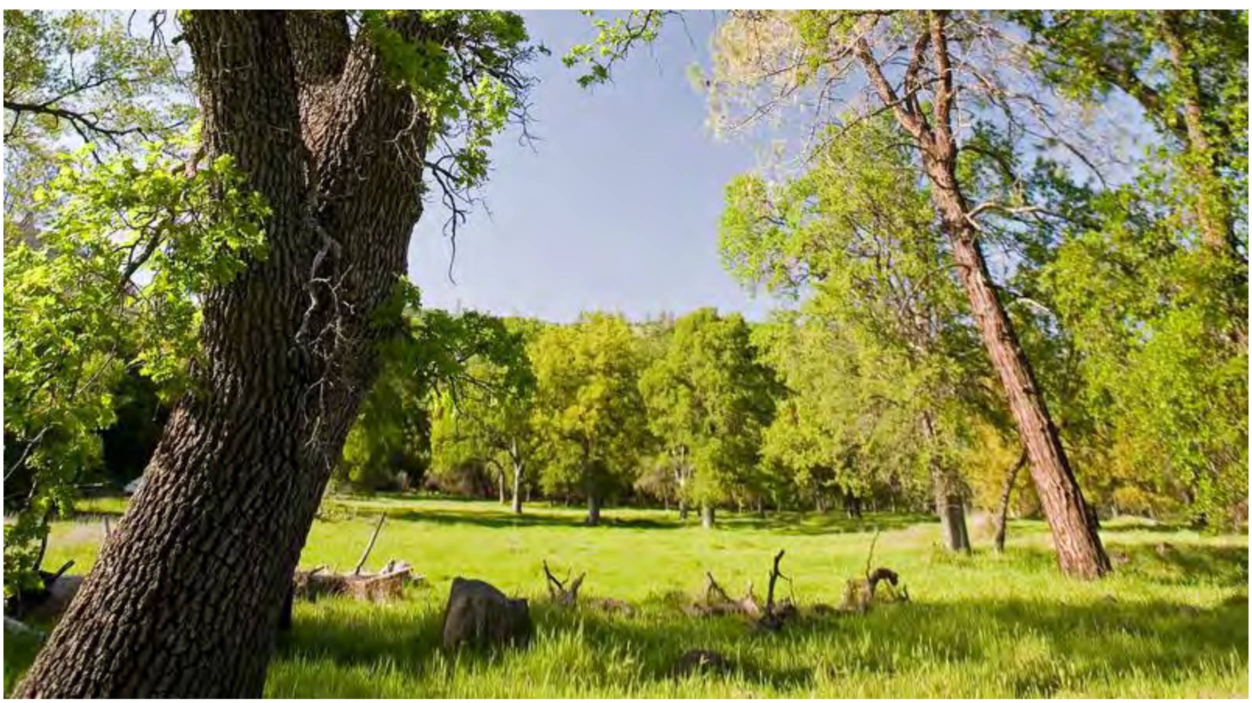
## Rooting Depth Database



The Plant Rooting Depth Database provides information that can help assess whether groundwater-dependent vegetation are accessing groundwater. Actual rooting depths will depend on the plant species and site-specific conditions, such as soil type and availability of other water sources. Site-specific knowledge of depth to groundwater combined with rooting depths will help provide an understanding of the potential groundwater levels are needed to sustain GDEs.

### How to use the database

The maximum rooting depth information in the Plant Rooting Depth Database is useful when verifying whether vegetation in the Natural Communities Commonly Associated with Groundwater (NC Dataset) are connected to groundwater. A 30 ft depth-to-groundwater threshold, which is based on averaged global rooting depth data for phreatophytes[1], is relevant for most plants identified in the NC Dataset since most plants have a max rooting depth of less than 30 feet. However, it is important to note that deeper thresholds are necessary for other plants that have reported maximum root depths that exceed the averaged 30 feet threshold, such as valley oak (*Quercus lobata*), Euphrates poplar (*Populus euphratica*), salt cedar (*Tamarix spp.*), and shadescale (*Atriplex confertifolia*). The Nature Conservancy advises that the reported max rooting depth for these deeper-rooted plants be used. For example, a depth-to groundwater threshold of 80 feet should be used instead of the 30 ft threshold, when verifying whether valley oak polygons from the NC Dataset are connected to groundwater. It is important to re-emphasize that actual rooting depth data are limited and will depend on the plant species and site-specific conditions such as soil and aquifer types, and availability to other water sources.

The Plant Rooting Depth Database is an Excel workbook composed of four worksheets:

1. California phreatophyte rooting depth data (included in the NC Dataset)
2. Global phreatophyte rooting depth data
3. Metadata
4. References

### How the database was compiled

The Plant Rooting Depth Database is a compilation of rooting depth information for the groundwater-dependent plant species identified in the NC Dataset. Rooting depth data were compiled from published scientific literature and expert opinion through a crowdsourcing campaign. As more information becomes available, the database of rooting depths will be updated. Please Contact Us if you have additional rooting depth data for California phreatophytes.

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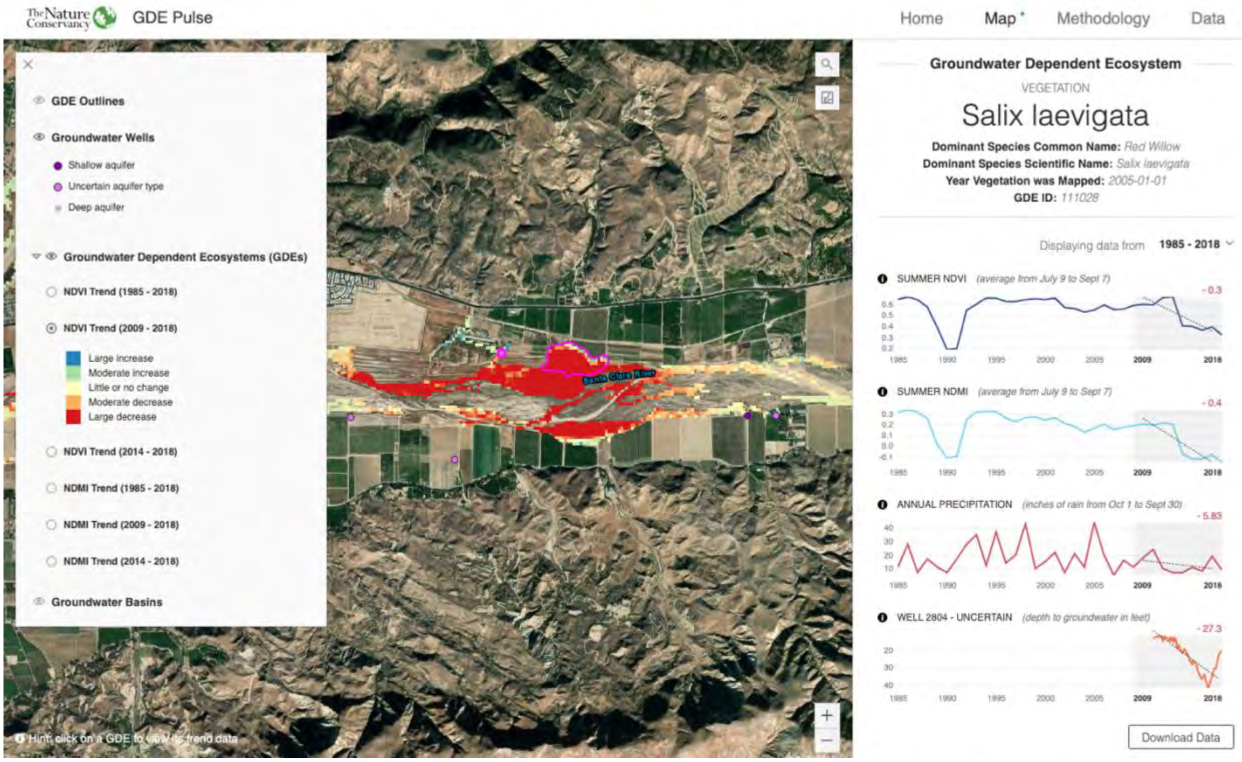
[1] Canadell, J., Jackson, R.B., Ehleringer, J.B. et al. 1996. Maximum rooting depth of vegetation types at the global scale. Oecologia 108, 583–595. https://doi.org/10.1007/BF00329030

# GDE Pulse




[GDE Pulse](#) is a free online tool that allows Groundwater Sustainability Agencies to assess changes in groundwater dependent ecosystem (GDE) health using satellite, rainfall, and groundwater data. Remote sensing data from satellites has been used to monitor the health of vegetation all over the planet. GDE pulse has compiled 35 years of satellite imagery from NASA's Landsat mission for every polygon in the Natural Communities Commonly Associated with Groundwater Dataset. The following datasets are available for downloading:

**Normalized Difference Vegetation Index (NDVI)** is a satellite-derived index that represents the greenness of vegetation. Healthy green vegetation tends to have a higher NDVI, while dead leaves have a lower NDVI. We calculated the average NDVI during the driest part of the year (July - Sept) to estimate vegetation health when the plants are most likely dependent on groundwater.

**Normalized Difference Moisture Index (NDMI)** is a satellite-derived index that represents water content in vegetation. NDMI is derived from the Near-Infrared (NIR) and Short-Wave Infrared (SWIR) channels. Vegetation with adequate access to water tends to have higher NDMI, while vegetation that is water stressed tends to have lower NDMI. We calculated the average NDVI during the driest part of the year (July–September) to estimate vegetation health when the plants are most likely dependent on groundwater.

**Annual Precipitation** is the total precipitation for the water year (October 1st – September 30th) from the PRISM dataset. The amount of local precipitation can affect vegetation with more precipitation generally leading to higher NDVI and NDMI.

**Depth to Groundwater** measurements provide an indication of the groundwater levels and changes over time for the surrounding area. We used groundwater well measurements from nearby (<1km) wells to estimate the depth to groundwater below the GDE based on the average elevation of the GDE (using a digital elevation model) minus the measured groundwater surface elevation.

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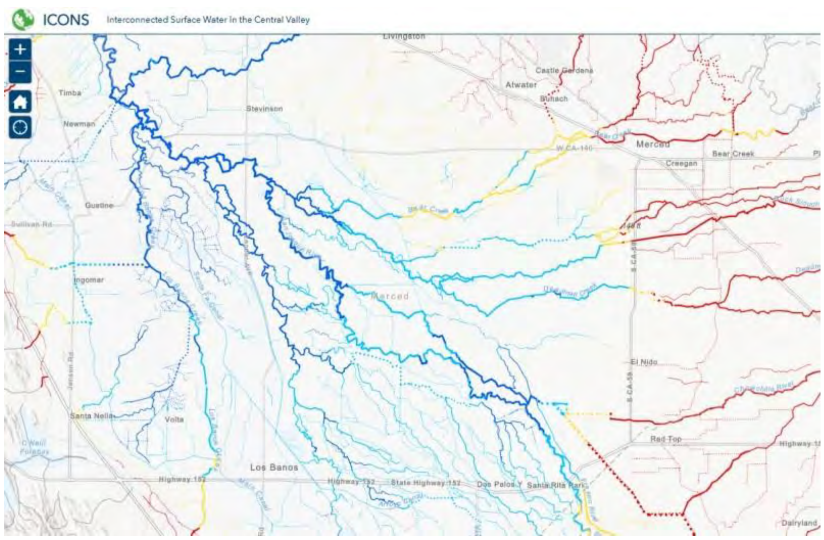
## ICONOS Mapper

### Interconnected Surface Water in the Central Valley




ICONS maps the likely presence of interconnected surface water (ISW) in the Central Valley using depth to groundwater data. Using data from 2011-2018, the ISW dataset represents the likely connection between surface water and groundwater for rivers and streams in California's Central Valley. It includes information on the mean, maximum, and minimum depth to groundwater for each stream segment over the years with available data, as well as the likely presence of ISW based on the minimum depth to groundwater. The Nature Conservancy developed this database, with guidance and input from expert academics, consultants, and state agencies.

We developed this dataset using groundwater elevation data available online from the California Department of Water Resources (DWR). DWR only provides this data for the Central Valley. For GSAs outside of the valley, who have groundwater well measurements, we recommend following our methods to determine likely ISW in your region. The Nature Conservancy's ISW dataset should be used as a first step in reviewing ISW and should be supplemented with local or more recent groundwater depth data.

# Attachment C

## Freshwater Species Located in the San Benito River Valley Basin

To assist in identifying the beneficial users of surface water necessary to assess the undesirable result "depletion of interconnected surface waters", Attachment C provides a list of freshwater species located in the San Benito River Valley Basin. To produce the freshwater species list, we used ArcGIS to select features within the California Freshwater Species Database version 2.0.9 within the basin boundary. This database contains information on ~4,000 vertebrates, macroinvertebrates and vascular plants that depend on fresh water for at least one stage of their life cycle. The methods used to compile the California Freshwater Species Database can be found in Howard et al. 2015[1]. The spatial database contains locality observations and/or distribution information from ~400 data sources. The database is housed in the California Department of Fish and Wildlife's BIOS[2] as well as on The Nature Conservancy's science website[3].

| Scientific Name | Common Name | Legal Protected Status | | |
|---|---|---|---|---|
| | | Federal | State | Other |
| **BIRDS** | | | | |
| Actitis macularius | Spotted Sandpiper | | | |
| Aechmophorus occidentalis | Western Grebe | | | |
| Agelaius tricolor | Tricolored Blackbird | Bird of Conservation Concern | Special Concern | BSSC - First priority |
| Anas americana | American Wigeon | | | |
| Anas crecca | Green-winged Teal | | | |
| Anas platyrhynchos | Mallard | | | |
| Ardea alba | Great Egret | | | |
| Ardea herodias | Great Blue Heron | | | |
| Bucephala albeola | Bufflehead | | | |
| Butorides virescens | Green Heron | | | |
| Calidris minutilla | Least Sandpiper | | | |
| Empidonax traillii | Willow Flycatcher | Bird of Conservation Concern | Endangered | |
| Fulica americana | American Coot | | | |
| Gallinago delicata | Wilson's Snipe | | | |
| Haliaeetus leucocephalus | Bald Eagle | Bird of Conservation Concern | Endangered | |
| Himantopus mexicanus | Black-necked Stilt | | | |
| Icteria virens | Yellow-breasted Chat | | Special Concern | BSSC - Third priority |
| Megaceryle alcyon | Belted Kingfisher | | | |

[1] Howard, J.K. et al. 2015. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PLoSONE, 11(7). Available at: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130710

[2] California Department of Fish and Wildlife BIOS: https://www.wildlife.ca.gov/data/BIOS

[3] Science for Conservation: https://www.scienceforconservation.org/products/california-freshwater-species-database

| | | | | |
|---|---|---|---|---|
| Oxyura jamaicensis | Ruddy Duck | | | |
| Phalacrocorax auritus | Double-crested Cormorant | | | |
| Podilymbus podiceps | Pied-billed Grebe | | | |
| Recurvirostra americana | American Avocet | | | |
| Setophaga petechia | Yellow Warbler | | | BSSC - Second priority |
| Tachycineta bicolor | Tree Swallow | | | |
| Tringa melanoleuca | Greater Yellowlegs | | | |
| Tringa solitaria | Solitary Sandpiper | | | |
| Xanthocephalus xanthocephalus | Yellow-headed Blackbird | | Special Concern | BSSC - Third priority |
| **CRUSTACEANS** | | | | |
| Branchinecta lynchi | Vernal Pool Fairy Shrimp | Threatened | Special | IUCN - Vulnerable |
| Hyalella spp. | Hyalella spp. | | | |
| **FISH** | | | | |
| Oncorhynchus mykiss - SCCC | South Central California coast steelhead | Threatened | Special Concern | Vulnerable - Moyle 2013 |
| **HERPS** | | | | |
| Actinemys marmorata marmorata | Western Pond Turtle | | Special Concern | ARSSC |
| Ambystoma californiense californiense | California Tiger Salamander | Threatened | Threatened | ARSSC |
| Anaxyrus boreas boreas | Boreal Toad | | | |
| Rana boylii | Foothill Yellow-legged Frog | Under Review in the Candidate or Petition Process | Special Concern | ARSSC |
| Rana draytonii | California Red-legged Frog | Threatened | Special Concern | ARSSC |
| Spea hammondii | Western Spadefoot | Under Review in the Candidate or Petition Process | Special Concern | ARSSC |
| Thamnophis hammondii hammondii | Two-striped Gartersnake | | Special Concern | ARSSC |
| Thamnophis sirtalis sirtalis | Common Gartersnake | | | |
| Anaxyrus boreas halophilus | California Toad | | | ARSSC |
| Pseudacris regilla | Northern Pacific Chorus Frog | | | |
| Pseudacris sierra | Sierran Treefrog | | | |

| | | | | |
|---|---|---|---|---|
| Thamnophis sirtalis fitchi | Valley Gartersnake | | | Not on any status lists |
| Thamnophis sirtalis infernalis | California Red-sided Gartersnake | | | Not on any status lists |
| **INSECTS & OTHER INVERTS** | | | | |
| Optioservus canus | Pinnacles Optioservus Riffle Beetle | | Special | |
| Sweltsa tamalpa | Tamalpais Sallfly | | | |
| Acentrella spp. | Acentrella spp. | | | |
| Agabus spp. | Agabus spp. | | | |
| Ambrysus spp. | Ambrysus spp. | | | |
| Apedilum spp. | Apedilum spp. | | | |
| Argia spp. | Argia spp. | | | |
| Argia vivida | Vivid Dancer | | | |
| Baetidae fam. | Baetidae fam. | | | |
| Baetis adonis | A Mayfly | | | |
| Baetis spp. | Baetis spp. | | | |
| Brechmorhoga mendax | Pale-faced Clubskimmer | | | |
| Brillia spp. | Brillia spp. | | | |
| Caenis bajaensis | A Mayfly | | | |
| Centroptilum spp. | Centroptilum spp. | | | |
| Cheumatopsyche spp. | Cheumatopsyche spp. | | | |
| Chironomidae fam. | Chironomidae fam. | | | |
| Coenagrionidae fam. | Coenagrionidae fam. | | | |
| Conchapelopia spp. | Conchapelopia spp. | | | |
| Corixidae fam. | Corixidae fam. | | | |
| Cricotopus spp. | Cricotopus spp. | | | |
| Cryptochironomus spp. | Cryptochironomus spp. | | | |
| Cryptotendipes spp. | Cryptotendipes spp. | | | |
| Dicrotendipes modestus | | | | Not on any status lists |
| Erpetogomphus spp. | Erpetogomphus spp. | | | |
| Eukiefferiella spp. | Eukiefferiella spp. | | | |
| Fallceon quilleri | A Mayfly | | | |
| Fallceon spp. | Fallceon spp. | | | |
| Gumaga spp. | Gumaga spp. | | | |
| Gyrinus spp. | Gyrinus spp. | | | |
| Hetaerina americana | American Rubyspot | | | |
| Hydropsyche spp. | Hydropsyche spp. | | | |
| Hydropsychidae fam. | Hydropsychidae fam. | | | |
| Hydroptila spp. | Hydroptila spp. | | | |
| Hydroptilidae fam. | Hydroptilidae fam. | | | |
| Ischnura denticollis | Black-fronted Forktail | | | |
| Ischnura perparva | Western Forktail | | | |
| Lepidostoma spp. | Lepidostoma spp. | | | |

| | | | | |
|---|---|---|---|---|
| Limnophyes spp. | Limnophyes spp. | | | |
| Microcylloepus spp. | Microcylloepus spp. | | | |
| Micropsectra spp. | Micropsectra spp. | | | |
| Microtendipes spp. | Microtendipes spp. | | | |
| Nectopsyche spp. | Nectopsyche spp. | | | |
| Neotrichia spp. | Neotrichia spp. | | | |
| Ochrotrichia spp. | Ochrotrichia spp. | | | |
| Paltothemis lineatipes | Red Rock Skimmer | | | |
| Pantala hymenaea | Spot-winged Glider | | | |
| Parametriocnemus spp. | Parametriocnemus spp. | | | |
| Paratendipes spp. | Paratendipes spp. | | | |
| Peltodytes spp. | Peltodytes spp. | | | |
| Pentaneura spp. | Pentaneura spp. | | | |
| Phaenopsectra spp. | Phaenopsectra spp. | | | |
| Polypedilum spp. | Polypedilum spp. | | | |
| Postelichus spp. | Postelichus spp. | | | |
| Psephenus falli | | | | Not on any status lists |
| Pseudochironomus spp. | Pseudochironomus spp. | | | |
| Radotanypus spp. | Radotanypus spp. | | | |
| Rheotanytarsus spp. | Rheotanytarsus spp. | | | |
| Rhionaeschna multicolor | Blue-eyed Darner | | | |
| Sialis spp. | Sialis spp. | | | |
| Sigara mckinstryi | A Water Boatman | | | Not on any status lists |
| Simulium spp. | Simulium spp. | | | |
| Sperchon spp. | Sperchon spp. | | | |
| Sympetrum madidum | Red-veined Meadowhawk | | | |
| Tanytarsus spp. | Tanytarsus spp. | | | |
| Tricorythodes spp. | Tricorythodes spp. | | | |
| **MOLLUSKS** | | | | |
| Physa spp. | Physa spp. | | | |
| Pisidium spp. | Pisidium spp. | | | |
| **PLANTS** | | | | |
| Azolla filiculoides | NA | | | |
| Baccharis salicina | | | | Not on any status lists |
| Berula erecta | Wild Parsnip | | | |
| Callitriche marginata | Winged Water-starwort | | | |
| Cotula coronopifolia | NA | | | |
| Crassula aquatica | Water Pygmyweed | | | |
| Cyperus erythrorhizos | Red-root Flatsedge | | | |
| Cyperus squarrosus | Awned Cyperus | | | |

| | | | | |
|---|---|---|---|---|
| Datisca glomerata | Durango Root | | | |
| Elatine californica | California Waterwort | | | |
| Eleocharis macrostachya | Creeping Spikerush | | | |
| Eleocharis parishii | Parish's Spikerush | | | |
| Eleocharis rostellata | Beaked Spikerush | | | |
| Euthamia occidentalis | Western Fragrant Goldenrod | | | |
| Helenium puberulum | Rosilla | | | |
| Hydrocotyle umbellata | Many-flower Marsh-pennywort | | | |
| Juncus effusus pacificus | | | | |
| Juncus phaeocephalus paniculatus | Brownhead Rush | | | |
| Juncus xiphioides | Iris-leaf Rush | | | |
| Lemna minor | Lesser Duckweed | | | |
| Lemna valdiviana | Pale Duckweed | | | |
| Limnanthes douglasii douglasii | Douglas' Meadowfoam | | | |
| Limosella aquatica | Northern Mudwort | | | |
| Mimulus cardinalis | Scarlet Monkeyflower | | | |
| Mimulus guttatus | Common Large Monkeyflower | | | |
| Mimulus pilosus | | | | Not on any status lists |
| Montia fontana fontana | Fountain Miner's-lettuce | | | |
| Perideridia californica | California Yampah | | | |
| Phacelia distans | NA | | | |
| Platanus racemosa | California Sycamore | | | |
| Potamogeton foliosus foliosus | Leafy Pondweed | | | |
| Potamogeton nodosus | Longleaf Pondweed | | | |
| Rorippa curvisiliqua curvisiliqua | Curve-pod Yellowcress | | | |
| Rumex salicifolius salicifolius | Willow Dock | | | |
| Salix exigua exigua | Narrowleaf Willow | | | |
| Salix laevigata | Polished Willow | | | |
| Salix lasiolepis lasiolepis | Arroyo Willow | | | |
| Scirpus microcarpus | Small-fruit Bulrush | | | |
| Stachys albens | White-stem Hedge-nettle | | | |
| Stachys pycnantha | Short-spike Hedge-nettle | | | |
| Typha domingensis | Southern Cattail | | | |

| | | | | |
|---|---|---|---|---|
| Veronica anagallis-aquatica | NA | | | |
| Veronica catenata | NA | | | Not on any status lists |

# Attachment D

July 2019

## IDENTIFYING GDEs UNDER SGMA

### Best Practices for using the NC Dataset

The Sustainable Groundwater Management Act (SGMA) requires that groundwater dependent ecosystems (GDEs) be identified in Groundwater Sustainability Plans (GSPs). As a starting point, the Department of Water Resources (DWR) is providing the Natural Communities Commonly Associated with Groundwater Dataset (NC Dataset) online[1] to help Groundwater Sustainability Agencies (GSAs), consultants, and stakeholders identify GDEs within individual groundwater basins. To apply information from the NC Dataset to local areas, GSAs should combine it with the best available science on local hydrology, geology, and groundwater levels to verify whether polygons in the NC dataset are likely supported by groundwater in an aquifer (Figure 1)[2]. This document highlights six best practices for using local groundwater data to confirm whether mapped features in the NC dataset are supported by groundwater.

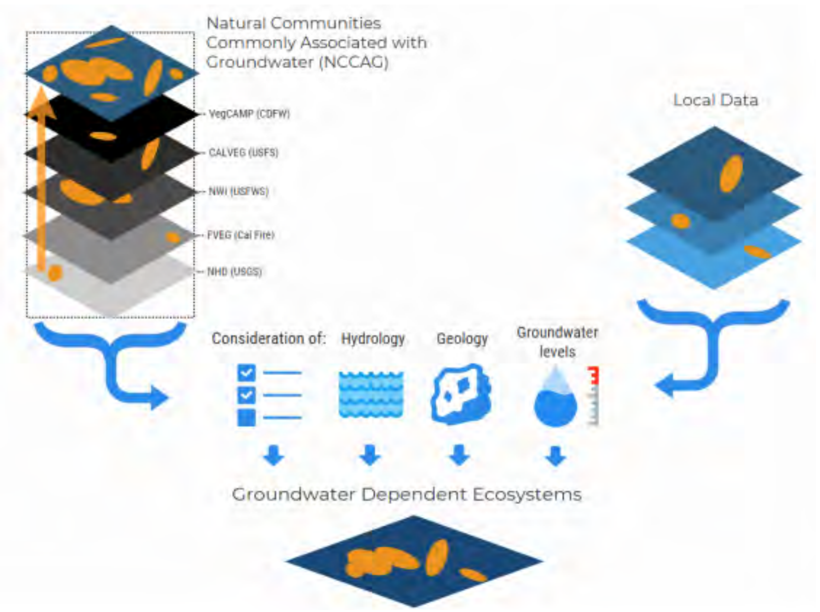



**Figure 1. Considerations for GDE identification.**
Source: DWR[2]

[1] NC Dataset Online Viewer: https://gis.water.ca.gov/app/NCDatasetViewer/
[2] California Department of Water Resources (DWR). 2018. Summary of the "Natural Communities Commonly Associated with Groundwater" Dataset and Online Web Viewer. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/Natural-Communities-Dataset-Summary-Document.pdf

The NC Dataset identifies vegetation and wetland features that are good indicators of a GDE. The dataset is comprised of 48 publicly available state and federal datasets that map vegetation, wetlands, springs, and seeps commonly associated with groundwater in California[3]. It was developed through a collaboration between DWR, the Department of Fish and Wildlife, and The Nature Conservancy (TNC). TNC has also provided detailed guidance on identifying GDEs from the NC dataset[4] on the Groundwater Resource Hub[5], a website dedicated to GDEs.

### BEST PRACTICE #1. Establishing a Connection to Groundwater

Groundwater basins can be comprised of one continuous aquifer (Figure 2a) or multiple aquifers stacked on top of each other (Figure 2b). In unconfined aquifers (Figure 2a), using the depth-to-groundwater and the rooting depth of the vegetation is a reasonable method to infer groundwater dependence for GDEs. If groundwater is well below the rooting (and capillary) zone of the plants and any wetland features, the ecosystem is considered disconnected and groundwater management is not likely to affect the ecosystem (Figure 2d). However, it is important to consider local conditions (e.g., soil type, groundwater flow gradients, and aquifer parameters) and to review groundwater depth data from multiple seasons and water year types (wet and dry) because intermittent periods of high groundwater levels can replenish perched clay lenses that serve as the water source for GDEs (Figure 2c). Maintaining these natural groundwater fluctuations are important to sustaining GDE health.

Basins with a stacked series of aquifers (Figure 2b) may have varying levels of pumping across aquifers in the basin, depending on the production capacity or water quality associated with each aquifer. If pumping is concentrated in deeper aquifers, SGMA still requires GSAs to sustainably manage groundwater resources in shallow aquifers, such as perched aquifers, that support springs, surface water, domestic wells, and GDEs (Figure 2). This is because vertical groundwater gradients across aquifers may result in pumping from deeper aquifers to cause adverse impacts onto beneficial users reliant on shallow aquifers or interconnected surface water. The goal of SGMA is to sustainably manage groundwater resources for current and future social, economic, and environmental benefits. While groundwater pumping may not be currently occurring in a shallower aquifer, use of this water may become more appealing and economically viable in future years as pumping restrictions are placed on the deeper production aquifers in the basin to meet the sustainable yield and criteria. Thus, identifying GDEs in the basin should done irrespective to the amount of current pumping occurring in a particular aquifer, so that future impacts on GDEs due to new production can be avoided. A good rule of thumb to follow is: *if groundwater can be pumped from a well - it's an aquifer*.

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[3] For more details on the mapping methods, refer to: Klausmeyer, K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Available at: https://groundwaterresourcehub.org/public/uploads/pdfs/iGDE_data_paper_20180423.pdf

[4] "Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans" is available at: https://groundwaterresourcehub.org/gde-tools/gsp-guidance-document/

[5] The Groundwater Resource Hub: www.GroundwaterResourceHub.org

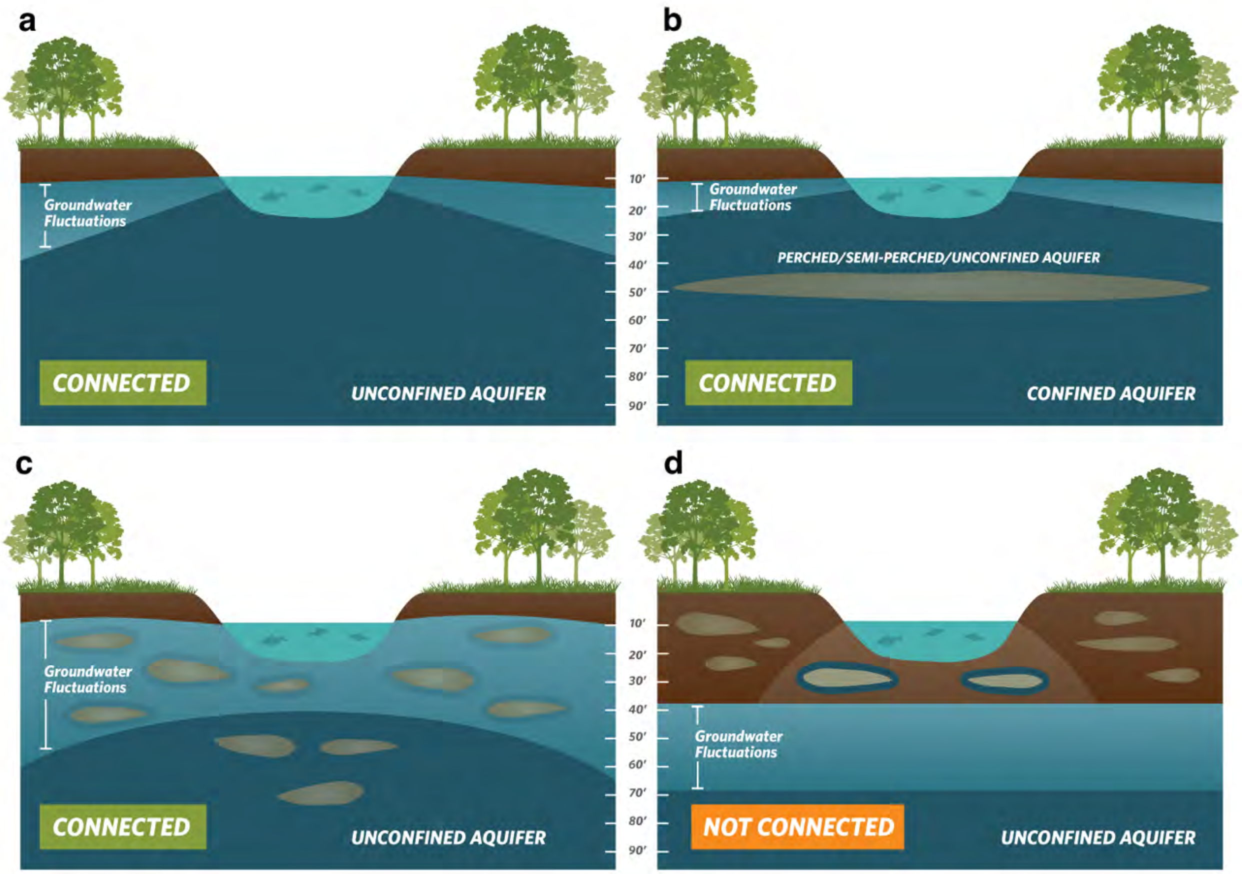


**Figure 2. Confirming whether an ecosystem is connected to groundwater. Top: (a)** Under the ecosystem is an unconfined aquifer with depth-to-groundwater fluctuating seasonally and interannually within 30 feet from land surface. **(b)** Depth-to-groundwater in the shallow aquifer is connected to overlying ecosystem. Pumping predominately occurs in the confined aquifer, but pumping is possible in the shallow aquifer. **Bottom: (c)** Depth-to-groundwater fluctuations are seasonally and interannually large, however, clay layers in the near surface prolong the ecosystem's connection to groundwater. **(d)** Groundwater is disconnected from surface water, and any water in the vadose (unsaturated) zone is due to direct recharge from precipitation and indirect recharge under the surface water feature. These areas are not connected to groundwater and typically support species that do not require access to groundwater to survive.

## BEST PRACTICE #2. Characterize Seasonal and Interannual Groundwater Conditions

SGMA requires GSAs to describe current and historical groundwater conditions when identifying GDEs [23 CCR §354.16(g)]. Relying solely on the SGMA benchmark date (January 1, 2015) or any other single point in time to characterize groundwater conditions (e.g., depth-to-groundwater) is inadequate because managing groundwater conditions with data from one time point fails to capture the seasonal and interannual variability typical of California's climate. DWR's Best Management Practices document on water budgets[6] recommends using 10 years of water supply and water budget information to describe how historical conditions have impacted the operation of the basin within sustainable yield, implying that a baseline[7] could be determined based on data between 2005 and 2015. Using this or a similar time period, depending on data availability, is recommended for determining the depth-to-groundwater.

GDEs depend on groundwater levels being close enough to the land surface to interconnect with surface water systems or plant rooting networks. The most practical approach[8] for a GSA to assess whether polygons in the NC dataset are connected to groundwater is to rely on groundwater elevation data. As detailed in TNC's GDE guidance document[4], one of the key factors to consider when mapping GDEs is to contour depth-to-groundwater in the aquifer that is supporting the ecosystem (see Best Practice #5).

Groundwater levels fluctuate over time and space due to California's Mediterranean climate (dry summers and wet winters), climate change (flood and drought years), and subsurface heterogeneity in the subsurface (Figure 3). Many of California's GDEs have adapted to dealing with intermittent periods of water stress, however if these groundwater conditions are prolonged, adverse impacts to GDEs can result. While depth-to-groundwater levels within 30 feet[4] of the land surface are generally accepted as being a proxy for confirming that polygons in the NC dataset are supported by groundwater, it is highly advised that fluctuations in the groundwater regime be characterized to understand the seasonal and interannual groundwater variability in GDEs. Utilizing groundwater data from one point in time can misrepresent groundwater levels required by GDEs, and inadvertently result in adverse impacts to the GDEs. Time series data on groundwater elevations and depths are available on the SGMA Data Viewer[9]. However, if insufficient data are available to describe groundwater conditions within or near polygons from the NC dataset, include those polygons in the GSP until data gaps are reconciled in the monitoring network (see Best Practice #6).

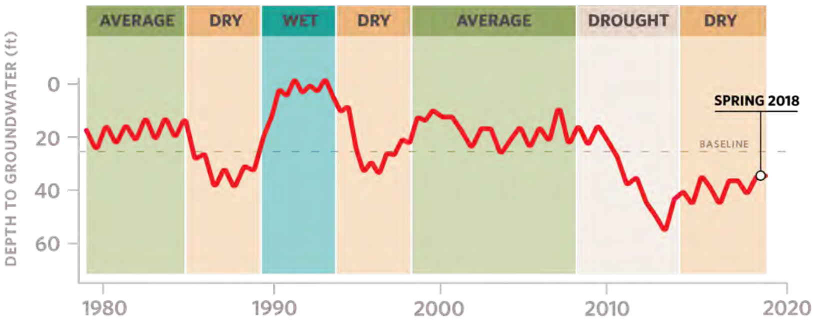


**Figure 3. Example seasonality and interannual variability in depth-to-groundwater over time.** Selecting one point in time, such as Spring 2018, to characterize groundwater conditions in GDEs fails to capture what groundwater conditions are necessary to maintain the ecosystem status into the future so adverse impacts are avoided.

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[6] DWR. 2016. Water Budget Best Management Practice. Available at: https://water.ca.gov/LegacyFiles/groundwater/sgm/pdfs/BMP_Water_Budget_Final_2016-12-23.pdf

[7] Baseline is defined under the GSP regulations as "historic information used to project future conditions for hydrology, water demand, and availability of surface water and to evaluate potential sustainable management practices of a basin." [23 CCR §351(e)]

[8] Groundwater reliance can also be confirmed via stable isotope analysis and geophysical surveys. For more information see The GDE Assessment Toolbox (Appendix IV, GDE Guidance Document for GSPs[4]).

[9] SGMA Data Viewer: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer

## BEST PRACTICE #3. Ecosystems Often Rely on Both Groundwater and Surface Water

GDEs are plants and animals that rely on groundwater for all or some of its water needs, and thus can be supported by multiple water sources. The presence of non-groundwater sources (e.g., surface water, soil moisture in the vadose zone, applied water, treated wastewater effluent, urban stormwater, irrigated return flow) within and around a GDE does not preclude the possibility that it is supported by groundwater, too. SGMA defines GDEs as "ecological communities and species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface" [23 CCR §351(m)]. Hence, depth-to-groundwater data should be used to identify whether NC polygons are supported by groundwater and should be considered GDEs. In addition, SGMA requires that significant and undesirable adverse impacts to beneficial users of surface water be avoided. Beneficial users of surface water include environmental users such as plants or animals[10], which therefore must be considered when developing minimum thresholds for depletions of interconnected surface water.

GSAs are only responsible for impacts to GDEs resulting from groundwater conditions in the basin, so if adverse impacts to GDEs result from the diversion of applied water, treated wastewater, or irrigation return flow away from the GDE, then those impacts will be evaluated by other permitting requirements (e.g., CEQA) and may not be the responsibility of the GSA. However, if adverse impacts occur to the GDE due to changing groundwater conditions resulting from pumping or groundwater management activities, then the GSA would be responsible (Figure 4).

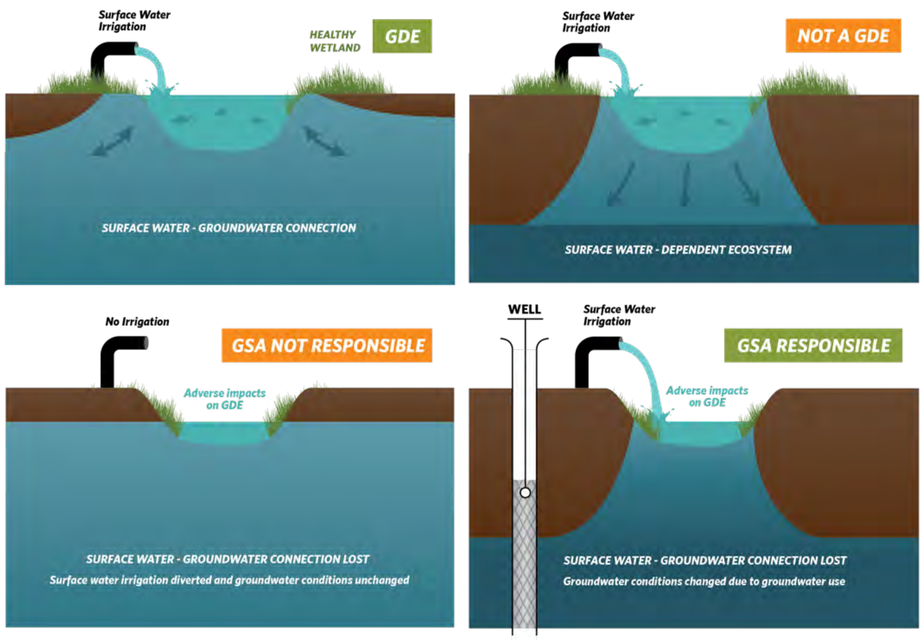


**Figure 4. Ecosystems often depend on multiple sources of water. Top: (Left)** Surface water and groundwater are interconnected, meaning that the GDE is supported by both groundwater and surface water. **(Right)** Ecosystems that are only reliant on non-groundwater sources are not groundwater-dependent. **Bottom: (Left)** An ecosystem that was once dependent on an interconnected surface water, but loses access to groundwater solely due to surface water diversions may not be the GSA's responsibility. **(Right)** Groundwater dependent ecosystems once dependent on an interconnected surface water system, but loses that access due to groundwater pumping is the GSA's responsibility.

[10] For a list of environmental beneficial users of surface water by basin, visit: https://groundwaterresourcehub.org/gde-tools/environmental-surface-water-beneficiaries/

## BEST PRACTICE #4. Select Representative Groundwater Wells

Identifying GDEs in a basin requires that groundwater conditions are characterized to confirm whether polygons in the NC dataset are supported by the underlying aquifer. To do this, proximate groundwater wells should be identified to characterize groundwater conditions (Figure 5). When selecting representative wells, it is particularly important to consider the subsurface heterogeneity around NC polygons, especially near surface water features where groundwater and surface water interactions occur around heterogeneous stratigraphic units or aquitards formed by fluvial deposits. The following selection criteria can help ensure groundwater levels are representative of conditions within the GDE area:

- Choose wells that are within 5 kilometers (3.1 miles) of each NC Dataset polygons because they are more likely to reflect the local conditions relevant to the ecosystem. If there are no wells within 5km of the center of a NC dataset polygon, then there is insufficient information to remove the polygon based on groundwater depth. Instead, it should be retained as a potential GDE until there are sufficient data to determine whether or not the NC Dataset polygon is supported by groundwater.

- Choose wells that are screened within the surficial unconfined aquifer and capable of measuring the true water table.

- Avoid relying on wells that have insufficient information on the screened well depth interval for excluding GDEs because they could be providing data on the wrong aquifer. This type of well data should not be used to remove any NC polygons.

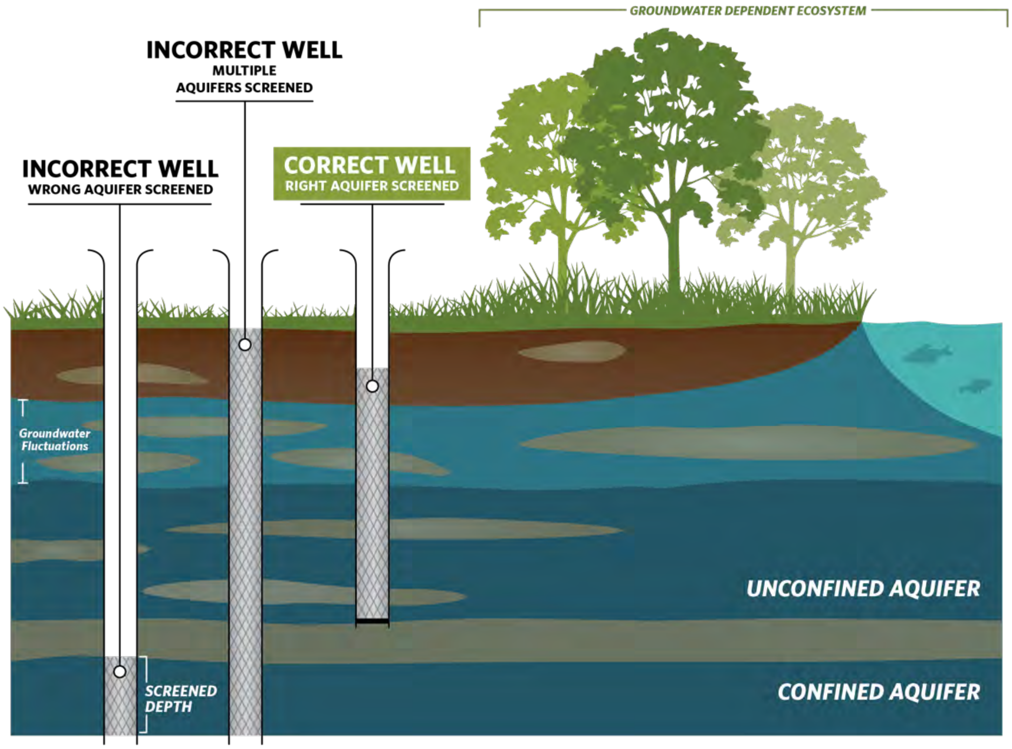


**Figure 5. Selecting representative wells to characterize groundwater conditions near GDEs.**

## BEST PRACTICE #5. Contouring Groundwater Elevations

The common practice to contour depth-to-groundwater over a large area by interpolating measurements at monitoring wells is unsuitable for assessing whether an ecosystem is supported by groundwater. This practice causes errors when the land surface contains features like stream and wetland depressions because it assumes the land surface is constant across the landscape and depth-to-groundwater is constant below these low-lying areas (Figure 6a). A more accurate approach is to interpolate **groundwater elevations** at monitoring wells to get groundwater elevation contours across the landscape. This layer can then be subtracted from land surface elevations from a Digital Elevation Model (DEM)[11] to estimate depth-to-groundwater contours across the landscape (Figure b; Figure 7). This will provide a much more accurate contours of depth-to-groundwater along streams and other land surface depressions where GDEs are commonly found.

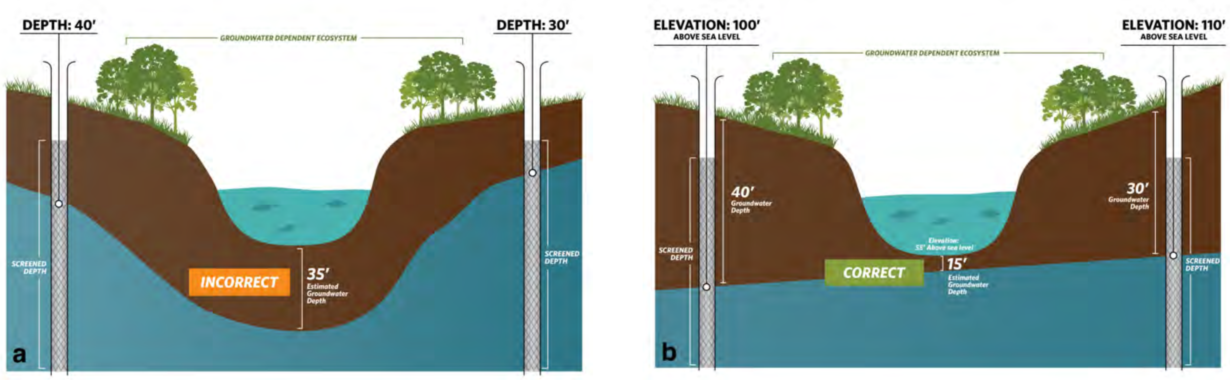


**Figure 6. Contouring depth-to-groundwater around surface water features and GDEs. (a)** Groundwater level interpolation using depth-to-groundwater data from monitoring wells. **(b)** Groundwater level interpolation using groundwater elevation data from monitoring wells and DEM data.

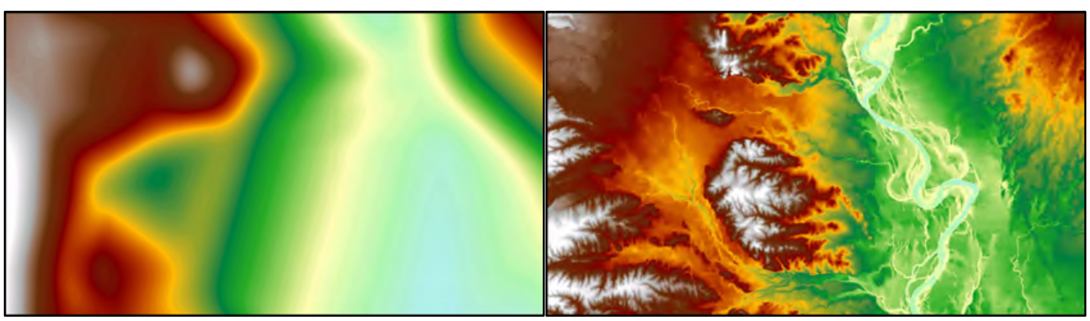

**Figure 7. Depth-to-groundwater contours in Northern California. (Left)** Contours were interpolated using depth-to-groundwater measurements determined at each well. **(Right)** Contours were determined by interpolating groundwater elevation measurements at each well and superimposing ground surface elevation from DEM spatial data to generate depth-to-groundwater contours. The image on the right shows a more accurate depth-to-groundwater estimate because it takes the local topography and elevation changes into account.

[11] USGS Digital Elevation Model data products are described at: https://www.usgs.gov/core-science-systems/ngp/3dep/about-3dep-products-services and can be downloaded at: https://iewer.nationalmap.gov/basic/

## BEST PRACTICE #6. Best Available Science

Adaptive management is embedded within SGMA and provides a process to work toward sustainability over time by beginning with the best available information to make initial decisions, monitoring the results of those decisions, and using the data collected through monitoring programs to revise decisions in the future. In many situations, the hydrologic connection of NC dataset polygons will not initially be clearly understood if site-specific groundwater monitoring data are not available. If sufficient data are not available in time for the 2020/2022 plan, **The Nature Conservancy strongly advises that questionable polygons from the NC dataset be included in the GSP until data gaps are reconciled in the monitoring network.** Erring on the side of caution will help minimize inadvertent impacts to GDEs as a result of groundwater use and management actions during SGMA implementation.

### KEY DEFINITIONS

**Groundwater basin** is an aquifer or stacked series of aquifers with reasonably well-defined boundaries in a lateral direction, based on features that significantly impede groundwater flow, and a definable bottom. *23 CCR §341(g)(1)*

**Groundwater dependent ecosystem (GDE)** are ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. *23 CCR §351(m)*

**Interconnected surface water (ISW)** surface water that is hydraulically connected at any point by a continuous saturated zone to the underlying aquifer and the overlying surface water is not completely depleted. *23 CCR §351(o)*

**Principal aquifers** are aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems. *23 CCR §351(aa)*

### ABOUT US

The Nature Conservancy is a science-based nonprofit organization whose mission is *to conserve the lands and waters on which all life depends*. To support successful SGMA implementation that meets the future needs of people, the economy, and the environment, TNC has developed tools and resources (www.groundwaterresourcehub.org) intended to reduce costs, shorten timelines, and increase benefits for both people and nature.

GSI Water Solutions, Inc.

October 27, 2021

San Benito County Water District
Groundwater Sustainability Agency
30 Mansfield Road
Hollister, California 95023

**Re: Public Comment on North San Benito County Groundwater Sustainability Plan Public Draft**

To the San Benito County Water District (SBWCD) Groundwater Sustainability Agency (GSA):

A consortium of agricultural growers known as Sustainable Water for Agriculture (SGFA) maintains agricultural operations in the North San Benito Groundwater Basin (the Basin). SGFA retained Groundwater Solutions Inc. to perform a brief technical review of the Draft GSP (dated June 30, 2021) and to provide suggestions for public comment of the draft GSP. The attached comments are provided to the GSAs for consideration in the preparation of the final GSP submitted for approval to the Department of Water Resources.

Sincerely,

GSI WATER SOLUTIONS, INC.

Nate Page, P.G.
Managing Hydrogeologist

Dave O'Rourke, P.G., CHg.
Supervising Hydrogeologist

The following comments on the North San Benito County Groundwater Sustainability Plan Public Draft are made on behalf of Sustainable Water for Agriculture (SGFA).

1. **Section 2.1.5.3 San Benito County General Plan Influences on GSA Ability to Achieve Sustainability (Page 2-16, PDF page 53)** presents a possible conflict between the General Plan and GSP: *"(County) land use planning could affect the ability of the GSA to achieve sustainable groundwater management over the planning and implementation horizon. This would occur chiefly by land use planning agencies allowing or promoting land use development (agricultural, urban, or rural) in the basin or watershed with net increases in water demand that challenge the GSAs' ability to secure water supply in a timely or cost-effective manner.*" This section also cites the requirements for developments to prepare Water Supply Assessments. We suggest that the GSP should require preparation and approval of a WSA for any development involving new groundwater demand.
2. **Figure 3-11 (PDF page 102)**. The legend references only groundwater recharge areas. Suggest changing the title to reference groundwater recharge only.
3. **Section 4.1.3**. In GSP Section 3.7 states that faulting has been indicated to affect groundwater flow within the Basin in some locations and in some conditions (LSCE, 1991 and Todd, 2015). Evaluation of groundwater elevations across fault traces has shown that large groundwater gradients sometimes exist on portions of the Calaveras Fault in the north of the Basin (LSCE, 1991 and Todd, 2015). It is unclear whether this has been adequately considered during selection of Key Wells in Bolsa Management Area (MA).
4. **Figures 4-8 and 4-9 (PDF pages 133 and 134/357)**, Groundwater Elevation Contours, would be more informative if the elevation data for each well was displayed.
5. **Page 4-12 (PDF page 114/357). Section 4.7.1 – Water Quality Goals**. "The recommended SMCL for TDS is 500 mg/L with an upper limit of 1,000 mg/L…". The inclusion of a "limit" of 500 mg/L seems unnecessary and confusing if the actual limit is 1,000 mg/L. This appears to reflect language from the General Plan. However, it's not useful to repeat this language if there is no direct impact on the GSP, or the minimum thresholds established for water quality in the GSP. Almost none of the water quality data presented for the Basin is lower than 500 mg/L, so it only serves to create a reference that is not likely to be achieved, implying a failure of an existing regulatory program.
6. **Figures 4-19 and 4-21 (PDF pages 144 and 146/357)** display transient chemographs for TDS and nitrates. The display of these data would be easier to interpret if individual graphs were placed on a map, as they are with the hydrographs in Figures 4-4 through 4-7. Then the reader would not need to refer back to a location map (Figure 4-15) to find out the locations of the individual points.
7. **Figures 4-19 and 4-21 (PDF pages 144 and 146/357)** Some of the data trends presented in Figures 4-19 and 4-21 are not immediately intuitive, and may merit some discussion in the text. For example, in Figure 4-19, TDS concentrations in well MW-42 are stable at about 400 mg/L for over a decade, then spike suddenly to the 1,500-1,900 range after 2015. In Figure 4-21, nitrate concentrations for well MW-31 increase suddenly from around 50 mg/L to over 200 mg/L after

2008. Interpretation of these data may be more obvious if individual graphs were displayed on a map, as discussed in Comment 6.

8. **Page 4-15 (PDF page 118/357). Section 4.8.1 - Selenium**. The text in this discussion mixes units, referencing both mg/L and ug/L, which creates some confusion. Recommend using consistent units in this discussion. Same comment for Section 4.8.3 – Boron.
9. **Page 4-16 (PDF page 118/357). Section 4.8.3 – Boron**. The second paragraph references an area of historically elevated boron concentration. If this text is presented, it may be helpful to include a display of the area on one of the existing figures.
10. **Page 4-16 (PDF page 118/357).** There appears to be a typographical error in the "Arsenic" paragraph of this section.
11. **Page 4-18, paragraph 2 (PDF page 120).** This sentence may not be necessary and should be considered for removal from the GSP: "*If a gaining stream is the natural discharge point for a groundwater basin, pumping anywhere in the basin can potentially decrease the outflow, particularly over long time periods such as multi-year droughts."*
12. **Figure 4-22 (PDF page 147)**, general comment on display. Groundwater elevation contours are the same color as roads, and some of the road labels are hard to find (like Highway 156). The text references the road locations, but these are difficult to find on the figure. Suggest some graphical revisions to this figure for clarity.
13. **Tables 5-3 and 5-4 (PDF pages 160,161).** Outflows are greater than inflows in Table 5-3 and 5-4. It is stated in the text description of Tables 5-2 through 5-4 inflows equal outflows. Inflows do equal outflows in table 5-3 and 5-4 if CVP imports are not included in the sum of inflows. The rationale is included as the last sentence on page 5-8. Perhaps a note should be included on the tables. Note in Table 5-3 and 5-4, 1st column, last row, "except CVP" has a typo.
14. **Figures 5-12 and 5-13 (formerly 5-10 and 5-11) (PDF page 186,187).** GSI recommends that the line graphs shown on these figures be labeled as representing Cumulative Change in Storage for greater clarity.
15. **Water Budget**. GSI recommends the development of a consolidated table and a consolidated figure showing the basin-wide water balance.
16. **Table 6-1 (PDF page 197/357).** The 5$^{th}$ column in this table lists the minimum thresholds proposed for the key wells, and are discussed as such in the ensuing text. This column should simply be labelled with reference to "Minimum Thresholds", thus using the SGMA language and making the MTs clear.
17. **Page 6-12 (PDF page 199).** The definition of the Minimum Threshold for Chronic Lowering of Groundwater Levels reads: "*The Minimum Threshold for defining undesirable results relative to chronic lowering of groundwater levels is defined at each Key Well by historical groundwater low levels adjusted to provide reasonable protection to nearby existing wells. Undesirable results are indicated when two consecutive exceedances occur in each of two consecutive years, in sixty percent or more of the Key Wells **in each Management Area***." Based on the description provided in the previous paragraph *"… undesirable results could occur in one MA and not the others.*" Considering this, we suggest that the bold text in the MT definition above be replaced with: "…**to be assessed separately for each Management Area**".
18. **Section 6.2.7 (page 6-14, PDF page 201/357).** It is our interpretation of SGMA requirements that Measurable Objectives (MOs) be defined as a numerical value. Section 6.2.7 (page 6-14, PDF page 201/357) uses vague language of "…to maintain groundwater levels within the operating

range…”. We suggest that a specific numerical water level indicative of current average or high water conditions be selected for each key well, and included in Table 6-1 as a column. This would maintain the current approach as presented but would define MOs with greater specificity as required by SGMA.

19. **Page 6-19 (PDF page 206/357).** It would provide clarity if the paragraph beginning “The Minimum Threshold for storage…” specifically referenced the numerical values presented in Table 6-1.
20. **Section 4.7.4 Page 4-14 (PDF page 116).** The statement made about average nitrate concentrations in the first paragraph (and presented in Table 4-3) does not seem consistent with the data presented on Page 6-32, including Table 6-4.
21. **Page 6-32 to 6-34 (PDF pages 219-221).** Considering the expected increase in TDS and N concentrations in groundwater documented in the GSP it seems overly aggressive to set the MTs for each constituent as the percentage of wells with concentrations exceeding the regulatory criteria based on current conditions (2015-2017). This definition means that current conditions = undesirable result. With projected increases in both TDS and N concentrations this leaves no room for potential corrective actions and sets the Basin up for immediate non-compliance. Consider revising to less stringent thresholds that do not result in immediate non-compliance for TDS and N concentrations in groundwater.
22. **Tables 6-4 and 6-5. (Page 6-32 and 6-33, PDF pages 219-220/357).** The percentage values presented in these tables are discussed and presented in the text as the Minimum Threshold criteria for water quality for TDS and nitrates. Therefore, we suggest it would provide greater clarity if the term “Minimum Threshold” were utilized in the table title or column headers.
23. **Page 6-46,47 (PDF pages 233,234).** The SMC for Depletion of Interconnected Surface Water is set using groundwater elevations in deep aquifer wells as a proxy. This is not appropriate considering ample evidence presented in the GSP that the shallow alluvial aquifer behaves independently from the deep aquifer. GSI recommends that time series Enhanced Vegetation Index (EVI) analyses be considered to supplement use of deep aquifer monitoring well groundwater elevations as proxy MTs for the Depletion of Interconnected SW SMC. The deep aquifer wells operate independently from the alluvial aquifer as evidenced by the comparison made between NDVI/NDMI and calibrated groundwater model water level fluctuations presented in the GSP (see GSP Fig. 6-9). This lack of correlation demonstrates the poor utility of using the deep aquifer wells to monitor the interconnected SW SMC.
24. **Groundwater Dependent Ecosystems (GDEs)**
    a. Nowhere are GDEs specifically identified in the GSP (this is a requirement of SGMA )
    b. **Section 4.11:** The GSP seems to conflate Riparian Vegetation with vegetation GDEs. This is probably OK, but to satisfy SGMA requirements the GSP should specifically identify these as vegetation GDEs if that is what the author believe they represent,
    c. **Page 4-19 (PDF page 121).** In the process of identifying Riparian Vegetation the GSP mischaracterizes the shallow alluvial water table as “streambank irrigation”. This term is misleading. While the shallow alluvial water table may exist due to so called “streambank irrigation” from a losing stream reach it is still in-fact a shallow alluvial water table. The GSP describes an effort to avoid including these “streambank irrigated” vegetation areas from inclusion in the Riparian Vegetation classification by using a 100-ft minimum width screening step. This does not seem appropriate. Regardless, if one

zooms way in, the resulting Riparian Vegetation extent shown on GSP Fig. 4-22 appears to be reasonable.

25. **Section 8.7.1.3.** The GSP states that SBCWD water quality sampling is completed quarterly to semiannually. In response to a prior comment suggesting that this interval of sampling is overkill Todd's response indicated the revised text of the Public Draft GSP would indicate a minimum interval of annual sampling here and in Section 6.6.4.1. This recommendation is not stated clearly in the text.
26. **Subsidence**: The GSP includes statements suggesting that, while no subsidence problems have been reported, there is a relationship between subsidence and local groundwater pumping. However, this supposed relationship is not supported by the GPS land surface elevation data presented in Figure 4-14 which show, at most, a land surface decline of 1 inch between 2004 and 2018. The InSAR data on Figures 4-12 and 4-14 are inconsistent with each other, with the GPS data, and with groundwater levels which were not declining during the time periods of the InSAR data. The GSP should be modified to remove statements that subsidence associated with groundwater extraction is occurring and to clarify the discrepancies in the datasets.
27. **The Groundwater Model Report** tables and figures are not included in **Appendix G**. Please provide.

*San Benito County Water District*

*30 Mansfield Road • P.O. Box 899 • Hollister, CA 95024-0899 • (831) 637-8218 • Fax (831) 637-7267*

November 15, 2021

To whom it may concern:

Throughout preparation of the Groundwater Sustainability Plan (GSP) for North San Benito Basin, the San Benito County Water District and Valley Water have encouraged and welcomed public input. Two public comment letters on the North San Benito Basin Draft GSP were received from the following:

1. The Nature Conservancy, Audubon California, Local Government Commission, Union of Concerned Scientists, and Clean Water Action/Clean Water Fund
2. GSI Water Solutions, Inc. on behalf of Sustainable Water for Agriculture (SGFA)

These letters are reproduced in this Appendix I to the Final GSP. The GSP staff and consultant team have been reviewing the Draft GSP and making some updates and edits. The comment letters have been reviewed as part of this process and responses are provided below. A table of changes to the draft GSP also is provided.

Sincerely,

Jeff Cattaneo
District Manager

## COMMENT LETTER 1 – THE NATURE CONSERVANCY, AUDUBON CALIFORNIA, LOCAL GOVERNMENT COMMISSION, UNION OF CONCERNED SCIENTISTS, AND CLEAN WATER ACTION/CLEAN WATER FUND

Responses are organized according to the Specific Comments in Attachment A to the letter.

**COMMENT 1.** ***Beneficial uses and users are not sufficiently considered in GSP development***

**COMMENT 1a.** ***Human Right to Water considerations are not sufficiently incorporated.***

Multiple topics were included in this comment; these are presented with responses by topic below.

**Comment:**

***The identification of Disadvantaged Communities (DACs) and drinking water users is insufficient.***

**Response:**

Figure 2-6 (showing Disadvantaged Communities) and accompanying text have been updated with most recent mapping from DWR. Available information on existing wells (including private domestic wells) is provided in Section 6.2.5.2. The importance of documenting private wells is indicated in GSP Section 7.5.2, which recommends improvement of the well inventory.

**Comment:**

***The identification of Interconnected Surface Waters (ISWs) is insufficient, due to lack of supporting information provided for the ISW analysis.***

**Response:**

The comment quotes a GSP section that acknowledges that available groundwater elevation data are not adequate for identifying stream reaches interconnected with groundwater because the data are from deep wells. The GSP agrees with this assessment and commits to installing shallow monitoring wells along potentially interconnected stream reaches (which are also areas of potential riparian vegetation GDEs), as described in Section 8.10.1. Six shallow wells have already been installed as of October 2021.

The comment states that the GSP shows a map of depth to water only for 2017. Please see Figure 6-6, which shows depth to water in 1992 and 1998.

The comment on Figure 4-22 misunderstands gaining and losing stream reaches. Gaining stream reaches are inherently interconnected with groundwater because groundwater discharge into the stream produces the increase in flow. The converse is not true: losing reaches may be interconnected or not depending on whether there is an unsaturated zone between the bottom of the stream bed and the underlying water table. Most stream reaches in the Basin are losing, and of those, most are probably not connected based on available water-level data. To clarify this distinction with respect to Figure 6-6, the legend entry has been changed to “Gaining stream reach (potential riparian GDE)”.

Thank you for pointing out the discrepancy between Figure 4-22 and Figure 6-6, which were developed at different times from different data sets. Figure 4-22 has been revised to include the more extensive delineation of potential riparian vegetation GDEs. The reference to Figure 4-

22 has been moved up to the paragraph stating that interconnected stream reaches were identified based on three factors: stream flow measurements, groundwater levels, and the presence of dense riparian vegetation.

**Comment:**

***The identification of Groundwater Dependent Ecosystems (GDEs) is insufficient, due to a lack of comprehensive, systematic analysis of the basin's GDEs.***

**Response:**

The comment notes a lack of a clear definition of GDE. Explicit definitions matching what was implicit in the text have been added to sections 4.11.4 and 4.11.7.

We disagree that the ISW and GDE analysis was not "systematic". It was extensive and made use of all available relevant data.

The lack of shallow groundwater elevation data near streams is freely acknowledged in the GSP, along with a commitment to install new shallow monitoring wells. The apparent lack of correlation between vegetation conditions and depth to water in deep wells could simply confirm that deep-well water levels do not indicate the true water table depth near streams (or it could indicate that the vegetation is facultatively phreatophytic).

The GSP does provide a map of GDEs in Figure 4-22. As noted above, we are expanding the riparian phreatophyte reaches in this figure to match the ones in Figure 6-6.

Regarding the period of analysis, it was remarkable that the DTW<30 feet regions for 1992 and 1998 were so similar given the difference in hydrologic conditions (end of drought versus end of wet period). Figure 6-5 shows hydrographs for 12 wells near riparian vegetation GDE stream reaches. So, the variability in riparian conditions is in fact documented in the GSP.

One of the recommendations provided after the comment is to develop complete lists of GDE species. We agree that listed species deserve individual attention. The three species present in the area (that are not exclusively upland species) are individually considered: California red-legged frog, California tiger salamander and steelhead (see Section 4.11.28 and Figure 4-24). Potential effects of the GSP on steelhead are evaluated extensively in the passage flow analysis (Sections 6.7.2.5 and 6.7.2.6). Beyond those species, it is reasonable and adequate to evaluate potential GSP effects at the community level, which in this case consists of phreatophytic riparian vegetation and vegetation surrounding a small number of springs. To the extent that groundwater management affects the vegetation community, it presumably affects most of the species within the community. By the same token, non-listed aquatic organisms are assumed to rise and fall along with steelhead if hydrologic conditions change.

**Comment:**

***Native vegetation and managed wetlands are water use sectors that are required to be included in the water budget. The integration of these ecosystems into the water budget is insufficient.***

**<u>Response:</u>**

A sentence has been added to acknowledge the Pajaro River Wetland Mitigation Bank in the Water Balance Section 5.3.4: “The Bolsa MA includes the Pajaro River Wetland Mitigation Bank (see Figure 2-1), which contains 273 acres; the water source and use is not known.”

The following text has been added to Section 6.7.6.3 Effect of Minimum Threshold on Beneficial Uses: “The Pajaro River Wetlands Mitigation Bank is adjacent to a stream reach identified as a riparian vegetation GDE and hence is covered by the minimum threshold for depletion of interconnected surface water (GSP page 6-47). It includes approximately 100 acres of wetland, much of which is seasonal (Wildlands, Inc. 2021). Groundwater conditions are highly confined in the Bolsa area where the wetland is located. Historical groundwater levels in the nearest monitored well (11S/4E-26B1) are close to the ground surface, exhibit no long-term declines and have modest declines during droughts. The lowest spring water level during 1987-1992 (which is the MT definition) was only 20 feet below the ground surface. The water table elevation near the ground surface is certainly higher and more stable. The wetland was established after 1992, but there is no reason to expect any adverse effect associated with groundwater levels if they decline to the MT in the future.”

**COMMENT 1b.** ***Public trust resources are not sufficiently considered. Stakeholder engagement during GSP development is insufficient.***

**<u>Response:</u>**

An updated Community Engagement Plan is included in GSP Appendix D. Strategies for engaging the general public, including DACs, were revised to comply with public health orders addressing the COVID-19 pandemic. Nonetheless, outreach continued through Zoom meetings, updates to the SBCWD website, and other media. Many the people living in the DAC areas are relatively recent immigrants from Spanish-speaking countries, and website pages and other materials are available in Spanish.

Opportunities for future engagement are included in Section 8 Projects and Management Actions as part of ongoing activities such as Section 8.6 Enhance Water Conservation and 8.12 Provide Administration, Monitoring, and Reporting.

**COMMENT 1c.** ***Impacts of Minimum Thresholds, Measurable Objectives and Undesirable Results on beneficial uses and users are not sufficiently analyzed.***

Multiple topics were included in this comment; these are presented with responses by topic below.

**<u>Comment:</u>**

***For chronic lowering of groundwater levels, minimum thresholds are initially set at historical groundwater level lows and then adjusted upward to be more protective. The GSP acknowledges the impact of minimum thresholds on DACs, by stating justification of the minimum threshold levels as (p. 6-8): “Upward adjustment to be protective in the San Juan Economically Disadvantaged Area.” The GSP does not state what the impacts of the minimum thresholds to DACs and drinking water users would be, however, when describing undesirable results.***

**Response:**

Sections 6.2.1 through 6.2.4 describe potential undesirable results of groundwater level declines, with detailed explanation of what happens in production wells as groundwater levels decline. A focus is placed on shallow private wells, which often are domestic wells providing drinking water supply to residents (including those in the San Juan DAC). To minimize any dewatering of wells, the MTs are defined at or above historical lows and account for wells drilled since the historical lows occurred. Undesirable results (such as dewatering of domestic wells) are not anticipated due to MTs. With availability of CVP water, the basin has been maintained with relatively high groundwater levels and no private wells have been reported to have water shortages in the DWR *Household Water Supply Shortage Reporting System*.

As discussed in Section 4.8, the water quality constituents mentioned in the comment are mostly naturally occurring. These are managed under existing programs and are monitored regularly by the GSAs. No undesirable effects of constituent mobilization due to groundwater use or basin management have been identified in this basin. North San Benito has been characterized by maintenance of groundwater levels within a stable operating range, which will be continued given the groundwater level MTs. The GSAs (and other agencies) will continue to monitor water quality as discussed in Section 7.1.5.

**Comment:**

***Sustainable management criteria for chronic lowering of groundwater levels provided in the GSP do not consider potential impacts to environmental beneficial users.***

**Response:**

The comment suggests that the assumed rooting depth for riparian phreatophytes be increased to 80 feet because valley oak trees reportedly can have roots that deep. If water levels were managed to that depth, all obligate phreatophytes would likely perish. Although some valley oaks might tap into groundwater at that depth, that species is clearly not an obligate phreatophyte as demonstrated by centuries-old specimens near McCloskey Road where water levels were over 150 feet below the ground surface for many years while groundwater was overpumped during the 1920s to 1970s.

The GSP does reference the TNC rooting depth database (Section 6.7.2.3). However, it was not useful for predicting the occurrence of phreatophytes because many of the values in the database are too small. Instead, we relied on empirical observations of where phreatophytes actually occur in the Basin, which is in areas where the depth to water (as estimated from water supply wells) is less than 20 feet.

The comment asserts that the GSP does not state how the NDVI-NDMI-water level analysis “helps to inform the development of SMC that are protective of terrestrial GDEs”. That is because the analysis (in Section 6.7.2.4) found no empirical correlation between changes in depth to water and changes in NDVI or NDMI. Therefore, the NDVI and NDMI data are not useful in this case for establishing water level criteria protective of GDEs. Instead, the GSP relies on the correlation of measured and simulated depths to water with the presence of riparian vegetation GDEs as the basis for the SMC. The lack of correlation between water levels and

NDVI/NDMI could be due to the use of water levels not representative of the true water table. This data gap is being addressed and will inform the GSP update five years from now.

One of the recommendations following the comment is to use biological metrics to evaluate the occurrence of undesirable results. This has some merit, given the uncertain relationship between water levels and vegetation health. However, it also introduces confounding variables that can also affect vegetation health, including outbreaks of pests and diseases, below-average rainfall and streamflow, flood scour, agricultural clearing, and fire. On balance, the stakeholders opted to stick with hydrologic variables more clearly linked to groundwater management.

**COMMENT 2.** ***Climate change is not sufficiently considered.***

**Response:**

The comment states that "the plan does not consider multiple climate scenarios (e.g., the 2070 extremely wet and extremely dry climate scenarios) in the projected water budget." The comment appears to be referring to two alternative sets of monthly climate multipliers provided in the files of climate change factors downloadable from the SGMA Data Portal. Those sets of factors are labeled Drier/Extreme-Warming (DEW) and Wetter/Moderate-Warming (WMW). There is no requirement to use anything but the expected factors. In fact, the DWR document "Guidance for Climate Change Data Use during Groundwater Sustainability Plan Development" does not even mention the alternative data sets. Rather, Section 4.5 of the guidance document states that uncertainty in climate change predictions is represented by inter-annual variability in the 50-year future simulations. It also states that the evaluation of sustainability will be based on the "central tendency" of the climate change factors, which is represented by the primary climate factor data set. The DEW and WMW data sets are for optional research purposes. Therefore, the climate change analysis in the GSP is adequate.

Our interpretation is that DWR is requesting two water budgets only (2030 and 2070) and that "uncertainty" is represented by the interannual variability represented by the 50 years of analysis. In other words, the climate change scenario is itself an expression of uncertainty relative to the future baseline scenario. Also, projects are evaluated on the "central tendency", which is based on the expected climate change factors (the ones used in the GSP climate change analysis). There is no requirement for additional analysis of alternative climate change factor sets such as those identified in the comment.

**COMMENT 3.** ***Data gaps are not sufficiently identified and the GSP does not have a plan to eliminate them.***

**Response:**

The comment incorrectly asserts that Sections 6.7.7.1, 7.1.6 and 8.10.2 include "proposed GDE-related biological monitoring". This is incorrect. The GSP does not propose biological monitoring. It does recommend a study to identify the critical riffle for steelhead passage along the San Benito River. That is an analysis of physical variables (stream channel morphology and flow hydraulics), not monitoring of biological variables.

Figures 7-1 and 7-4, showing monitoring well locations, do not show DACs, but comparison between Figures 2-6 (DACs) and the monitoring wells on Figures 7-1 and 7-4 indicates monitoring wells in and near the San Juan and Hollister DACs. Figure 6-1 shows how existing private wells are associated with the Key Wells, including those in the DACs. As of 2021, new shallow and deep monitoring wells are being installed to fill gap areas.

**COMMENT 4.** ***Projects and Management Actions do not sufficiently consider potential impacts or benefits to beneficial uses and users.***

**Response:**

The comment asserts that GSP Chapter 8 Projects and Management Actions is inadequate "due to the failure to completely identify benefits or impacts of identified projects and management actions … to key beneficial users of groundwater such as GDEs, aquatic habitats…" We disagree. The two-page discussion of management actions related to GDEs (Section 8.10) focuses on two foundational actions that will enable better management of GDEs: shallow monitoring wells near streams and identification of the critical riffle and flow requirement for steelhead passage along the San Benito River. Those efforts will clearly benefit GDEs. Similarly, the text lists five management actions that could be implemented to raise groundwater levels near riparian vegetation GDEs and/or improve fish passage flows. The discussion is ample and adequate.

Section 8 summarizes numerous projects and management actions, including description of project benefits of each. Benefits to DACs, domestic wells, GDEs, and ISWs are incorporated. Three examples:

- Section 8.5.3.7 describes how the North County Project provides high quality water to the Hollister Urban Area (which includes DACs).
- Section 8.5.4.8 describes how managed percolation helps maintain groundwater levels and storage and enhances water quality with benefits to the Southern, Hollister and San Juan MAs downstream. These areas include numerous private wells and DACs.
- Section 8.10 describes actions to better monitor Interconnected Surface Water and GDEs and to explore means to reduce potential impacts (see above).

## COMMENT LETTER 2 – GSI WATER SOLUTIONS, INC. ON BEHALF OF SUSTAINABLE WATER FOR AGRICULTURE (SGFA)

Responses are organized according to the numbered comments in the letter.

**COMMENT 1.** ***Section 2.1.5.3 San Benito County General Plan Influences on GSA Ability to Achieve Sustainability (Page 2-16, PDF page 53)*** *presents a possible conflict between the General Plan and GSP: "(County) land use planning could affect the ability of the GSA to achieve sustainable groundwater management over the planning and implementation horizon. This would occur chiefly by land use planning agencies allowing or promoting land use development (agricultural, urban, or rural) in the basin or watershed with net increases in water demand that challenge the GSAs' ability to secure water supply in a timely or cost-effective manner." This section also cites the requirements for developments to prepare Water Supply Assessments. We suggest that the GSP should require preparation and approval of a WSA for any development involving new groundwater demand.*

**Response:**

The Section Heading is General Plan Influences on GSA Ability to Achieve Sustainability and refers to all General Plans (consistent with the GSP Regulations), not just San Benito County. San Benito County is responsible for land use planning over most of the Plan Area and this section includes a straightforward assessment that the County General Plan contains little policy to manage land use within the constraints of available water supply. However, the County has participated in preparation of the GSP, including representation in the Technical Advisory Committee and provision of comments on draft sections. The County and SBCWD GSA have discussed potential issues of land use and water supply. As stated, the County acknowledges Water Supply Assessments, which are required for residential, commercial, industrial projects of a certain size. The County would be responsible for expanding requirements for such assessments and not the GSA through its GSP. In fact, SGMA states clearly in §10726.89(f) that a GSP cannot supersede the land use authority of cities and counties.

**COMMENT 2.** ***Figure 3-11 (PDF page 102)****. The legend references only groundwater recharge areas. Suggest changing the title to reference groundwater recharge only.*

**Response:**

A footnote regarding discharge has been added to this figure. The components of recharge and discharge are discussed in the text.

**COMMENT 3.** ***Section 4.1.3****. In GSP Section 3.7 states that faulting has been indicated to affect groundwaterflow within the Basin in some locations and in some conditions (LSCE, 1991 and Todd, 2015). Evaluation of groundwater elevations across fault traces has shown that large groundwater gradients sometimes exist on portions of the Calaveras Fault in the north of the Basin (LSCE, 1991 and Todd, 2015). It is unclear whether this has been adequately considered during selection of Key Wells in Bolsa*

*Management Area (MA).*

**Response:**

Key well selection included assessment of locations relevant to structures affecting groundwater from the hydrogeologic conceptual model, including faults. The GSP has been edited to clarify inclusion of this selection component.

**COMMENT 4.** ***Figures 4-8 and 4-9 (PDF pages 133 and 134/357)****, Groundwater Elevation Contours, would be more informative if the elevation data for each well was displayed.*

**Response:**

Including well-specific groundwater elevation data for all the wells used in these contour maps would make the figures cluttered and harder for readers to understand. The groundwater elevation data used in these maps will be transmitted to DWR as part of the submittal of the GSP and can be downloaded from the SGMA data portal thereafter.

**COMMENT 5.** ***Page 4-12 (PDF page 114/357). Section 4.7.1 – Water Quality Goals****. "The recommended SMCL for TDS is 500 mg/L with an upper limit of 1,000 mg/L…". The inclusion of a "limit" of 500 mg/L seems unnecessary and confusing if the actual limit is 1,000 mg/L. This appears to reflect language from the General Plan. However, it's not useful to repeat this language if there is no direct impact on the GSP, or the minimum thresholds established for water quality in the GSP. Almost none of the water quality data presented for the Basin is lower than 500 mg/L, so it only serves to create a reference that is not likely to be achieved, implying a failure of an existing regulatory program.*

**Response:**

The text has been updated to clarify that the 500 and 1,000 mg/L concentrations are recommended values and not limits. However, the SMCLs and RWQCB General Basin Plan Objectives include all three values, and it is necessary to accurately state what the RWQCB objectives are. SGMA requires that sustainability criteria be established with reference to regulatory standards (see Section 6.6.5.6), and thus these have a direct impact on MTs. Note that the values are RWQCB General Basin Plan Objectives from the Water Quality Control Plan for the Central Coastal Basin (Basin Plan) and are not from any General Plan (relating to land use planning). As indicated in Section 4.7, TDS concentrations are generally high and reflect natural high background levels; this is not a management failure.

**COMMENT 6.** ***Figures 4-19 and 4-21 (PDF pages 144 and 146/357)*** *display transient chemographs for TDS and nitrates. The display of these data would be easier to interpret if individual graphs were placed on a map, as they are with the hydrographs in Figures 4-4 through 4-7. Then the reader would not need to refer back to a location map (Figure 4-15) to find out the locations of the individual points.*

**Response:**

The well locations and time concentration plots are presented in the section, but we will consider the suggestion for graphics in upcoming Annual Reports and Five-Year Updates.

**COMMENT 7.** ***Figures 4-19 and 4-21 (PDF pages 144 and 146/357)*** *Some of the data trends presented in Figures 4-19 and 4-21 are not immediately intuitive, and may merit some discussion in the text. For example, in Figure 4-19, TDS concentrations in well MW-42 are stable at about 400 mg/L forover a decade, then spike suddenly to the 1,500-1,900 range after 2015. In Figure 4-21, nitrate concentrations for well MW-31 increase suddenly from around 50 mg/L to over 200 mg/L after 2008. Interpretation of these data may be more obvious if individual graphs were displayed on amap, as discussed in Comment 6.*

**Response:**

The changes in water quality for these specific wells are a result of local sources including facilities that are regulated by the RWQCB. Further discussion of these wells can be found in the 2016 and 2019 Annual Groundwater Reports (Appendix F), which include updates on water quality.

**COMMENT 8.** ***Page 4-15 (PDF page 118/357). Section 4.8.1 - Selenium****. The text in this discussion mixes units,referencing both mg/L and ug/L, which creates some confusion. Recommend using consistent units in this discussion. Same comment for Section 4.8.3 – Boron.*

**Response:**

The units have been revised for consistency.

**COMMENT 9.** ***Page 4-16 (PDF page 118/357). Section 4.8.3 – Boron****. The second paragraph references an area of historically elevated boron concentration. If this text is presented, it may be helpful to include a display of the area on one of the existing figures.*

**Response:**

Boron has not been selected as a constituent to determine sustainability as it is naturally occurring and unlikely to be mobilized by local groundwater management. North San Benito has been characterized by maintenance of groundwater levels within a stable operating range, which will be continued given the groundwater level MTs. The geographic extent of boron is discussed in Annual Groundwater Reports (Appendix F), but the best map is in the SBCWD 2004 Development of a Groundwater Quality Monitoring Network.

**COMMENT 10.** ***Page 4-16 (PDF page 118/357).*** *There appears to be a typographical error in the "Arsenic"paragraph of this section.*

**Response:**

The text has been corrected.

**COMMENT 11.** ***Page 4-18, paragraph 2 (PDF page 120).*** *This sentence may not be necessary and should be considered for removal from the GSP: "If a gaining stream is the natural discharge point for agroundwater basin, pumping anywhere in the basin can potentially decrease the outflow, particularly over long time periods such as multi-year droughts."*

**<u>Response:</u>**

We believe the statement is correct and relevant to the discussion of interconnected surface water.

**COMMENT 12.** ***Figure 4-22 (PDF page 147)****, general comment on display. Groundwater elevation contours are the same color as roads, and some of the road labels are hard to find (like Highway 156). The text references the road locations, but these are difficult to find on the figure. Suggest some graphical revisions to this figure for clarity.*

**<u>Response:</u>**

The colors of the contours have been changed to be distinct from roads.

**COMMENT 13.** ***Tables 5-3 and 5-4 (PDF pages 160,161).*** *Outflows are greater than inflows in Table 5-3 and 5-4.It is stated in the text description of Tables 5-2 through 5-4 inflows equal outflows. Inflows do equal outflows in table 5-3 and 5-4 if CVP imports are not included in the sum of inflows. The rationale is included as the last sentence on page 5-8. Perhaps a note should be included on thetables. Note in Table 5-3 and 5-4, 1st column, last row, "except CVP" has a typo.*

**<u>Response:</u>**

A footnote has been added to the tables and the typographical error has been corrected.

**COMMENT 14.** ***Figures 5-12 and 5-13 (formerly 5-10 and 5-11) (PDF page 186,187).*** *GSI recommends that the line graphs shown on these figures be labeled as representing Cumulative Change in Storage for greater clarity.*

**<u>Response:</u>**

The title of the figure has been changed to indicate that the storage changes are cumulative.

**COMMENT 15.** ***Water Budget****. GSI recommends the development of a consolidated table and a consolidated figure showing the basin-wide water balance.*

**<u>Response:</u>**

The water budget is presented by management area alone because the four management areas are quite different from a hydrogeologic and management perspective. Presenting a consolidated table is not necessary or particularly helpful for the sustainable management of this groundwater basin.

**COMMENT 16.** ***Table 6-1 (PDF page 197/357).*** *The 5$^{th}$ column in this table lists the minimum* *thresholds proposed for the key wells, and are discussed as such in the ensuing text. This column should simply be labelled with reference to "Minimum Thresholds", thus using the SGMA language andmaking the MTs clear.*

**Response:**

The table has been modified.

**COMMENT 17.** ***Page 6-12 (PDF page 199).*** *The definition of the Minimum Threshold for Chronic Lowering of Groundwater Levels reads: "The Minimum Threshold for defining undesirable results relative to chronic lowering of groundwater levels is defined at each Key Well by historical groundwater lowlevels adjusted to provide reasonable protection to nearby existing wells. Undesirable results areindicated when two consecutive exceedances occur in each of two consecutive years, in sixty percent or more of the Key Wells* ***in each Management Area****." Based on the description provided in the previous paragraph "… undesirable results could occur in one MA and not the others." Considering this, we suggest that the bold text in the MT definition above be replaced with: "…****to be assessed separately for each Management Area****".*

**Response:**

Comment noted, no change made.

**COMMENT 18.** ***Section 6.2.7 (page 6-14, PDF page 201/357).*** *It is our interpretation of SGMA requirements that Measurable Objectives (MOs) be defined as a numerical value. Section 6.2.7 (page 6-14, PDF page 201/357) uses vague language of "…to maintain groundwater levels within the operating range…". We suggest that a specific numerical water level indicative of current average or high water conditions be selected for each key well, and included in Table 6-1 as a column. This would maintain the current approach as presented but would define MOs with greater specificity as required by SGMA.*

**Response:**

The full text is "The Measurable Objective is to maintain groundwater levels above the groundwater level MTs (as quantified above or the interconnected surface water MTs, whichever is higher at the relevant measurement event), and to maintain groundwater levels within the operating range as defined in this section." [Emphasis added.] Adding a column to Table 6-1 would not acknowledge that the MOs also involve the MTs for interconnected surface water (Table 6-6), whichever is higher at the time. The text has been edited to refer to the two tables. A specific value for the MO would be misleading; a current average or high groundwater level is not necessarily more desirable than a groundwater level that is just one foot above the MT. The fact is that groundwater levels and storage in North San Benito are managed sustainably through conjunctive use that requires variation across the operating range.

**COMMENT 19.** ***Page 6-19 (PDF page 206/357).*** *It would provide clarity if the paragraph* *beginning "The Minimum Threshold for storage…" specifically referenced the numerical values presented inTable 6-1.*

**Response:**

A reference to Table 6-1 has been added in the paragraph above, but a reference to a specific table is not included in the formal, inset statement of the Minimum Threshold for storage.

**COMMENT 20.** ***Section 4.7.4 Page 4-14 (PDF page 116).*** *The statement made about average nitrate concentrations in the first paragraph (and presented in Table 4-3) does not seem consistent with the data presented on Page 6-32, including Table 6-4.*

**Response:**

We edited the sentence on page 4-19. The reference is to the average concentrations of the SBCWD monitoring wells whereas Table 6-4 reflects the median of all available data.

**COMMENT 21.** ***Page 6-32 to 6-34 (PDF pages 219-221).*** *Considering the expected increase in TDS and N concentrations in groundwater documented in the GSP it seems overly aggressive to set the MTsfor each constituent as the percentage of wells with concentrations exceeding the regulatory criteria based on current conditions (2015-2017). This definition means that current conditions =undesirable result. With projected increases in both TDS and N concentrations this leaves no room for potential corrective actions and sets the Basin up for immediate non-compliance. Consider revising to less stringent thresholds that do not result in immediate non-compliance for TDS and N concentrations in groundwater.*

**Response:**

Establishment of MTs for TDS and nitrate included detailed discussion over multiple meetings by the Technical Advisory Committee, followed by presentation and discussion in a public workshop. The discussion in the GSP Section 6.6.5 recognizes data limitations and the problem of legacy loading and takes the approach to proceed with measures to reduce loading of nitrate and salts. The MTs are the current starting point and refer to the RWQCB Basin Plan objectives and the State's non-degradation policy per GSP Regulations. Given historical and ongoing groundwater use, the current conditions are sustainable.

**COMMENT 22.** ***Tables 6-4 and 6-5. (Page 6-32 and 6-33, PDF pages 219-220/357).*** *The percentage values presented in these tables are discussed and presented in the text as the Minimum Thresholdcriteria for water quality for TDS and nitrates. Therefore, we suggest it would provide greaterclarity if the term "Minimum Threshold" were utilized in the table title or column headers.*

**Response:**

The term "minimum threshold" has been added to the table headers.

**COMMENT 23.** ***Page 6-46,47 (PDF pages 233,234).*** *The SMC for Depletion of Interconnected*

*Surface Water is set using groundwater elevations in deep aquifer wells as a proxy. This is not appropriate considering ample evidence presented in the GSP that the shallow alluvial aquifer behaves independently from the deep aquifer. GSI recommends that time series Enhanced Vegetation Index (EVI) analyses be considered to supplement use of deep aquifer monitoring well groundwater elevations as proxy MTs for the Depletion of Interconnected SW SMC. The deep aquifer wells operate independently from the alluvial aquifer as evidenced by the comparison made between NDVI/NDMI and calibrated groundwater model water level fluctuations presented in the GSP (see GSP Fig. 6-9). This lack of correlation demonstrates the poor utility ofusing the deep aquifer wells to monitor the interconnected SW SMC.*

**Response:**

The GSP does not characterize the Basin as having "shallow" and "deep" aquifers. It repeatedly notes the inability to differentiate between alluvial deposits and the Purisima Formation based on lithology (for example, Sections 3.6.1 and 3.9.3). Although the GSP describes Holocene alluvial deposits as the "principal aquifer" and the Plio-Pleistocene Purisma Formation as a "secondary aquifer", it does not assert that they have different water levels. The GSP does not identify a thin surficial aquifer along waterways with different water levels that would affect the distribution of phreatophytes. The GSP notes that water levels vary with depth within the basin materials and that the lack of shallow monitoring wells near riparian areas is a data gap (Section 7.5.1 and Table 7.2) and commits to installing six wells to improve monitoring related to GDEs (Section 8.10.1).

The Enhanced Vegetation Index is another spectral ratio product derived from Landsat satellite imagery. It can have advantages over NDVI and NDMI in certain circumstances (such as rainforests and areas with snowpack) but would likely produce similar results as NDVI and NDMI in the San Benito Basin. Notably, DWR's SGMA data portal website includes NDVI and NSMI data sets but not EVI data sets.

The GSP text agrees that water levels from deep water supply wells are inadequate for monitoring water table conditions relevant to riparian vegetation, and installation of new shallow monitoring wells in those areas is among the GSP management actions (Section 8.10.1)

**COMMENT 24.** ***Groundwater Dependent Ecosystems (GDEs)***

**COMMENT 24a.** *Nowhere are GDEs specifically identified in the GSP (this is a requirement of SGMA).*

**Response:**

The following text has been added to the first paragraph of Section 4.11.6 Identification of Groundwater Dependent Ecosystems: "Figure 4-22 identifies potential GDEs as phreatophytic riparian vegetation and as springs and seeps, and also identifies gaining stream reaches (based on depth to groundwater)."

**Section 4.11:** *The GSP seems to conflate Riparian Vegetation with vegetation GDEs. This is probably OK, but to satisfy SGMA requirements the GSP should specifically identify these as vegetation GDEs if that is what the author believe they represent.*

***Response:***

The 4th paragraph of section 4.11.3 Riparian Vegetation has been changed to include this first sentence: "For the purposes of this GSP, riparian vegetation GDEs are defined as areas of dense riparian tree canopy more than one tree wide along streams where depth to groundwater is plausibly less than 30 feet."

**COMMENT 24b.** ***Page 4-19 (PDF page 121).*** *In the process of identifying Riparian Vegetation the GSP mischaracterizes the shallow alluvial water table as "streambank irrigation". This term is misleading. While the shallow alluvial water table may exist due to so called "streambank irrigation" from a losing stream reach it is still in-fact a shallow alluvial water table. The GSP describes an effort to avoid including these "streambank irrigated" vegetation areas from inclusion in the Riparian Vegetation classification by using a 100- ft minimum width screening step. This does not seem appropriate. Regardless, if one zooms way in, the resulting Riparian Vegetation extent shown on GSP Fig. 4-22 appears to be reasonable.*

**Response:**

The canopy width criterion was included because some channels in areas with large depths to water have a single line of (often sparse) vegetation along one or both banks that is distinct from vegetation farther from the stream (often annual grassland). Although the streambank vegetation probably enjoys higher soil moisture lingering after ephemeral winter stream flows, that does not necessarily imply there is a perched aquifer. And if there is a perched aquifer, it would not be affected by recharge and pumping in the principal aquifer, which is the focus of groundwater management in the GSP. Where the water level in the principal aquifer is close to the ground surface, depth to water is usually shallow for a considerable distance from the channel, resulting in a wide area of phreatophytic vegetation. Those are the areas appropriately identified as riparian vegetation GDE's (Fig. 4-24) and used as the basis for sustainable groundwater management.

**COMMENT 25.** ***Section 8.7.1.3.*** *The GSP states that SBCWD water quality sampling is completed quarterly to semiannually. In response to a prior comment suggesting that this interval of sampling is overkillTodd's response indicated the revised text of the Public Draft GSP would indicate a minimum interval of annual sampling here and in Section 6.6.4.1. This recommendation is not stated clearly in the text.*

**Response:**

In Sections 8.7.1.3 and 6.6.4.1, the discussion has been updated to indicate a recommendation for a monitoring frequency of at least annual.

**COMMENT 26.** ***Subsidence****: The GSP includes statements suggesting that, while no subsidence problems have been reported, there is a relationship between subsidence and local groundwater pumping. However, this supposed relationship is not supported by the*

*GPS land surface elevation data presented in Figure 4-14 which show, at most, a land surface decline of 1 inch between 2004 and 2018. The InSAR data on Figures 4-12 and 4-14 are inconsistent with each other, with the GPS data, and with groundwater levels which were not declining during the time periods of theInSAR data. The GSP should be modified to remove statements that subsidence associated withgroundwater extraction is occurring and to clarify the discrepancies in the datasets.*

**Response:**

In Sections 4.3 and 6.4, the GSP presents available InSAR and UNAVCO data that, while limited, indicate subsidence. While the indicated land surface changes are small, subsidence is widely recognized as irreversible, so small changes over time represent potential undesirable results, such as incremental but permanent loss of drainage capacity. SGMA (see §10727.2) requires monitoring if subsidence has been identified as a potential problem. In accordance with SGMA and the GSP's stated objective to prevent subsidence, the GSP has included subsidence monitoring and establishment of sustainability criteria to assess the potential problem. This monitoring will document any relationships between subsidence and local groundwater pumping, as requested in the comment, and will minimize any potential subsidence problems.

**COMMENT 27.** ***The Groundwater Model Report*** *tables and figures are not included in* ***Appendix G****. Pleaseprovide.*

**Response:**

The Model Report tables and figures will be included in the Final GSP.

## List of Changes to Public Draft Groundwater Sustainability Plan, North San Benito

| Topic | GSP Section | Word Document Page | Description of Changes* |
|---|---|---|---|
| Disadvantaged Communities | 2.1.2.1 | 2-2 | Updated description of DAC mapping |
| Disadvantaged Communities | Figure 2-6 | | Update of DAC mapping |
| Disadvantaged Communities | Appx H Figure 1 | | Update of DAC mapping |
| Land Subsidence | 2.1.4 | 2-7 | Clarification of DWR mapping program |
| Recharge and Discharge Areas | 3.1 | | Added a footnote to Figure 3-11 clarifying discharge areas. |
| Groundwater Elevations and Trends | 4.1.3 | 4-2 | Clarified consideration of structures that affect groundwater flow |
| Water QualityObjectives | 4.7.1 | 4-12 | Clarified SMCLs for TDS |
| Perchlorate and Selenium | 4.8.1 | 4-15 | Made units consistent |
| Boron | 4.8.3 | 4-16 | Made units consistent |
| Nitrate as NO3 | 4.7.4 | 4-14 | Edited the sentence for clarity |
| Interconnection of Surface Water and Groundwater | 4.11 | 4-18 | Added text to describe Figure 4-22, Surface Water Connected to Groundwater |
| Riparian Vegetation | 4.11.3 | 4-20 | Provided definition of riparian vegetation |
| Springs and seeps | 4.11.4 | 4-20 | Provided definition of wetland GDEs and clarified wetland GDE sites |
| GDEs | 4.11.6 | 4-21 | Added text to describe potential GDEs on Figure 4-22 |
| Riparian Vegetation | 4.11.7 | 4-21 | Defined riparian vegetation |
| Animals Dependent on Groundwater | 4.11.8 | 4-23 | Described Figure 4-24 riparian vegetation and steelhead passage streams |
| Surface Water Connected to Groundwater | Figure 4-22 | | Adjusted colors, added labels, added phreatophytes, indicated all 13 wetland sites |
| Surface Water Balance | 5.5 | 5-8 | Clarified change in surface water in storage as very small water balance component. Footnoted relevant tables. |
| Change in Groundwater Storage | Figure 5-12 | | Changed title to add "cumulative" change in storage |
| Future Change in Groundwater Storage | Figure 5-13 | | Changed title to add "cumulative" change in storage. |
| Groundwater Level Measurable Objectives | 6.2.7 | 6-14 | Noted relevant tables for definition of MOs |
| Well Permitting | 6.2.7.1 | 6-14 | Added text describing outreach to drillers about MTs |
| Water Level/Water Quality Monitoring | 6.6.4.1 | 6-30 | Clarified discussion of monitoring frequency to quarterly to a minimum of annually |
| Minimum Threshold and Beneficial Uses | 6.7.6.3 | 6-48 | Explained effect of Interconnected Surface Water MTs on Pajaro River Wetland Bank |
| Managed Aquifer Recharge (MAR) Study | 8.4, 8.10.4 | 8-14 to 8-18, 8-43 | Clarified text that MAR TM will be provided on SBCWD website, not in appendix; in sections 8.4, 8.4.5, 8.4.9. |
| Siting of New Monitoring Wells | 8.7 | 8-32 | Clarifies that Appendix H includes documention of siting for new monitoring wells |
| Remote Sensing Pilot Study | 8.7.1.1 | 8-33 | Simplified description of remote sensing pilot study |
| Water Level Monitoring | 8.7.1.2 | 8-34 | Added sentence about reviewing the monitoring schedule and modifying as needed |
| Well Permitting | 8.7.1.3 | 8-34 | Added section about enhancing outreach on well permitting |
| Pilot Study | 8.7.1.4 | 8-34 | Clarified text on pilot program. |
| Remote Sensing for Groundwater Use Evaluation | 8.7.2 | 8-35 | Updated description of investigation of remote sensing to evaluate groundwater use |
| TM on Siting of New Monitoring Wells | 8.7.3 | 8-36 | Clarified contents of Monitoring Well Drilling and Construction Technical Memorandum |
| Remote Sensing for Groundwater Use Evaluation | 8.7.6 | 8-36 | Updated text about exploration of remote sensing options to evaluate groundwater extraction. |
| Community Engagement Program | App D | | Updated and completed |
| Numerical Model Report | App G | | Included all tables and graphics. |
| | | | * Not including minor edits. |