Salinas Valley: 180/400-Foot Aquifer Subbasin Groundwater Sustainability Plan

VOLUME 1

Chapter 1. Introduction to the 180/400-Foot Aquifer Subbasin

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Prepared for:

Salinas Valley Basin Groundwater Sustainability Agency

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ACRONYMS AND ABBREVIATIONS

$/AF ....dollar per acre-foot
AF ....acre-foot or acre-feet
AF/yr. ....acre-feet per year
ALCO ....Alisal Water Company
Basin ....Salinas Valley Groundwater Basin
Basin Plan ......Water Quality Control Plan for the Central Coastal Basin
BLM...............U.S. Bureau of Land Management
BMPs.............Best Management Practices
Caltrans ....California Department of Transportation
CASGEM.......California Statewide Groundwater Elevation Monitoring
CCC................California Coastal Commission
CCGC.............Central Coast Groundwater Coalition
CCRWQCB....Central Coast Regional Water Quality Control Board
CCWG............Central Coast Wetlands Group
CDFW............California Department of Fish and Wildlife
CEQA.............California Environmental Quality Act
cfs...................cubic feet per second
COC ....constituents of concern
CPE Actions...Communication and Public Engagement Actions
CSD................Community Services District
CSIP ....Castroville Seawater Intrusion Project
DACs..............Disadvantage Communities
DDW..............Division of Drinking Water
DEM...............Digital Elevation Model
DMS...............Data Management System
D-TAC ....Drought Technical Advisory Committee
DTSC ....California Department of Toxic Substances Control
DWR ....California Department of Water Resources
EDF................Environmental Defense Fund
EIR ....Environmental Impact Report
EPA ....Environmental Protection Agency
ET...................evapotranspiration
eWRIMS ....Electronic Water Rights Information Management System
GAMA ....Groundwater Ambient Monitoring and Assessment Program
GDE ....groundwater-dependent ecosystem
GEMS ....Monterey County Groundwater Extraction Management System
GIS ....Geographic Information System
GMP...............Groundwater Management Plan
gpm ....gallons per minute

GSA................Groundwater Sustainability Agency/Agencies
GSP or Plan....Groundwater Sustainability Plan
HCM ....hydrogeologic conceptual model
HCP................Habitat Conservation Plan
IIP...................Integrated Implementation Plan
ILRP...............Irrigated Lands Regulatory Program
InSAR ....Interferometric Synthetic Aperture Radar
IRWMP..........Integrated Regional Water Management Plan
ISW ....interconnected surface water
JPA.................Joint Powers Authority
MCLs ....Maximum Contaminant Levels
MCWD...........Marina Coast Water District
MCWRA........Monterey County Water Resources Agency
Monterey County GSA …County of Monterey Groundwater Sustainability Agency
MPWMD........Monterey Peninsula Water Management District
MTBE ....methyl-tertiary-butyl ether
NAVD88........North American Vertical Datum of 1988
NCCAG..........Natural Communities Commonly Associated with Groundwater
NEPA ....National Environmental Policy Act
NMFS.............National Marine Fisheries Service
NOAA............National Oceanic & Atmospheric Administration
O&M..............operations and maintenance
OSWCR ....Online System for Well Completion Report
RCDMC.........Resource Conservation District of Monterey
River Series....Salinas River Discharge Measurement Series
RMS...............Representative Monitoring Sites
RWMG...........Greater Monterey County Regional Water Management Group
SAGBI............Soil Agricultural Groundwater Banking Index
SDACs ....Severely Disadvantaged Communities
SGMA............Sustainable Groundwater Management Act
SMC...............Sustainable Management Criteria
SMCLs...........Secondary Maximum Contaminant Levels
SMP................Salinas River Stream Maintenance Program
SRDF..............Salinas River Diversion Facility
Subbasin.........180/400-Foot Aquifer Subbasin
SVBGSA........Salinas Valley Basin Groundwater Sustainability Agency
SVIHM...........Salinas Valley Integrated Hydrologic Model
SVOM............Salinas Valley Operational Model
SVRP..............Salinas Valley Reclamation Project
SWIG ....Seawater Intrusion Working Group

SWRCB..........State Water Resources Control Board
URCs..............Underrepresented Communities
TAC................Technical Advisory Committee
TDS................total dissolved solids
USACE ..........U.S.Army Corps of Engineers
USFWS ..........U.S. Fish and Wildlife Service
USGS .............U.S. Geological Survey
UWMP...........Urban Water Management Plan

1 INTRODUCTION TO THE 180/400-FOOT AQUIFER SUBBASIN GROUNDWATER SUSTAINABILITY PLAN

1.1 Introduction and Purpose

The 2014 Sustainable Groundwater Management Act (SGMA) requires groundwater basins or subbasins that are designated as medium or high priority to be managed sustainably. In general, satisfying the requirements of SGMA requires four activities:

1. Forming one or more Groundwater Sustainability Agency(s) (GSAs) in the basin
2. Developing a Groundwater Sustainability Plan (GSP, or Plan)
3. Implementing the GSP and managing to measurable, quantifiable objectives
4. Providing regular reports to the California Department of Water Resources (DWR)

DWR has designated the Salinas Valley – 180-400-Foot Aquifer Subbasin (Subbasin) as a high priority basin. The 180-400-Foot Aquifer Subbasin is one of nine subbasins in the Salinas Valley, and it is located at the northern end of the Salinas Valley and is bounded by the Monterey Bay to the northwest (Figure 1-1).

Groundwater conditions in the 180/400-Foot Aquifer Subbasin have deteriorated in recent decades, including seawater intrusion, a decline in groundwater elevations in specific areas, and an overall decline in groundwater storage. Seawater intrusion poses groundwater quality concerns, with TDS values range from 223 to 1,013 mg/L (DWR, 2004a). The purpose of this GSP Update is to outline how the Salinas Valley Basin Groundwater Sustainability Agency (SVBGSA) will address the declining groundwater conditions and achieve groundwater sustainability in the Subbasin. Sustainability is the absence of undesirable results for any of the six sustainability indicators applicable in the subbasin: groundwater level declines, groundwater storage reductions, seawater intrusion, groundwater quality degradations, land subsidence, and surface water depletion from groundwater use. Sustainability must by achieved in 20 years and maintained for an additional 30 years.

In 2020, SVBGSA submitted the groundwater sustainability plan (GSP) for the 180/400-Foot Aquifer Subbasin that outlined how it would adaptively manage groundwater. In 2022, the 5 other Salinas Valley subbasins under the authority of SVBGSA submitted GSPs. This 2-Year GSP Update to the 180/400-Foot Aquifer Subbasin GSP (GSP Update) is developed to align all SVBGSA GSPs in approach and timing. This GSP Update incorporates additional data about current conditions, adds clarifications identified during development of the 2022 Salinas Valley GSPs, addresses recommended actions from DWR's review of the original GSP, and incorporates additional regulatory requirements. This 2-Year Update is submitted to DWR as an amendment according to GSP Regulation § 355.10, and replaces the original 2020 GSP. It continues to meet all of the GSP regulatory requirements and additionally includes an assessment of the original GSP submitted in 2020, meeting GSP Regulations § 356.4.

This GSP Update first presents the stakeholders, plan area, geologic and hydrogeologic data, groundwater conditions, and water budget necessary to develop an informed and robust plan. This GSP Update is based on best available data and analyses. As additional data are collected and analyses are refined, the GSP will be modified to reflect changes in the local understanding.

Following the foundational information, the GSP Update introduces the current agreed-to sustainability goal for the Subbasin. It also locally defines significant and unreasonable conditions, which underpin the quantifiable minimum thresholds, measurable objectives, and interim milestones for each of the corresponding sustainability indicators. The final chapters detail projects and actions that could be implemented to achieve sustainability and provide a plan for implementing the GSP. The GSP is intended to include adaptive management that will refine the implementation and direction of this GSP over time.

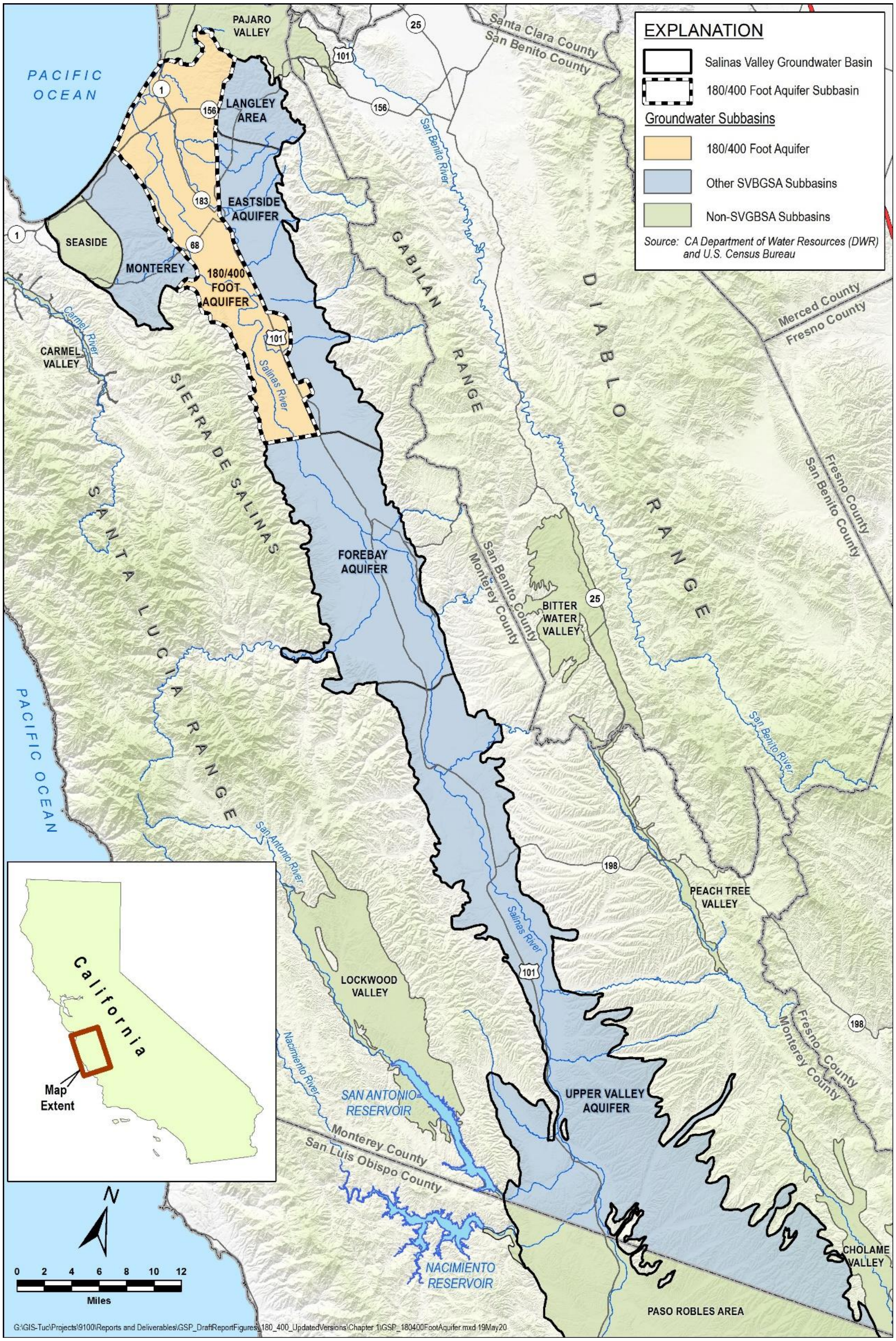


Figure 1-1. 180/400-Foot Aquifer Subbasin Location

1.2 Agency Information

The 180/400-Foot Aquifer Subbasin falls within the jurisdiction of three GSAs: the SVBGSA, Marina Coast Water District GSA (MCWD GSA), and County of Monterey Groundwater Sustainability Agency (Monterey County GSA). This GSP was developed by the SVBGSA with input and assistance from the MCWD GSA and the County GSA. Each is an exclusive GSA for its respective portion of the Subbasin. The Subbasin boundary is shown on Figure 1-2.

1.2.1 Agency Name, Mailing Address, and Plan Manager

Pursuant to California Water Code § 10723.8, the name and contact information for each GSA are:

Salinas Valley Basin Groundwater Sustainability Agency
Attn.: Donna Meyers, General Manager
1441 Schilling Place
Salinas, CA 93901
https://svbgsa.org

Marina Coast Water District Groundwater Sustainability Agency
Attn.: Remleh Scherzinger, General Manager
11 Reservation Road
Marina, CA 93933
http://www.mcwd.org

County of Monterey Groundwater Sustainability Agency
Attn: Brian Briggs, Deputy County Counsel
169 W Alisal St, 3rd Floor
Salinas, CA 93901
https://www.co.monterey.ca.us/

The Plan Manager and her contact information are:

Ms. Donna Meyers, General Manager
Salinas Valley Basin Groundwater Sustainability Agency
1441 Schilling Place
Salinas, CA 93901 | (831) 682-2592
meyersd@svbgsa.org
https://svbgsa.org

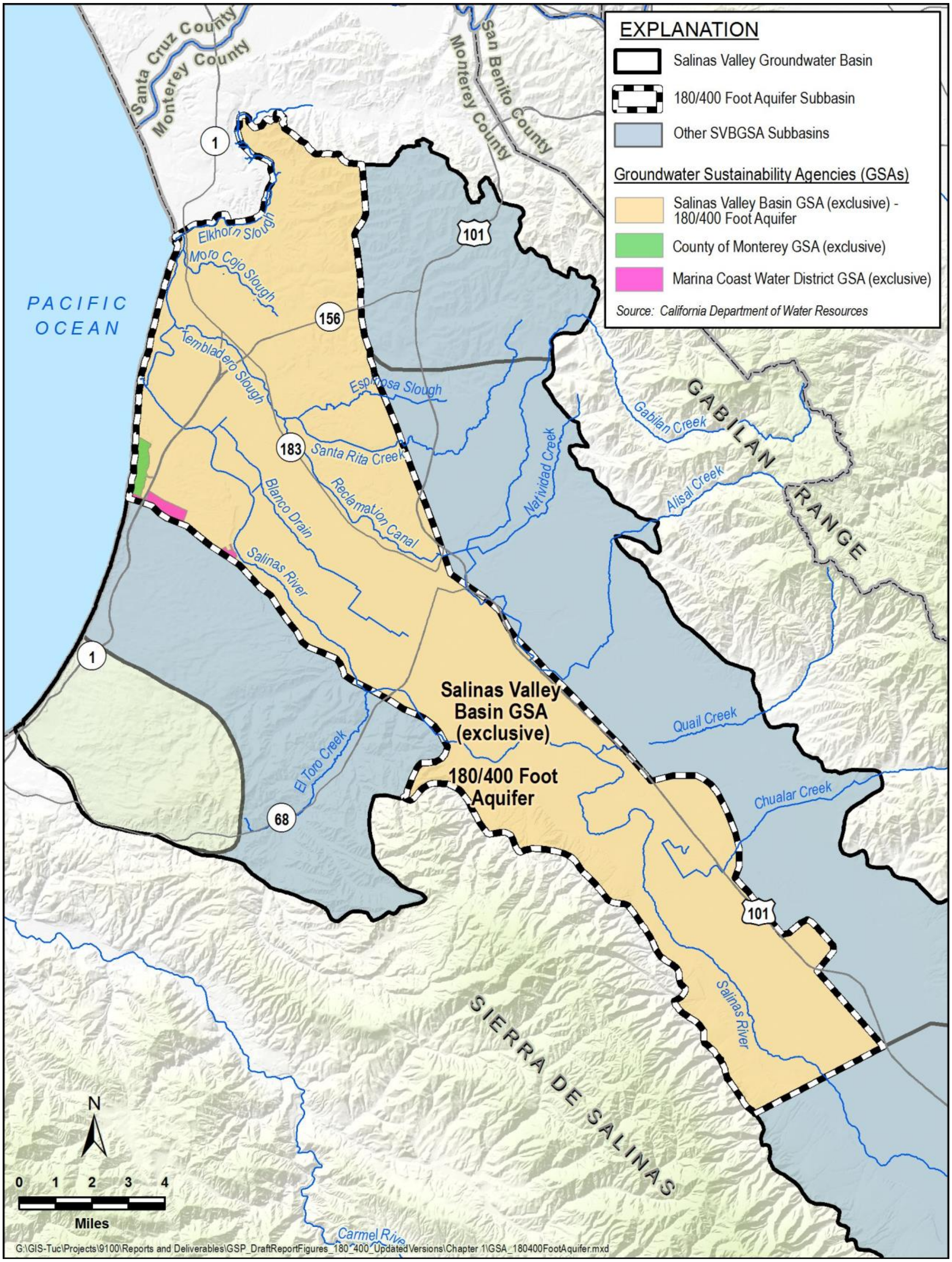


Figure 1-2. Map of Area Covered by the SVBGSA in the 180/400-Foot Aquifer Subbasin

1.2.2 Agencies' Organization and Management Structure

1.2.2.1 SVBGSA

Local GSA-eligible entities formed the SVBGSA in 2017. The SVBGSA represents agriculture, public utility, municipal, county, and environmental stakeholders, and is partially or entirely responsible for developing GSPs in 6 of the Salinas Valley Groundwater Subbasins.

The SVBGSA is a Joint Powers Authority (JPA), and its membership includes the County of Monterey, Monterey County Water Resources Agency (MCWRA), City of Salinas, City of Soledad, City of Gonzales, City of King (King City), the Castroville Community Services District (CSD), and Monterey One Water (formerly the Monterey Regional Water Pollution Control Agency). The SVBGSA is governed and administered by an 11-member Board of Directors, representing public and private groundwater interests throughout the Valley. When a quorum is present, a majority vote is required to conduct business. Some business items require a super majority vote or a super majority plus vote. A super majority requires an affirmative vote by eight of the 11 Board members. A super majority vote is required for:

- Approval of a GSP
- Amendment of budget and transfer of appropriations
- Withdrawal or termination of Agency members

A super majority plus requires an affirmative vote by 8 of the 11 Board members, including an affirmative vote by 3 of the 4 agricultural representatives. A super majority plus vote is required for:

- Decisions to impose fees not requiring a vote of the electorate or property owners
- Proposals to submit to the electorate or property owners (as required by law) decisions to impose fees or taxes
- Limitations on well extractions (pumping limits)

In addition to the Board of Directors, SVBGSA includes a Budget and Finance Committee consisting of five Directors, an Executive Committee consisting of 5 Directors, a Planning Committee consisting of five Directors, and an Advisory Committee consisting of Directors and non-directors. The Advisory Committee is designed to ensure participation by constituencies whose interests are not directly represented on the Board. The SVBGSA's activities are coordinated by a general manager. The SVBGSA established individual subbasin committees to advise the Board of Directors on each of the subbasins under its jurisdiction for which it is developing a 2022 GSP. This GSP Update, as well as GSP implementation, is guided and reviewed by the 180/400-Foot Aquifer Subbasin Implementation Committee, which comprises local representatives from the Subbasin.

1.2.2.2 MCWD GSA

MCWD GSA is a single agency GSA formed by MCWD and covering the areas within the MCWD service area within Monterey Subbasin, except for those areas owned by a federal government entity and thus not subject to SGMA. MCWD is by a five-member Board of Directors who each serve four-year terms. Board members are elected at large. Decisions on all GSA-related matters require an affirmative vote of a majority of the five Board of Directors members. The MCWD GSA activities are coordinated by the MCWD's existing staff.

1.2.2.3 Monterey County GSA

The Monterey County GSA is governed by the Board of Supervisors of the County of Monterey. The Board of Supervisors is composed of five members who are elected by their respective geographical districts within the County. The County's GSA activities are coordianted by the County Administrative Officer (CAO) or designee.

1.2.3 Authority of Agency

1.2.3.1 SVBGSA

The SVBGSA was formed in accordance with the requirements of California Water Code §10723 *et seq*. This section lists its specific authorities for GSA formation and groundwater management.

SVBGSA is a JPA that was formed for the Salinas Valley Groundwater Basin in accordance with the requirements of California Government Code § 6500 *et seq*. The JPA agreement is included in Appendix 1A. In accordance with California Water Code § 10723 *et seq.*, the JPA signatories are all local agencies under California Water Code § 10721 with water or land use authority that are independently eligible to serve as GSAs:

- The County of Monterey has land use authority over the unincorporated areas of the County, including areas overlying the 180/400-Foot Aquifer Subbasin.
- The MCWRA is a California Special Act District with broad water management authority in Monterey County.
- The City of Salinas is incorporated under the laws of the State of California. The City provides water supply and land use planning services to its residents.
- The City of Soledad is incorporated under the laws of the State of California. The City provides water supply and land use planning services to its residents.
- The City of Gonzales is incorporated under the laws of the State of California. The City provides water supply and land use planning services to its residents.
- King City is incorporated under the laws of the State of California. The City provides

water supply and land use planning services to its residents.

- The Castroville CSD is a local public agency of the State of California, organized and operating under the Community Services District Law, Government Code §6100 *et seq*. Castroville CSD provides water services to its residents.
- Monterey One Water is itself a joint powers authority whose members include many members of the SVBGSA.

Upon establishing itself as a GSA, the SVBGSA retains all the rights and authorities provided to GSAs under California Water Code § 10725 *et seq*. as well as the powers held in common by the members.

1.2.3.2 Authority of MCWD GSA

MCWD GSA was formed in accordance with California Water District Law, California Water Code § 34000, and is responsible for water supply in a portion of the Subbasin. MCWD is therefore a local agency under California Water Code § 10721 with the authority to establish itself as a GSA. Upon establishing itself as a GSA, MCWD retains all the rights and authorities provided to GSAs under California Water Code § 10725 *et seq*.

1.2.3.3 Authority of County GSA

Pursuant to California Water Code section § 10724, the Board of Supervisors of the County of Monterey elected to be the exclusive GSA for the approximately 400-acre parcel within the 180/400-Foot Aquifer Subbasin commonly known as the CEMEX site.

1.2.3.4 Coordination Agreement

Because the SVBGSA is developing a single GSP for the entire 180/400-Foot Aquifer Subbasin, with input of MCWD GSA and County GSA, coordination agreements with MCWD GSA and Monterey County GSA are not required (California Water Code § 10720.7). However, the SVBGSA and MCWD GSA developed agreements to cooperatively develop this GSP. Likewise, the SVBGSA and Monterey County GSA developed a Cooperation Agreement to ensure that GSP implementation in the 180/400-Foot Aquifer Subbasin is synchronized, and the legal authorities to implement the GSP for the entire Subbasin exist. According to these agreements, MCWD GSA and Monterey County GSA will adopt those aspects of the SVBGSA's 180/400-Foot Aquifer Subbasin GSP that apply to their respective jurisdictions within the 180/400-Foot Aquifer Subbasin. These agreements to cooperatively develop this GSP are included in Appendix 1B.

1.3 Agency Coordination

1.3.1 Coordination Between GSAs

SVBGSA continues to coordinate with agencies involved in water management within the 180/400-Foot Aquifer Subbasin, the adjacent Pajaro Valley Groundwater Basin, and the adjacent Salinas Valley subbasins. MCWD GSA, Arroyo Seco GSA, and MCWRA have representation on the Integrated Implementation Committee, as described in Chapter 2. [SVBGSA also solicited input from Monterey County GSA and the Pajaro Valley Water Management Agency GSA prior to submitting the GSP Update.]

1.3.2 Coordination with Land Use Agencies

SVBGSA acknowledges the critical importance of coordinating water management and land use planning. The SVBGSA will be coordinating with land use authorities within the Subbasin, including the County of Monterey, and the Cities of Salinas, Marina, and Gonzales. During 2020 and 2021, SVBGSA began coordination with land use agencies through meeting with the City of Salinas. SVBGSA also drafted a Land Use Coordination Program Implementation Action that is included in Chapter 9. This implementation action provides for more robust, on-going coordination between the GSA and land use agencies during GSP implementation.

1.4 Overview of this GSP Update

The SVBGSA, with input from MCWD and County GSA, developed this GSP Update for the entire 180/400-Foot Aquifer Subbasin. This GSP Update is developed in concert with GSPs for five other Salinas Valley Groundwater Basin subbasins under SVBGSA jurisdiction: the Eastside Aquifer Subbasin, the Forebay Aquifer Subbasin, the Upper Valley Aquifer Subbasin, the Langley Area Subbasin and the Monterey Subbasin. While this GSP is focused on the 180/400-Foot Aquifer Subbasin, the GSP will be implemented in accordance with SVBGSA's role in maintaining and achieving sustainability for all subbasins within the Salinas Valley Groundwater Basin The 180/400-Foot Aquifer Subbasin is referred to as the Subbasin throughout this GSP Update, and the collection of Salinas Valley Groundwater Subbasins that fall partially or entirely under SVBGSA jurisdiction are collectively referred to as the Basin or the Valley.

The SVBGSA used a collaborative process to develop this GSP. Chapter 2 details the stakeholders that participated, and process followed, to develop this GSP. Stakeholders worked together to gather existing information, define sustainable management criteria (SMC) for the Subbasin, and develop a list of projects and management actions.

This GSP Update describes the basin setting, presents the hydrogeologic conceptual model (HCM), and describes historical and current groundwater conditions. It further establishes estimates of the historical, current, and future water budgets based on the best available information. This GSP Update defines local SMC, details required monitoring networks, and outlines projects and management actions for reaching sustainability in the Subbasin by 2040.

The SVBGSA developed this GSP as part of an adaptive management process. This GSP will be updated and adapted as new information and more refined models become available. This includes updating SMC and projects and management actions to reflect updates and future conditions. Adaptive management will be reflected in the required 5-year assessment and annual reports.

2 COMMUNICATIONS AND PUBLIC ENGAGEMENT

2.1 Introduction

The SVBGSA was formed in 2017 to implement SGMA locally within the Salinas Valley Groundwater Basin. GSA formation and coordination took place from 2015 through 2017 and included completing a Salinas Valley Groundwater Stakeholder Issues Assessment which resulted in recommendations for a transparent, inclusive process for the local implementation of SGMA and the formation of the SVBGSA. Through the development and implementation of the GSPs SVBGSA is committed to following the requirements for stakeholder engagement as defined by SGMA:

- Consider the interests of all beneficial uses of water and users of groundwater (§ 10723.2)
- Encourage the active involvement of diverse social, cultural, and economic elements of the population within the groundwater basin (§ 10727.8)
- Establish and maintain a list of persons interested in receiving notices regarding plan preparation, meeting announcements and availability of draft plans, maps, and other relevant documents (§ 10723.4)
- Make available to the public and DWR a written statement describing the manner in which interested parties may participate in the development and implementation of the GSP (§ 10723.2)

2.2 Defining and Describing Stakeholders for Public Engagement

The SVBGSA stakeholders are highly diverse. Groundwater supports economic activities from small domestic scale to large industrial scale. Groundwater is an important supply for over 400,000 people living within the Salinas Valley Groundwater Basin. Beneficial users in the Basin are the key stakeholders targeted for robust public engagement for GSP development and implementation. Beneficial users in the Basin are listed below:

Agriculture. Includes row crops, field crops, vineyards, orchards, cannabis, and rangeland. The Salinas Valley agricultural region supports a $4.25 billion dollar production value and produces a large percentage of the nation’s produce and healthy foods including 61% of the leaf lettuce, 57% of celery, 56% of head lettuce, 40% of broccoli, and 38% of spinach. Agriculture is the largest user of groundwater in the Basin accounting for approximately 250,000 irrigated acres and 94% of pumping in the Basin.

Domestic Water Users. Includes urban water use assigned to non-agricultural water uses in the cities and census-designated places and rural residential wells used for drinking water. Urban water use includes small local water systems, small state water systems, and small and large public water systems.

Industrial Users. Includes industrial water users, such as quarries and oil production. There is little industrial use within the Basin.

Environmental Users. Environmental users include the habitats and associated species maintained by conditions related to surface water flows such as steelhead trout and groundwater dependent ecosystems (GDE) including brackish and freshwater marsh and riparian habitats. Environmental users include native vegetation and managed wetlands.

Stakeholders associated with these beneficial users and uses include the following. These users are also represented on the SVBGSA Board and Advisory Committees as described in the next section.

- **Environmental organizations.** Environmental organizations that are stakeholders include Sustainable Monterey County, League of Women Voters of Monterey County, Landwatch Monterey County, Friends and Neighbors of Elkhorn Slough, California Native Plant Society Monterey Chapter, Trout Unlimited, Surfriders, the Nature Conservancy and the Carmel River Steelhead
- **Underrepresented communities (URCs) and Disadvantaged Communities (DACs).** URCs and DACs include the City of Greenfield, the City of Salinas, Castroville Community Services District, San Jerardo Cooperative, San Ardo Water District, San Vicente Mutual Water Company, Environmental Justice Coalition for Water
- **City and county government.** Cities of Gonzales, Soledad, Greenfield, King City, Marina, and Salinas, Monterey County, Monterey County Environmental Health Department
- **Land use nonprofits.** Sustainable Monterey County, League of Women Voters of Monterey County, Landwatch Monterey County, Friends and Neighbors of Elkhorn Slough
- **Residential well owners.** Represented by public members and members of mutual water companies and local small or state small water systems.
- **Water agencies.** Monterey County Water Resource Agency, Marina Coast Water District, Arroyo Seco Groundwater Sustainability Agency, Castroville Community Services District, Monterey 1 Water, Monterey Peninsula Water Management District (MPWMD)

- **CPUC-regulated water companies.** Alco Water Corporation, California Water Service Company, California American Water.

2.3 SVBGSA Governance Structure

SVBGSA is governed by a local and diverse 11-member Board of Directors (Board) and relies on robust science and public involvement for decision-making. The Board meets monthly and all meetings are open to the public. The Board is the final decision-making body for adoption of Groundwater Sustainability Plans completed by the GSA.

The SVBGSA Advisory Committee advises the SVBGSA Board. The Advisory Committee is comprised of 25 members. The Advisory Committee strives to include a range of interests in groundwater in the Salinas Valley and outlined in SGMA. Advisory Committee members live in the Salinas Valley or represent organizations with a presence or agencies with jurisdiction in the Basin including:

- All groundwater users
- Municipal well operators, Public-Utilities Commission-Regulated water companies, and private and public water systems
- County and city governments
- Planning departments/land use
- Local landowners
- URCs
- Business and agriculture
- Rural residential well owners
- Environmental uses

The Advisory Committee, at this time, does not include representation from:

- Tribes
- Federal government

The Advisory Committee will review its charter following GSP completion for additional members if identified as necessary by the Board. The Advisory Committee provides input and recommendations to the Board and uses consensus to make recommendations to the Board. The Advisory Committee was established by Board action and operates according to a Committee Charter which serve as the bylaws of the Advisory Committee. The Advisory Committee reviews and provides recommendations to the Board on groundwater-related issues that may include:

- Development, adoption, or amendment of the GSP
- Sustainability goals
- Monitoring programs
- Annual work plans and reports
- Modeling scenarios
- Inter-basin coordination activities
- Projects and management actions to achieve sustainability
- Community outreach
- Local regulations to implement SGMA
- Fee proposals
- General advisory

Subbasin planning committees were established in May 2020 by the Board to inform and guide planning for the five 5 GSPs submitted in January 2022. In July 2021 the SVBGSA Board voted for the creation of Subbasin Implementation Committees upon submittal of a GSP. Together the Board, Advisory Committee, and Subbasin Implementation committees are working to complete the six 6 GSPs required within the SVBGSA jurisdiction. In addition, SVBGSA will complete a Salinas Valley Basin-wide Integrated Implementation Plan (IIP) that will detail project portfolios and groundwater sustainability programs to meet SGMA compliance for subbasins by 2040 and maintain sustainability through 2050.

The following graphic captures the phases of GSA development and GSP planning and implementation intended by the SVBGSA through 2050.

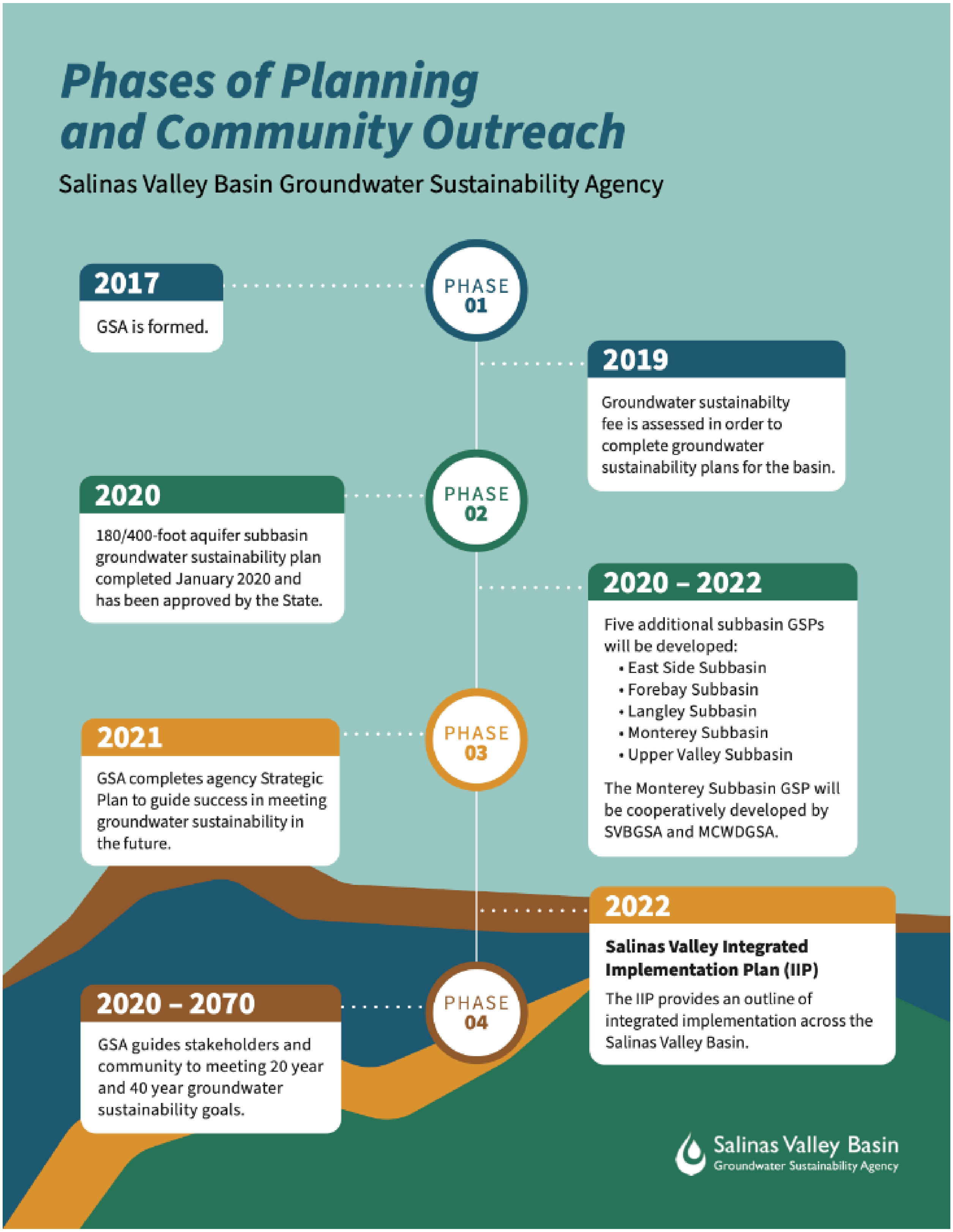


Figure 2-1. Phases of Planning and Community Outreach

2.4 180/400-Foot Aquifer Subbasin GSP Preparation and GSP Update

Given the importance of the Basin and the development of the 180/400-Foot Aquifer Subbasin GSP to the communities, residents, landowners, farmers, ranchers, businesses, and others, inclusive stakeholder input was a primary component of the 180/400-Foot Aquifer Subbasin GSP process. In order to encourage ongoing stakeholder engagement SVBGSA deployed the following strategies in the preparation of the 180/400-Foot Aquifer Subbasin GSP and GSP Update:

- An inclusive outreach and education process conducted that best supports the success of a well-prepared GSP that meets SGMA requirements.
- Kept the public informed by distributing accurate, objective, and timely information.
- Invited input and feedback from the public at every step in the decision-making process.
- In 2018, established the180/400-Foot Aquifer Subbasin Planning Committee that completed a comprehensive planning process that engaged the Advisory Committee in discussion of key plan elements and the Board of Directors on review of the Plan.
- In 2021, established the 180/400-Foot Aquifer Subbasin Implementation Committee that completed a comprehensive planning process, including engagement on key items with the Integrated Implementation Committee, Advisory Committee, and Board of Directors.
- Publicly noticed drafts of the 180/400-Foot Aquifer Subbasin GSP and allowed for required public comment periods as required by SGMA. Public comments received are included in Appendix 2A [to be added at later date].
- Followed consistent stakeholder outreach for GSP Update.

Additionally, a rigorous review process for each chapter in the 180/400-Foot Aquifer Subbasin GSP and for the final plan was completed. This process ensured that stakeholders had multiple opportunities to review and comment on the development of the chapters.

2.5 180/400-Foot Aquifer Subbasin Planning and Implementation Committees

Subbasin planning/implementation committees are comprised of local stakeholders and Board members and are appointed by the Board of Directors following a publicly-noticed application process by the GSA. After the 180/400-Foot Aquifer Subbasin Planning Committee completed the GSP submitted in January 2020, SVBGSA convened the 180/400-Foot Aquifer Subbasin Implementation Committee in October 2021. Subbasin implementation committees do the comprehensive work of reviewing monitoring data, project and management action priortization/funding, general GSP implementation, and plan updates, with assistance provided by SVBGSA staff and technical consultants.

These committees represent constituencies that are considered important stakeholders to implementing comprehensive subbasin plans for the Salinas Valley or are not represented on the Board. A list of the 180/400-Foot Aquifer Subbasin Implementation Committee is included in the Acknowledgements section of this GSP Update.

Subbasin implementation committee meetings are Brown Act meetings and noticed publicly on the SVBGSA website. Public comment is taken on all posted agenda items. Subbasin implementation committees have been engaged in an iterative planning process that [combines education of pertinent technical topics through presentations and data packets] and receiving GSPs chapters for review and comment. All GSP chapters were posted for public review and comment.

GSP chapters that have been taken to the Subbasin Planning Committee were also taken to the Advisory Committee for further review and comments. Community engagement and public transparency on SVBGSA decisions is paramount to building a sustainable and productive solution to groundwater sustainability in the Basin. At the conclusion of the planning process in 2019 for the 180/400-Foot Aquifer Subbasin GSP, the SVBGSA held more than XX planning meetings. The process to develop the GSP Update included XX planning meetings.

[List of meetings to be added]

2.6 Communication and Public Engagement Actions

SVBGSA is focused on communication and public engagement targeted at the public, including beneficial users, regarding the development of the SVBGSA's GSP for the 180/400-Foot Aquifer Subbasin**.** Communication and public engagement actions (CPE Actions) that have taken place during GSP development will continue during implementation of all SVBGSA GSPs. Communication and public engagement actions provide the SVBGSA Board and staff a guide to ensure consistent messaging about SVBGSA requirements and other related information. CPE Actions provide ways that beneficial users and other stakeholders can provide timely and meaningful input into the GSA decision-making process. CPE Actions also ensure beneficial users and other stakeholders in the Basin are informed of milestones and offered opportunities to participate in GSP implementation and plan updates. Appendix 2B includes the SVBGSA's marketing and communications plan.

Notice and communication, as required by GSP Regulations § 354.10, was focused on providing the following activities during the development of the 180/400-Foot Aquifer Subbasin GSP**:**

- Clear decision-making process on GSP approvals and outcomes
- Robust public engagement opportunities
- Encouragement of active involvement in GSP development

2.6.1 Goals for Communication and Public Engagement

Ultimately, the success of the 180/400-Foot Aquifer Subbasin GSP will be determined by the collective action of every groundwater user. In order to meet ongoing water supply needs, both for drinking water and for economic livelihoods, the Subbasin must achieve and maintain sustainability into the future. This outreach strategy engages the public early and frequently, and keeps the internal information flow seamless among staff, consultants, committee members and the SVBGSA Board regarding the goals and objectives of the 180/400-Foot Aquifer Subbasin GSP and associated monitoring and implementation activities.

Critical to the success of the 180/400-Foot GSP implementation will be public understanding of the projects and management actions planned for sustainability, as well as sustainability implementation actions and other groundwater management activities. These important actions are identified below and specifically described in Chapter 9 of the 180/400-Foot GSP.

[*TO BE FILLED IN ONCE PROJECTS AND MANAGEMENT ACTIONS CHAPTER IS COMPLETED]*

Additional important actions of GSP implementation is the production of the required Annual Report by April 1 each year for the 180/400-Foot Aquifer Subbasin. The Annual Report covers annual data collected each water year from October 1 through September 30. The Annual Report provides an annual benchmark for SVBGSA to provide to the public and stakeholders to assess progress towards sustainability. The Annual Report also includes assessment of the 6 SMC for the subbasin. The Annual Report provides an important opportunity to reengage the 180/400-Foot Aquifer Subbasin Committee in its review and to discuss sustainability status and goals.

CPE Actions provide outreach during the Subbasin planning efforts and assists SVBGSA in being receptive to stakeholder needs through communication tools. The CPE Actions also forecast how SVBGSA will communicate during GSP implementation.

The goals of the CPE Actions are:

1. To keep stakeholders informed through the distribution of accurate, objective, and timely information while adhering to SGMA requirements for engagement (noted above).
2. To articulate strategies and communications channels that will foster an open dialogue and increase stakeholder engagement during the planning process.
3. To invite input from the public at every step in the decision-making process and provide transparency in outcomes and recommendations.
4. To ensure that the Board, staff, consultants, and committee members have up-to-date information and understand their roles and responsibilities.
5. To engage the public on GSP Implementation progress especially for project and management actions and Annual Reports.

2.6.2 Communication and Outreach Objectives

The following are the communications and outreach objectives of the CPE Actions:

- Expand Audience Reach
  - Maintain a robust stakeholder list of interested individuals, groups and/or organizations.
  - Secure a balanced level of participants who represent the interests of beneficial uses and users of groundwater.
- Increase Engagement
  - Keep interested stakeholders informed and aware of opportunities for involvement through email communications and/or their preferred method of communications.
  - Publish meeting agendas, minutes, and summaries on the SVBGSA website (www.svbgsa.org).
  - Inform and obtain comments from the general public through GSP online

comment form and public meetings held on a monthly basis.
    - Facilitate productive dialogues among participants throughout the GSP planning process.
    - Seek the input of interest groups during the planning and implementation of the GSP and any future planning efforts.
- Increase GSP Awareness
    - Provide timely and accurate public reporting of planning milestones through the distribution of outreach materials and posting of materials on the SVBGSA website for the GSP.
    - Secure quality media coverage that is accurate, complete, and fair.
    - Utilize social media to engage with and educate the general public.
- Track Efforts
    - Maintain an active communications tracking tool to capture stakeholder engagement and public outreach activities and to demonstrate the reporting of GSP outreach activities.

2.6.3 Target Audiences and Stakeholders

SVBGSA stakeholders consist of other agencies and interested parties including all beneficial users of groundwater or representatives of someone who is. Under the requirements of SGMA, all beneficial uses and users of groundwater must be considered in the development of GSPs, and GSAs must encourage the active involvement of diverse social, cultural, and economic elements of the population.

There are a variety of audiences targeted within the Basin whose SGMA knowledge varies from high to little or none. Given this variance, SVBGSA efforts are broad and all-inclusive. Target audiences include:

- SVBGSA Board of Directors, Advisory Committee and Subbasin Planning Committees
- SVBGSA Groundwater Sustainability Fee Payers
- Partner agencies including Monterey County Environmental Health Department, County of Monterey, Monterey County Water Resources Agency, and the Greater Monterey County Integrated Regional Water Management Group
- Municipal and public water service providers
- Private and local small or state small water system providers
- Local municipalities and communities

- Elected officials within the Basin
- Beneficial uses and users of groundwater including, agriculture, domestic wells and local small or state small water systems, and environmental uses such as wetlands
- Diverse social, cultural, and economic segments of the population within the Basin including URCs
- The general public

Stakeholder involvement and public outreach is critical to the GSP development because it helps promote the plan based on input and broad support. The following activities summarize involvement opportunities and outreach methods to inform target audiences and stakeholders. It is important to note that levels of interest will evolve and shift according to the GSP’s implementation opportunities and priorities.

2.6.4 Stakeholder Database

A stakeholder database of persons and organizations of interest will be created and maintained. The database will include stakeholders that represent the region’s broad interests, perspectives, and geography. It will be developed by leveraging existing stakeholder lists and databases and by conducting research of potential stakeholders that may be interested in one or all of the following categories: municipal users and groundwater users including agricultural, urban, industrial, commercial, institutional, rural, environmental, URCs, state lands and agencies, and integrated water management.

2.6.5 Key Messages and Talking Points

SVBGSA developed key messages focused on getting to know your GSA, an overview of groundwater sustainability planning for our community, and how we intend to continue outreach through implementaion. These messages were guided by the underlying statements:

- The GSP process, both planning and implementation, is transparent and direct about how the GSP will impact groundwater users.
- SVBGSA represents the groundwater interests of all beneficial uses/users of the basin equitably and transparently to ensure that the basin achieves and maintains sustainable groundwater conditions.
- SVBGSA is committed to working with stakeholders using an open and transparent communication and engagement process.
- As the overall GSP will be more comprehensive with an engaged group of stakeholders providing useful information, SVBGSA will create as many opportunities as possible to educate stakeholders and obtain their feedback on the GSP implementation and plan

updates.

These messages are being used as the basis for specific talking points/Q&A to support effective engagement with audiences. The SVBGSA Key Messages are also used to support communication with audiences (Appendix 2C).

2.6.6 Engagement Strategies

SVBGSA utilizes a variety of tactics to achieve broad, enduring, and productive involvement with stakeholders during the development and implementation of the GSPs. Below are activities that SVBGSA uses to engage the public currently and anticipated activities for GSP implementation:

- Develop and maintain a list of interested parties
- Offer public informational sessions and subject-matter workshops and provide online access via Facebook Live or via Zoom
- Basin tours (currently on hold due to COVID restrictions)
- SVBGSA Web Map
- Annual Report presentations
- FAQS – Offer FAQs on several topics including SGMA, SVBGSA, GSP, projects, Monitoring Program, Annual Report, Programs and Groundwater Sustainability Fee
- Science of Groundwater – new examples (studies, etc.)
- Board, Advisory Committee, and other Committee Meetings
    - Regular public notices and updates; Brown Act compliance
    - Develop talking points for various topics and evolve as necessary
- Subbasin Implementation Committees
    - Each subbasin's planning committee for GSP development will transition to a subbasin implementation committee to be convened for GSP updates and annual report reviews.
- Integrated Implementation Committee
    - The Integrated Implementation Committee will be convened to discuss Basin wide aspects to the 6 GSPs in the Basin including public outreach.
- Online communications
    - SVBGSA website: maintain with current information
    - SVBGSA Facebook page: maintain and grow social media presence

  - Direct email via Mailchimp newsletter

- Mailings to most-impacted water users and residents – topics to include: Annual Report dashboard, What does your GSA do with the Sustainability Fee?, newsletter that accompanies each tax bill.
- Media coverage. Appendix 2D includes SVBGSA's media policy.
  - Op-eds in the local newspapers
  - Press releases
  - Radio interviews
- Promote/Celebrate National Groundwater Week (held in December)
- Co-promotional opportunities and existing channels with agencies, committees, and organizations including email newsletters, social media, board meetings and mailings to customers.
- Talks and presentations to various stakeholder groups, associations, community organizations, and educational institutions.
- Educational materials

2.6.7 CPE Actions Timeline and Tactics

CPE Actions and GSP milestone requirements by phase include:

- Prior to initiating plan development: Share how interested parties may contact the GSA and participate in development and implementation of the plan submitted to DWR. (23 California Code of Regulations § 353.6)
- Prior to GSP development: Establish and maintain an interested persons list. (California Water Code § 10723.4)
- Prior to and with GSP submission:
  - Record statements of issues and interests of beneficial users of basin groundwater including types of parties representing the interests and consultation process
  - Lists of public meetings
  - Inventory of comments and summary of responses
  - Communication section in GSP (23 California Code of Regulations §354.10) that includes: agency decision-making process, identification of public engagement opportunities and response process, description of process for inclusion, and method for public information related to progress in implementing the plan (status, projects, actions)

- Supporting tactics to be used to communicate messages and supporting resources available through GSP development and GSP implementation:
    - SVBGSA website, updated regularly to reflect meetings and workshop offerings
    - Direct email via Mailchimp sent approximately monthly to announce board meetings, special workshop offerings and other opportunities for engagement
    - Outreach to local media to secure coverage of announcements and events, radio interviews, op-ed placement
    - Workshops, information sessions and other community meetings
    - Social media, specifically Facebook, updated regularly to share information and support other outreach efforts

2.6.8 CPE Actions – Annual Evaluation and Assessment

CPE Actions and GSP milestone requirements by phase include:

- What worked well?
- What didn't go as planned?
- Are stakeholders educated about the GSP development process and their own role?
- Is the timeline for implementation of the GSP clear?
- Has the GSA received positive press coverage?
- Do diverse stakeholders feel included?
- Has there been behavior changes related to the program goals? Or improved trust/relationships among participants?
- Community meeting recaps and next steps
- Lessons learned
- Budget analysis

2.7 Underrepresented Communities and Disadvantaged Communities Strategic Engagement and Communications

During development of the 2022 GSPs SVBGSA conducted the scoping of an engagement strategy for URCs and DACs that would provide both an assessment of how URCs and DACs may be engaged with the GSA and to develop GSA materials that are accessible and culturally responsive (visual and in Spanish). These materials will communicate impacts of groundwater management on local water conditions in order to engage URCs and DACs into GSA plan reviews and develop pathways for future involvement.

2.7.1 Underrepresented Communities and Disadvantaged Communities in the Salinas Valley

In this GSP Update, URCs and DACs are considered communities that currently have little or no representation in water management, or who historically have had disproportionately less representation in public policy decision making. URCs and DACs are inclusive of Severely Disadvantaged Communities (SDACs), Economically Distressed Areas (EDAs) and other communities that are traditionally underrepresented. The cities of Salinas and Gonzales anf the community of Chualar have URCs and DACs within their boundaries.

The basin-wide SVBGSA program area also has well documented DAC designation including 7 Census Designated Places, 60 Block Groups and 20 Tracts. Additionally, work conducted by the Greater Monterey County Integrated Regional Water Management Program (IRWMP) identified 25 small DACs, SDACs, and suspected DACs in unincorporated areas of the IRWMP region (RWMG, 2018). Figure 2-2 shows where DACs, SDACs, and EDAs are located within the Salinas Valley Groundwater Basin, and Appendix 2E further describes DACs.

SVBGSA seeks to engage more constructively with URCs and DACs moving forward in subbasin planning processes and ultimately GSP implementation. In August 2019, SVBGSA hired the Consensus Building Institute (CBI) to conduct an assessment with URC and DAC community leaders via formal interviews. The purpose of the assessment was to capture insights and recommendations to inform an engagement strategy for URCs and DACs. CBI conducted 14 interviews and summarized findings from the assessment to identify initial strategic steps for work with URCs and DACs for GSP planning and implementation. Based on this work, an initial set of short and middle term actions were identified and work will continue on these items during GSPimplementation. The Board affirmed these short and middle term actions on February 11, 2021, and are intended for focus during implementation of the GSP. The *Spectrum of Community to Ownership* will be utilized as a guide in further shaping SVBGSA work with URCs and DACs communities in the Basin in consultation with community leaders.

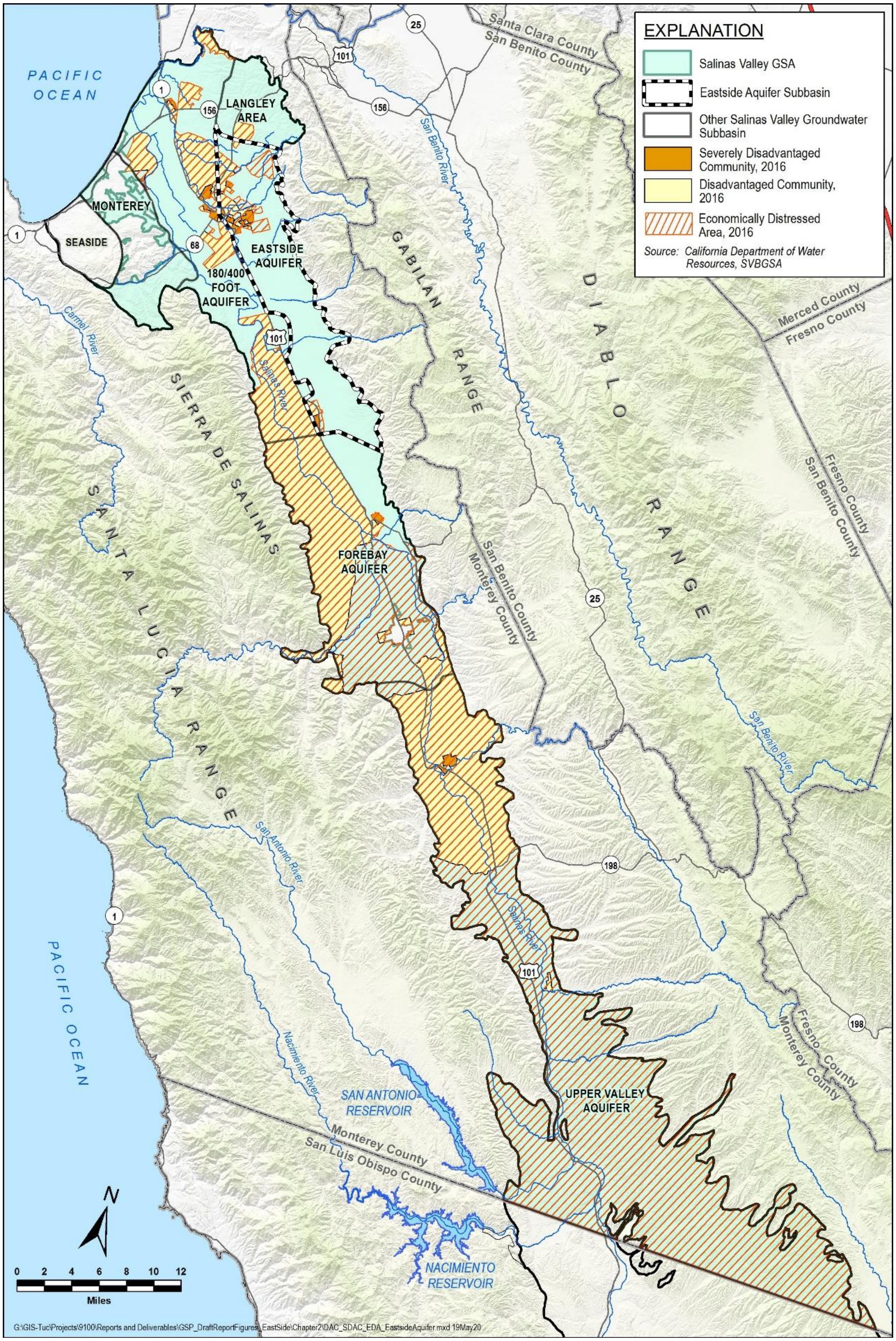


Figure 2-2. Disadvantaged Communities in the Salinas Valley Groundwater Basin

2.7.2 Additional activities scoped for engagement of Underrepresented Communities and Disadvantaged Communities

Additional activities scoped for engagement of URCs and DACs include:

- Conduct workshops with partners on importance of water and groundwater sustainability
- Identify URC and DAC concerns and needs for engagement
- Plan listening sessions around GSA milestones
- Coordinate with partner organizations to develop a “resource hub” where people can go for support
- Identify community allies in groundwater engagement work and bring down barriers for participation
- Consider particular URC and DAC impacts during routine GSA proceedings
- Convene a working group on domestic water, including URCs and DACs

3 DESCRIPTION OF PLAN AREA

This GSP Update covers the entire 180/400-Foot Aquifer Subbasin, as shown on Figure 3-1. This includes the areas within the Subbasin under the jurisdiction of the MCWD GSA and County GSA, as shown on Figure 1-2. The 180/400-Foot Aquifer Subbasin lies in northwestern Monterey County and includes the northern end of the Salinas River Valley. The Subbasin covers an area of 89,700 acres, or 140 square miles (DWR, 2004). It is bounded by the Eastside Aquifer and Langley Area Subbasins to the east (DWR subbasin numbers 3-004.02 and 3-004.09, respectively), the Forebay Aquifer Subbasin (DWR subbasin number 3-004.05) to the south, the Monterey Subbasin (DWR subbasin number 3-004.10) to the west, and the Monterey Bay to the north. The boundaries of the Subbasin, combined with those of the Monterey and Seaside subbasins, are generally consistent with MCWRA's Pressure Subarea (MCWRA, 2006). When this report refers to the 180/400-Foot Aquifer Subbasin, it refers to the area under the jurisdiction of the SVBGSA, MCWD, and County GSA.

The Salinas River drains the Subbasin, discharging into Monterey Bay. The Subbasin contains the municipalities of Salinas and Gonzales, part of Marina, and the census-designated places of Castroville, Moss Landing, Elkhorn, Boronda, Spreckels, and Chualar. United States Highway 101 runs generally north-south along the eastern border of the Subbasin. State Highways 1, 156, 183, and 68 also cross the Subbasin. Rivers and streams, urban areas, and major roads are shown on Figure 3-1.

This description of the plan area has been prepared in accordance with the GSP Regulations § 354.8. Information from existing water resource monitoring, management, and regulatory programs have been incorporated into this GSP Update through the development of the sustainability goal, SMC, and projects and management actions. This GSP Update has been developed to reflect the principles outlined in existing local plans, programs, and policies, and will build off them during GSP implementation.

3.1 Summary of Adjudicated and Jurisdictional Areas

3.1.1 Adjudicated Areas, Other GSAs, and Alternatives

The 180/400-Foot Aquifer Subbasin is not adjudicated. The only adjudicated area in the Salinas Valley Groundwater Basin is the Seaside Subbasin (DWR subbasin number 3-004.08), which is not adjacent to the 180/400-Foot Aquifer Subbasin.

No alternative plans have been submitted for any part of the Subbasin, or for any other Salinas Valley Groundwater Subbasins.

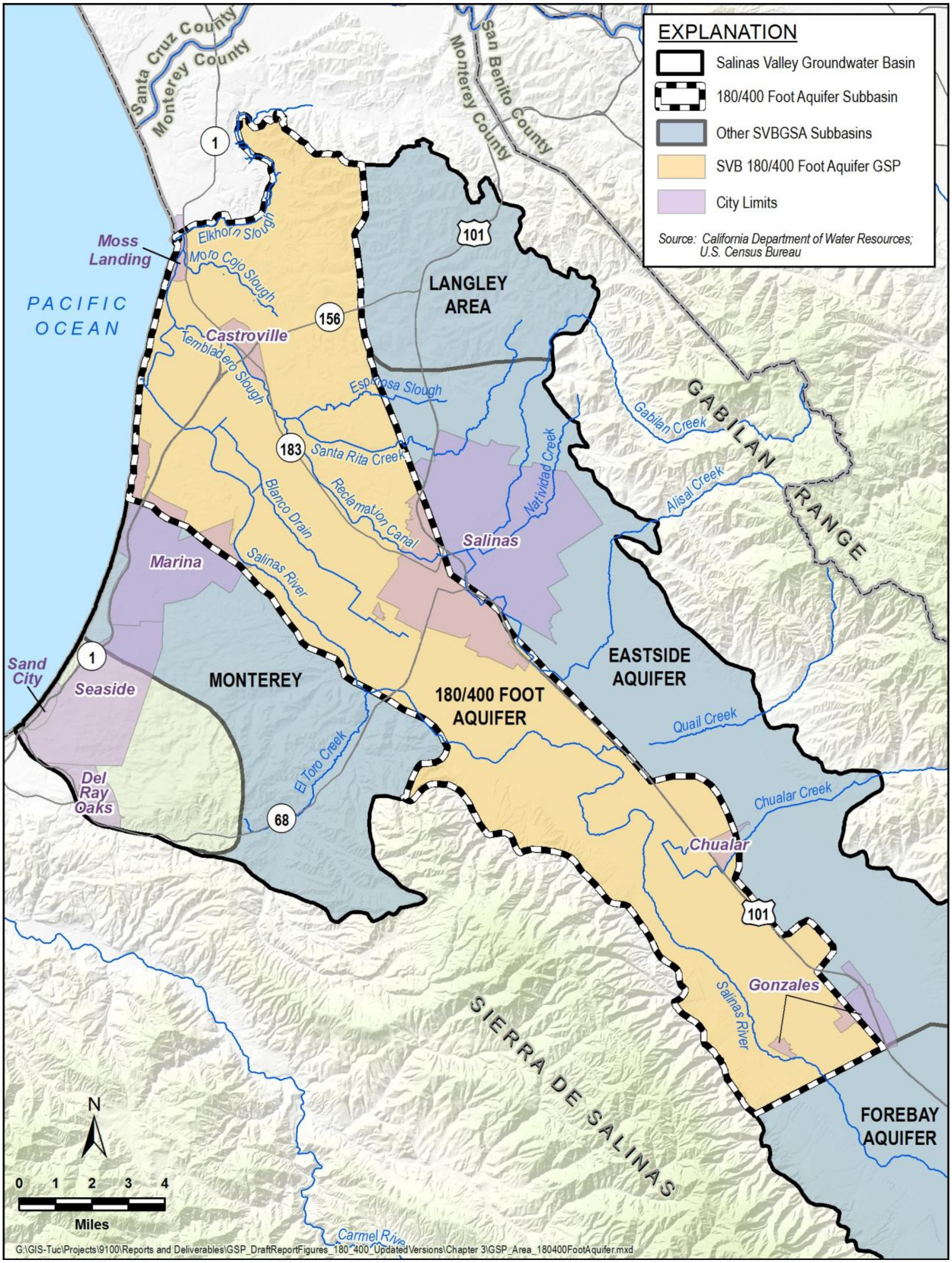


Figure 3-1. 180/400-Foot Aquifer Subbasin Area Covered by GSP

3.1.2 Jurisdictional Areas

3.1.2.1 Federal and State Jurisdictional Areas

Areas under federal jurisdiction are shown on Figure 3-2. Maps of federal and state jurisdictional areas are based on data from the U.S. Bureau of Land Management National Surface Management Agency National Geospatial Data Asset (BLM, 2020). The United States Department of Fish and Wildlife manages the Salinas River National Wildlife Refuge. A portion of the Fort Ord former Army base lies in the Subbasin and encompasses the Marina Municipal Airport. Although the DWR land use dataset depicts this area as federal land, this land has been transferred to civilian use and is no longer under federal jurisdiction. The Subbasin does not contain any tribal lands (Greater Monterey County Regional Water Management Group, 2018).

Areas under State jurisdiction are also shown on Figure 3-2. The California Department of Fish and Wildlife owns and operates the Elkhorn Slough Ecological Reserve, the Moro Cojo Slough State Marine Reserve (SMR), Elkhorn Slough State Marine Conservation Area (SMCA), Elkhorn SMR, and the Moss Landing Wildlife Area. The California Department of Parks and Recreation manages several areas in the Subbasin near Moss Landing including: Moss Landing State Beach, Salinas River Dunes Natural Preserve, Salinas River State Beach, and the Salinas River Mouth Natural Preserve.

3.1.2.2 County Jurisdiction

The County of Monterey has jurisdiction over the entire Subbasin. There are no County conservation areas or parks within the Subbasin (BLM, 2020).

MCWRA has broad water management authority in Monterey County, with its jurisdiction covering the entire 180/400-Foot Aquifer Subbasin, as shown on Figure 3-2. MCWRA manages, protects, stores, and conserves water resources in the Monterey County for beneficial and environmental use. Originally formed under a different name for flood control and management, it also has jurisdiction over water conservation, purveying water, and preventing extractions that are harmful to the groundwater basin. Key assessment zones for various projects and programs administered by MCWRA are shown on Figure 3-3. MCWRA is governed by a 9-member Board of Directors who are appointed by the 5-member MCWRA Board of Supervisors. The Board of Supervisors of the County is ex oficio the Board of Supervisors of MCWRA (Monterey County Water Resources Agency Act, Sec. 15).

3.1.2.3 City and Local Jurisdiction

The jurisdictional boundaries of cities and local jurisdictions shown on Figure 3-2 (U.S. Census Bureau, 2018). Part of the cities of Salinas, Gonzales, and Marina and the town of Castorville are located within the Subbasin and have water management authority. The City of Salinas is served by 2 private water supplies: California Water Company and Alisal Water Corporation (Alco). In

Gonzales, the City supplies drinking water. The Castroville CSD provides water and sewer collection services in the town of Castroville. The MCWD provides water and sewer collection services within its jurisdictional boundaries. A small portion of the MCWD's service area extends from the Monterey Subbasin into the 180/400-Foot Aquifer Subbasin. Pajaro/Sunny Mesa Community Services District provides water service to part of the northern Subbasin.

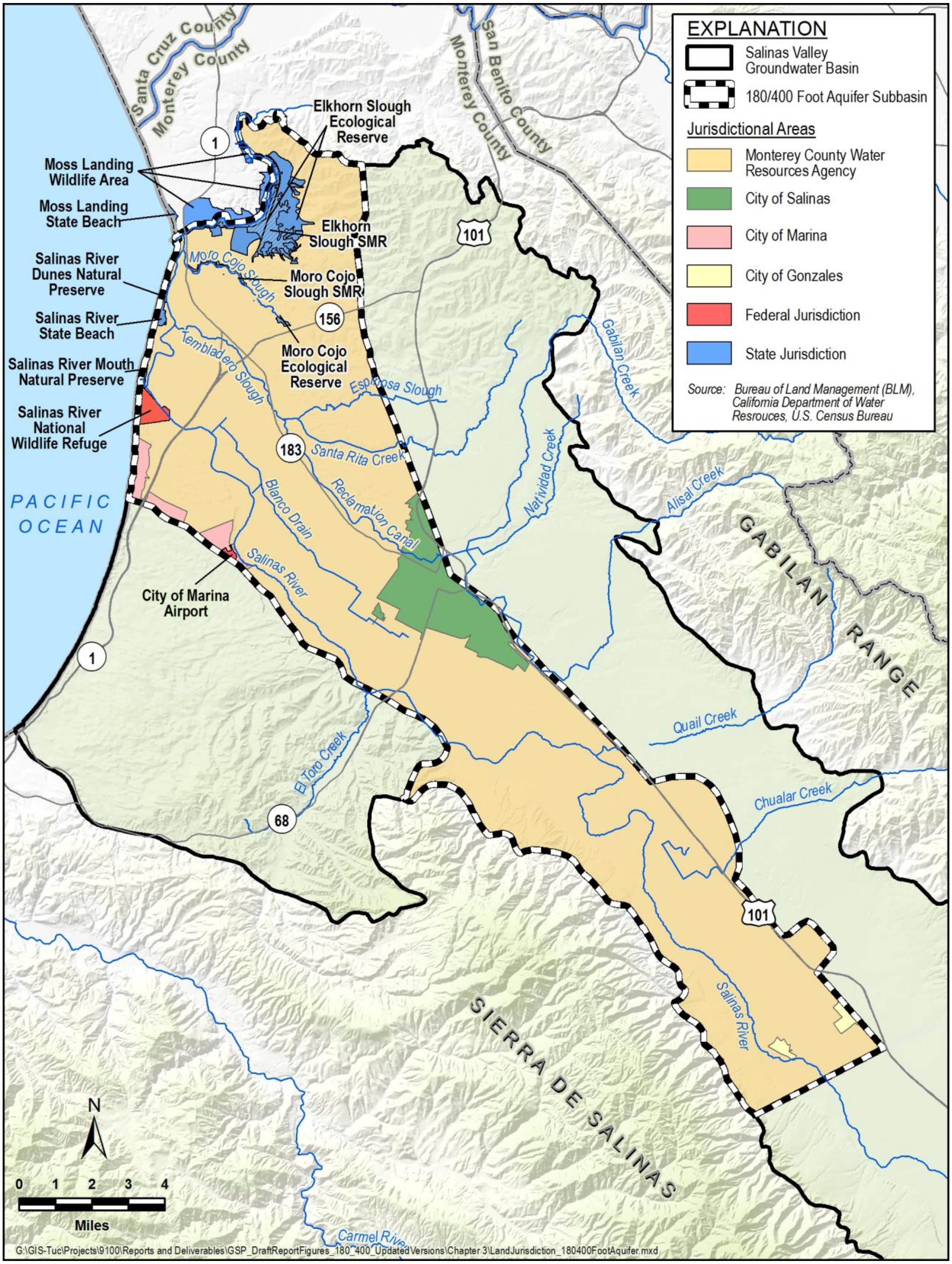


Figure 3-2. Federal, State, County, City, and Local Jurisdictional Areas

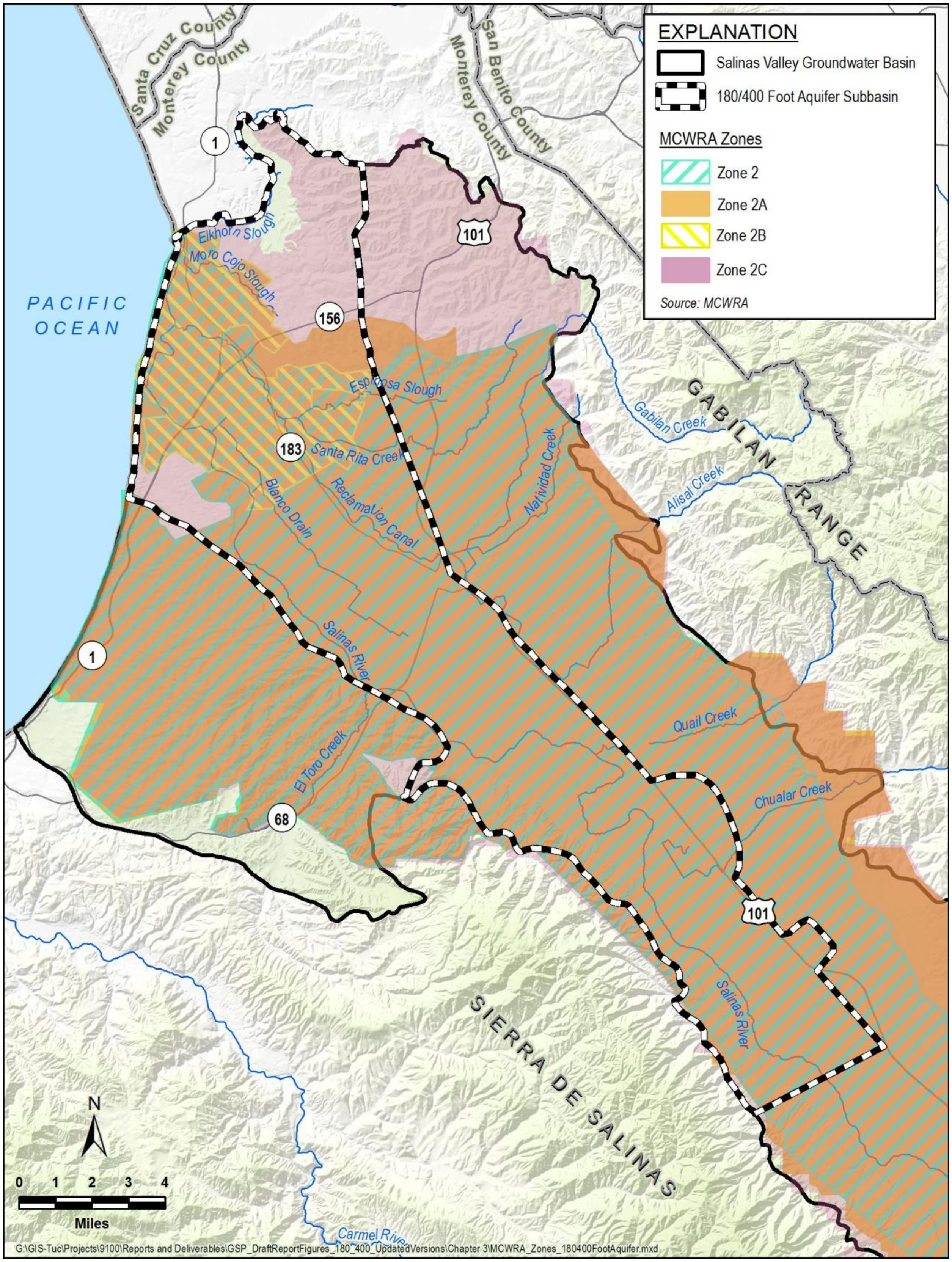


Figure 3-3. MCWRA Zones in the 180/400-Foot Aquifer Subbasin

3.2 Land Use

The Monterey County Assessor's office maintains a Geographic Information System (GIS) database of land use at the parcel level. Current (2019) land use in the 180/400-Foot Aquifer Subbasin is shown on Figure 3-4 and summarized by major category in Table 3-1. The difference between the land use area in Table 3-1 and the total Subbasin area of 89,000 arecres is the result of 1) MCWD parcels not being included in the table, 2) some parcels having null land use values, and 3) small gaps between parcels that are not counted.

Table 3-1. Land Use Summary

Category	Area in Subbasin (acres)
Agriculture (Irrigated)	62,806
Agriculture (Dry)	2,757
Commercial	822
Industrial	2,017
Institutional	5,672
Miscellaneous	1,761
Multi-Family	573
Residential (Urban)	2,605
Rural	6,815
Other	554
Total	**86,382**

Source: Monterey County Assessor's Office parcel data

The majority of land in the Subbasin is used for agriculture; the top three crops by value in Monterey County in 2017 were lettuce, strawberries, and broccoli (Monterey County Agriculture Commissioner, 2018). Vineyards are also a major crop in Monterey County. Other crops included under irrigated agriculture are various row crops, field crops, alfalfa, pasture, orchards (fruits and nuts), and irrigated agricultural preserves.

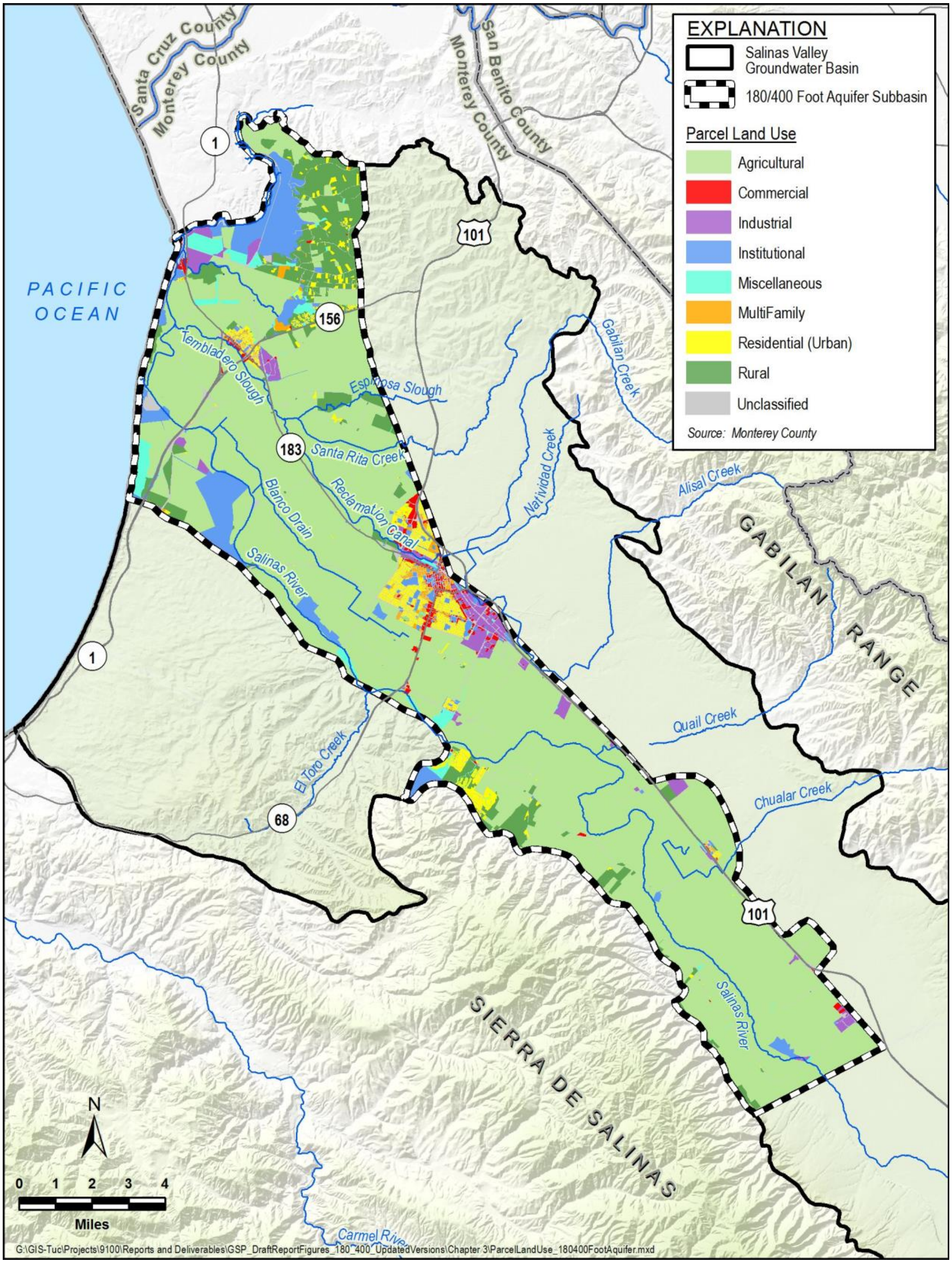


Figure 3-4. Existing Land Use

3.2.1 Water Source Types

Surface water diversions within the Salinas River watershed are reported to the State Water Resources Control Board (SWRCB) under Electronic Water Rights Information Management System (eWRIMS).The locations of the reported surface water diversions are shown on Figure 3-5. This figure does not show land that is dependent on the reported diversions, but rather infers areas through locations of diversion permits. Some reported surface water diversions are also reported to MCWRA as groundwater extractions. Based on an initial analysis comparing WY 2018 SWRCB diversion data and MCWRA pumping data, the estimated locations that reported both surface water diversions and groundwater pumping are identified with pink dots on Figure 3-5. The initial analysis suggests approximately 2,000 AF of water was reported to both MCWRA and SWRCB. Further review indicated that the eWRIMS data do not include the river diversions of the Salinas River Diversion Facility (SRDF), discussed below.

Groundwater is the primary water source for all water use sectors in the Subbasin. Communities that depend on groundwater are shown on Figure 3-6. The large public water systems shown on this figure are derived from data provided by Tracking California (Tracking California, 2020). Monterey County provided the boundaries for the small public water systems and the local small or state small water systems shown on

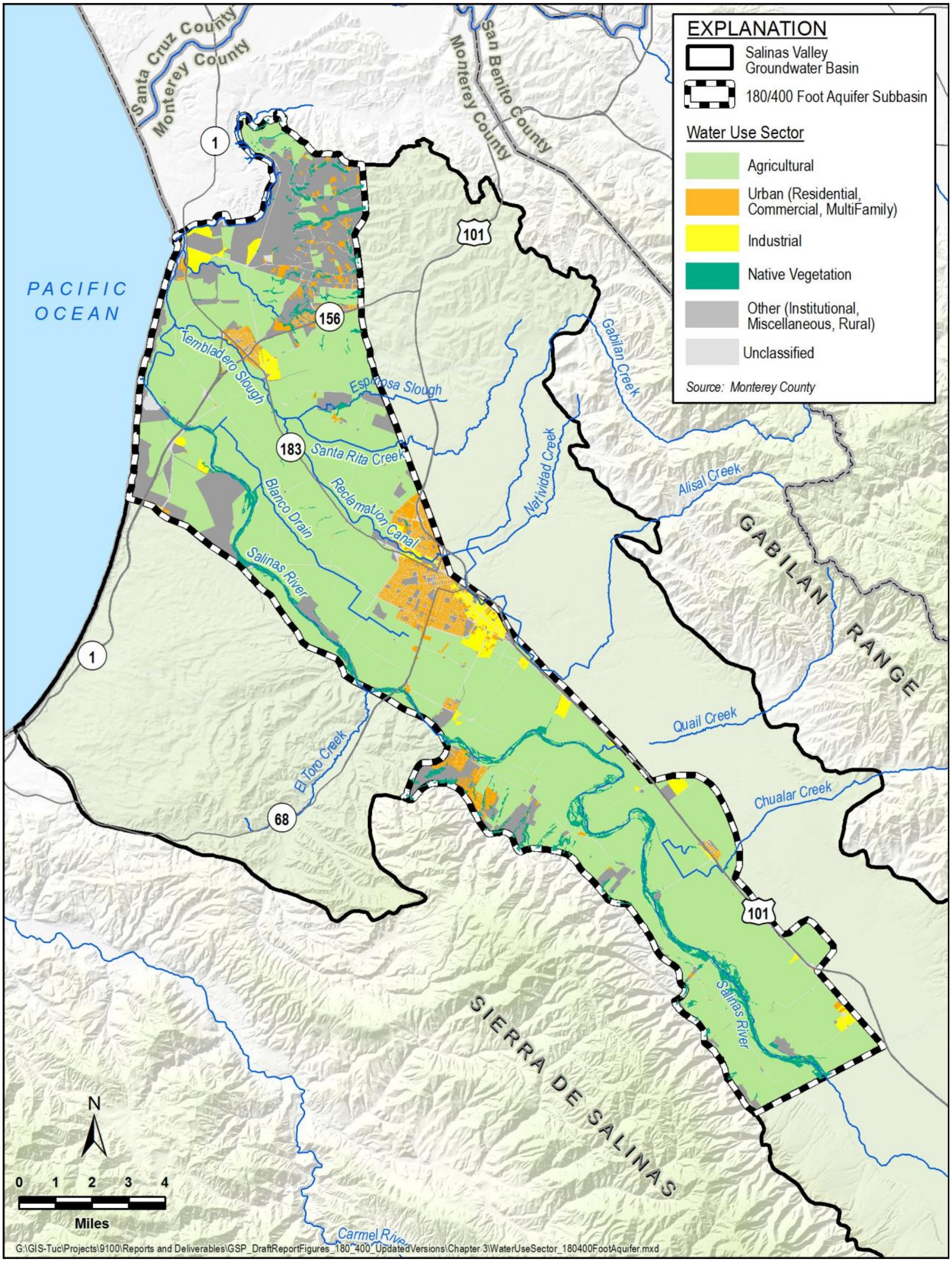


Figure 3-7. More information on these water systems can be found on SVBGSA's Web Map,

accessible at https://portal.elmontgomery.com. Groundwater is also used for rural residential areas, small community systems, and small commercial operations such as wineries and schools. The complete list of water systems and their number of connections, if available, are listed in Appendix 3A.

Costal farmland surrounding Castroville receives a combination of recycled water, groundwater, and surface water through the Castroville Seawater Intrusion Project (CSIP). Surface water diversions provide water to agriculture, and additional surface water is diverted through a pneumatic diversion dam known as the SRDF. This dam is located on the Salinas River near Marina. The SRDF provides surface water to the CSIP distribution system to offset groundwater pumping. Figure 3-6 shows the CSIP distribution area. CSIP delivers water to the agricultural land shown in orange. Recycled water is also used for irrigation in the Las Palmas Ranch development.

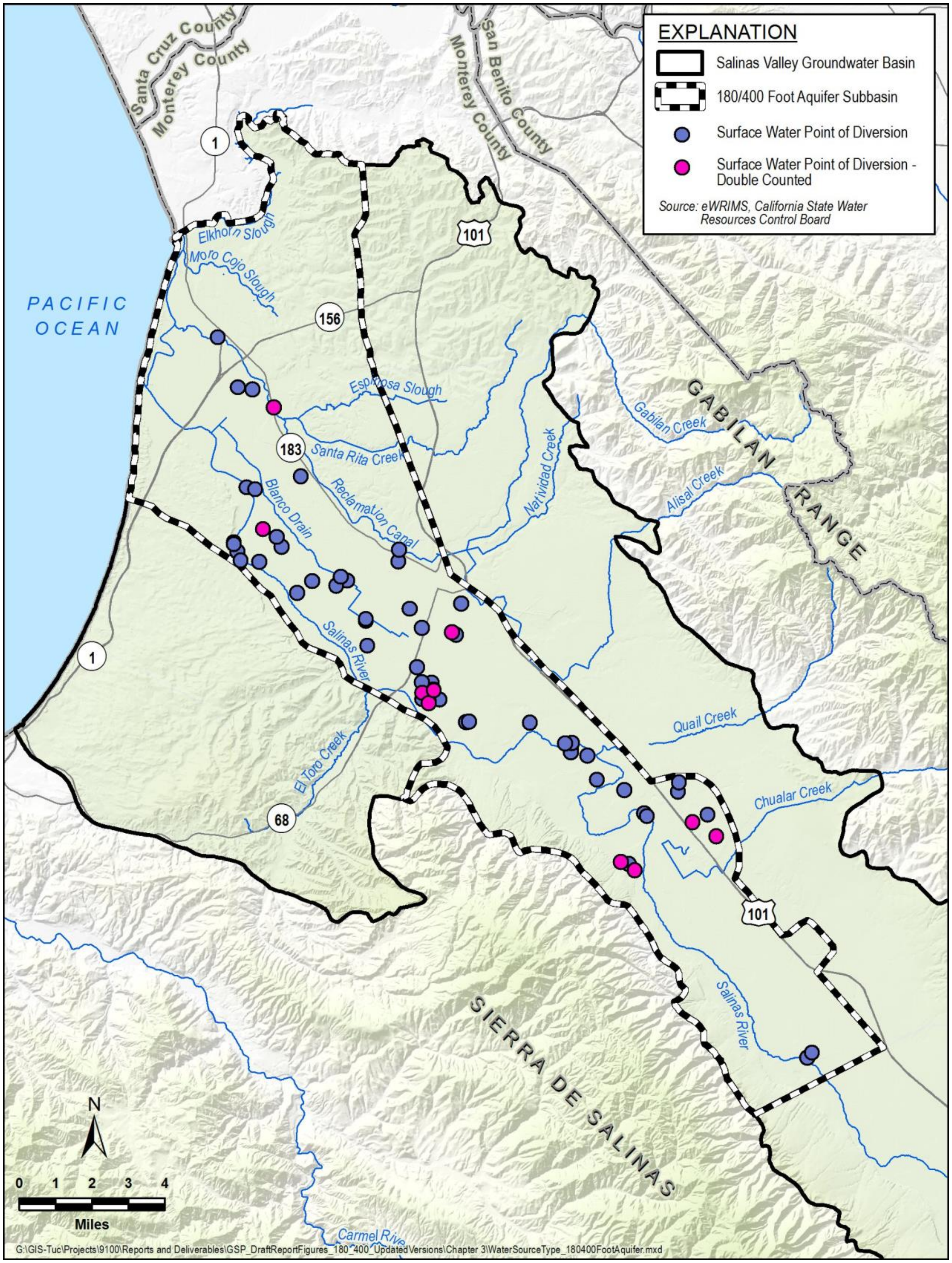


Figure 3-5. Salinas River Watershed Surface Water Points of Diversion in the 180/400-Foot Aquifer Subbasin

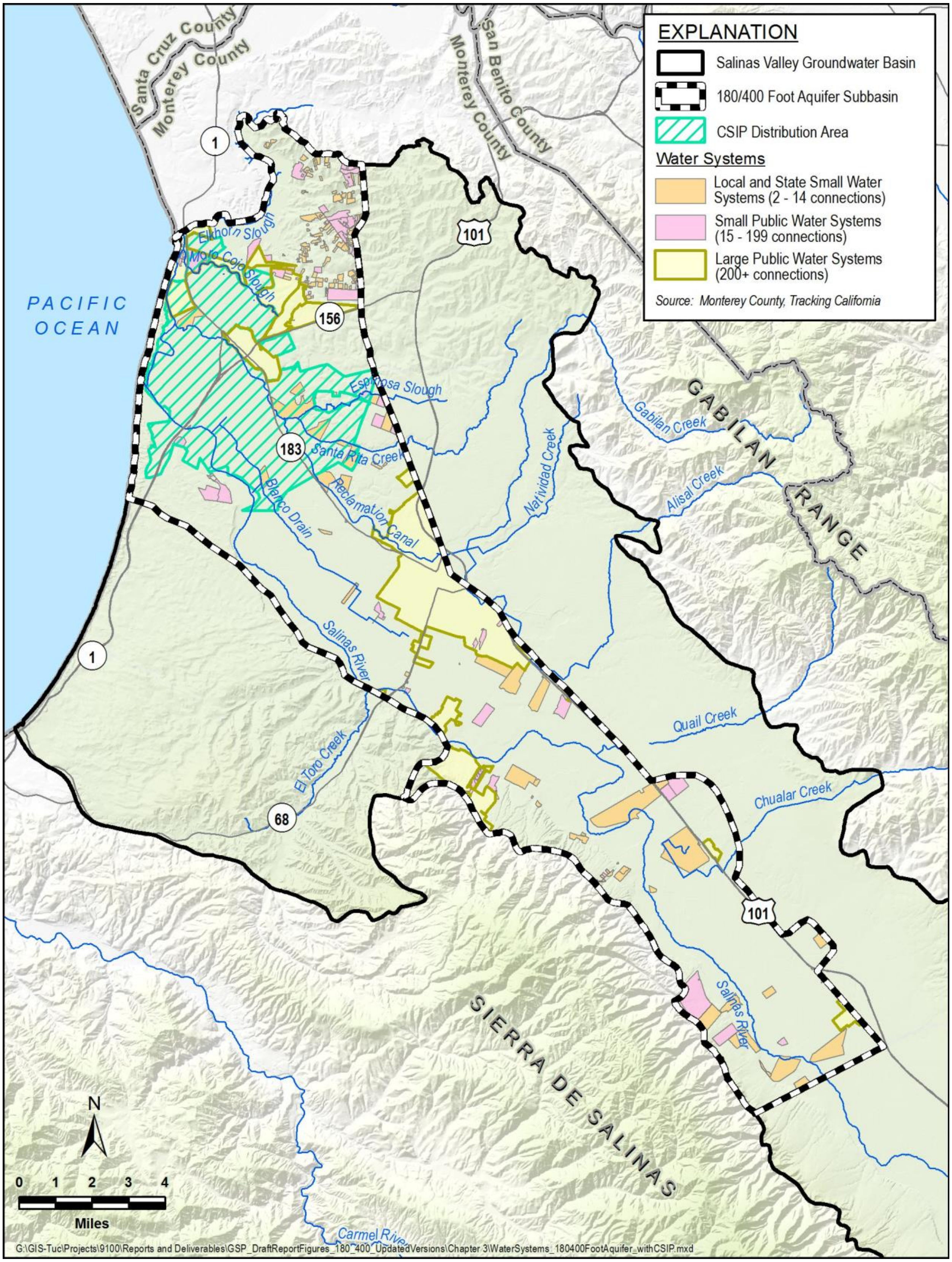


Figure 3-6. Communities Dependent on Groundwater

3.2.2 Water Use Sectors

Groundwater demands in the Subbasin are classified into the 6 water use sectors identified in the GSP Regulations. The water use sectors are shown on

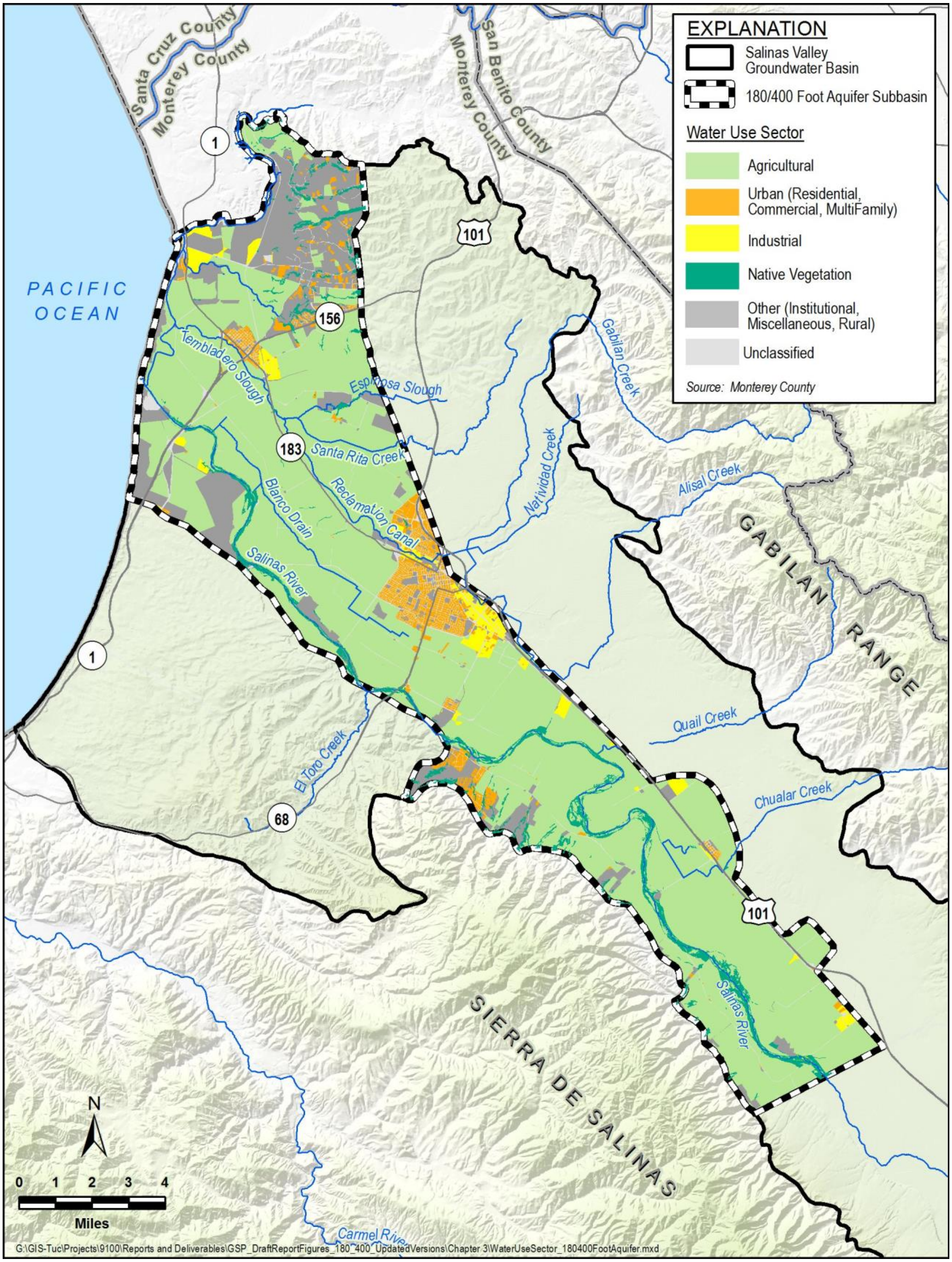


Figure 3-7. Groundwater demand categories include:

- **Urban**. Urban water use is assigned to non-agricultural water uses in the cities and census-designated places. Domestic use outside of census-designated places is not considered urban use.
- **Industrial**. There is limited industrial use in the Subbasin.
- **Agricultural**. This is the largest water use sector in the Subbasin.
- **Managed wetlands**. DWR land use records indicate that there is one managed wetland in the Subbasin, an 11.2-acre wetland owned by the State of California and located northeast of the Monte De Lago neighborhood, between state highway 156 and Castroville Boulevard. The water use of this wetland is unknown.
- **Managed recharge**. There is no managed recharge in the Subbasin. Wastewater treated by the Salinas Valley Reclamation Project (SVRP) is distributed by the CSIP distribution system and used to offset agricultural groundwater pumping within the CSIP service area resulting in in-lieu recharge.
- **Native vegetation.** Groundwater use by native vegetation is minimal. Although not a native species, water use by *Arundo donax* is estimated at between 32,000 and 64,000 acre-feet per year (AF/yr.) in the entire Salinas Valley Groundwater Basin (Giessow, 2011); an unknown quantity occurs within the 180/400-Foot Aquifer Subbasin.
- **Other.** This includes rural residential water use and any water use not captured in the other water use sectors.

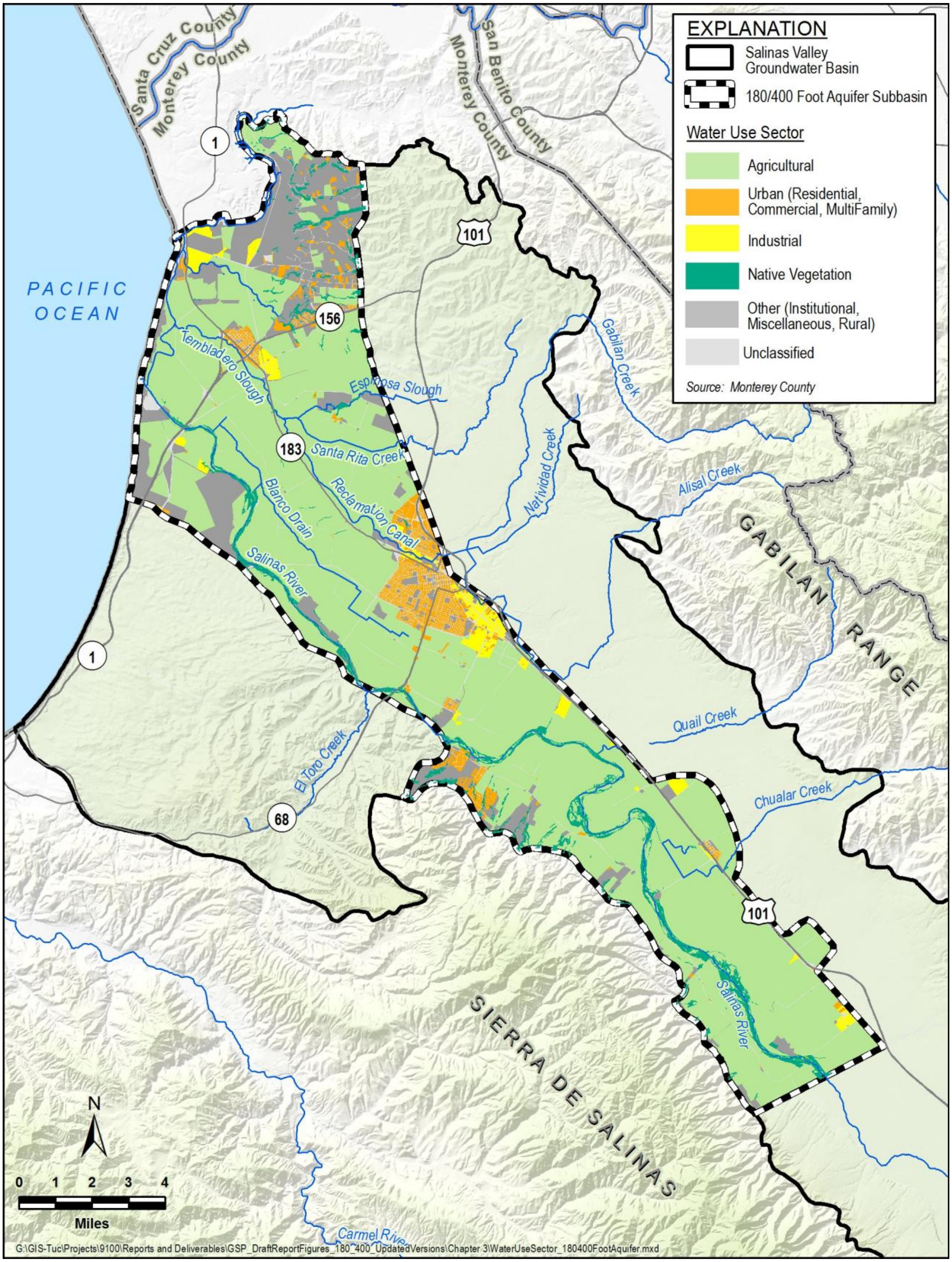


Figure 3-7. Map of Water Use Sectors

3.3 Existing Well Types, Numbers, and Density

Well density data were derived from DWR's Online System for Well Completion Report (OSWCR) Map Application (DWR, 2020a). Other data sources are available from MCWRA or other sources, and they may result in different well densities that are not reflected in DWR's OSWCR database. However, the DWR data were used for simplicity and consistency with other DWR data used in this GSP Update.

DWR's Well Completion Report Map Application classifies wells as domestic, production, and public supply; production wells include wells that are designated as irrigation, municipal, public, or industrial, and only exclude those designated as domestic. Fewer than 3% of wells in the Subbasin are classified as public supply wells, even though groundwater is the primary water source for urban and rural communities in the Subbasin. Domestic wells account for most of the remaining wells and have an average depth of approximately 362 feet. Some of the domestic wells identified by DWR may be classified as *de minimis* extractors, defined as pumping less than 2 AF/yr. for domestic purposes. Well counts in the Subbasin are summarized in Table 3-2, with public supply wells subtracted from the production category so as to not double count. DWR provides well counts by Public Land Survey System sections; well counts for sections that are only partially in the Subbasin use the proportion of the section in the subbasin to proportion the well count. Figure 3-8, Figure 3-9, and Figure 3-10 show the density of domestic, production, and public supply wells, respectively, in the Subbasin, with the production wells being inclusive of the public supply wells.

Table 3-2. Well Count Summary

Category	Number of Wells
Domestic	691
Production	780
Public Supply	43
Total	1,514

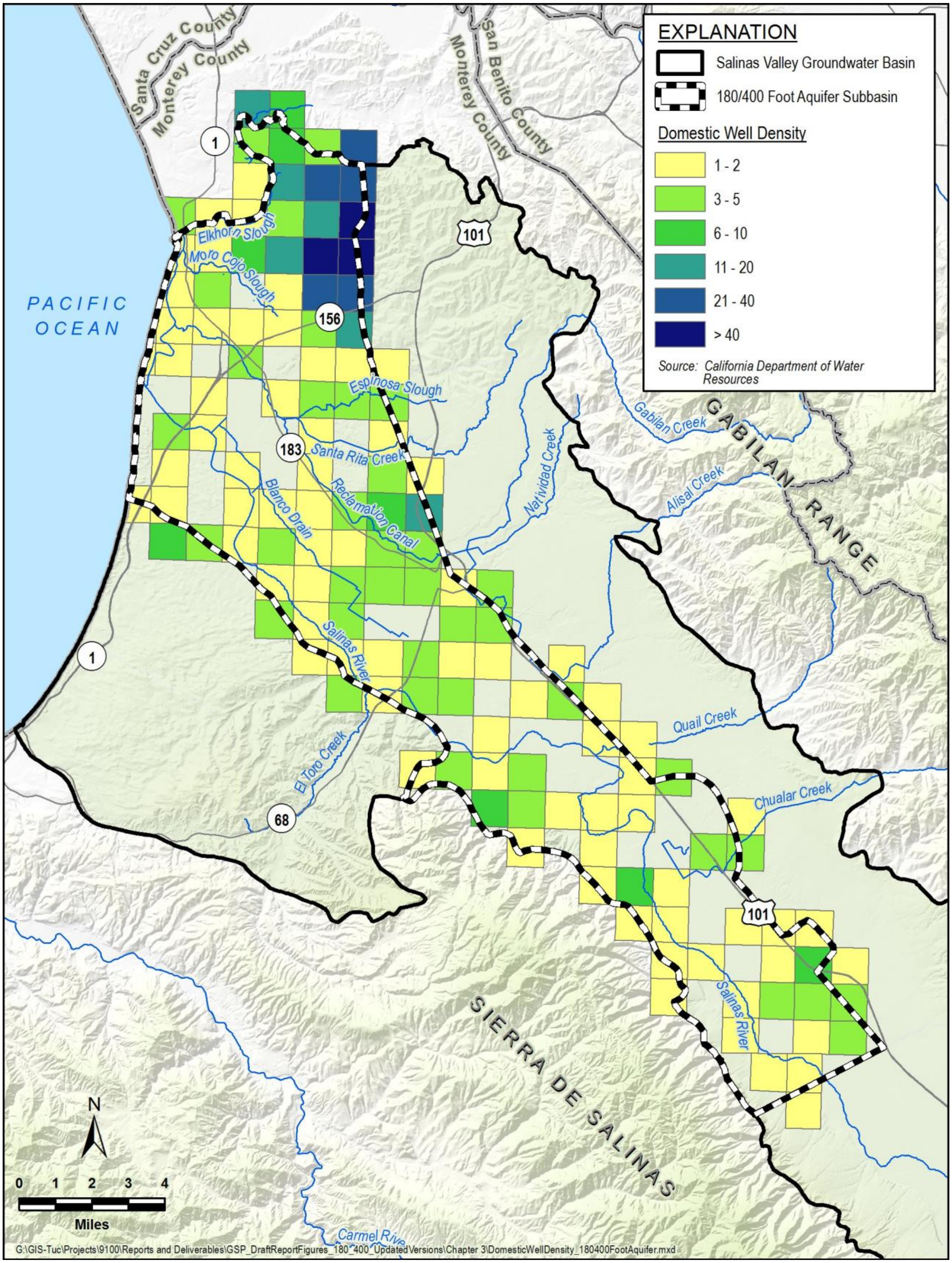


Figure 3-8. Density of Domestic Wells (Number of Wells per Square Mile)

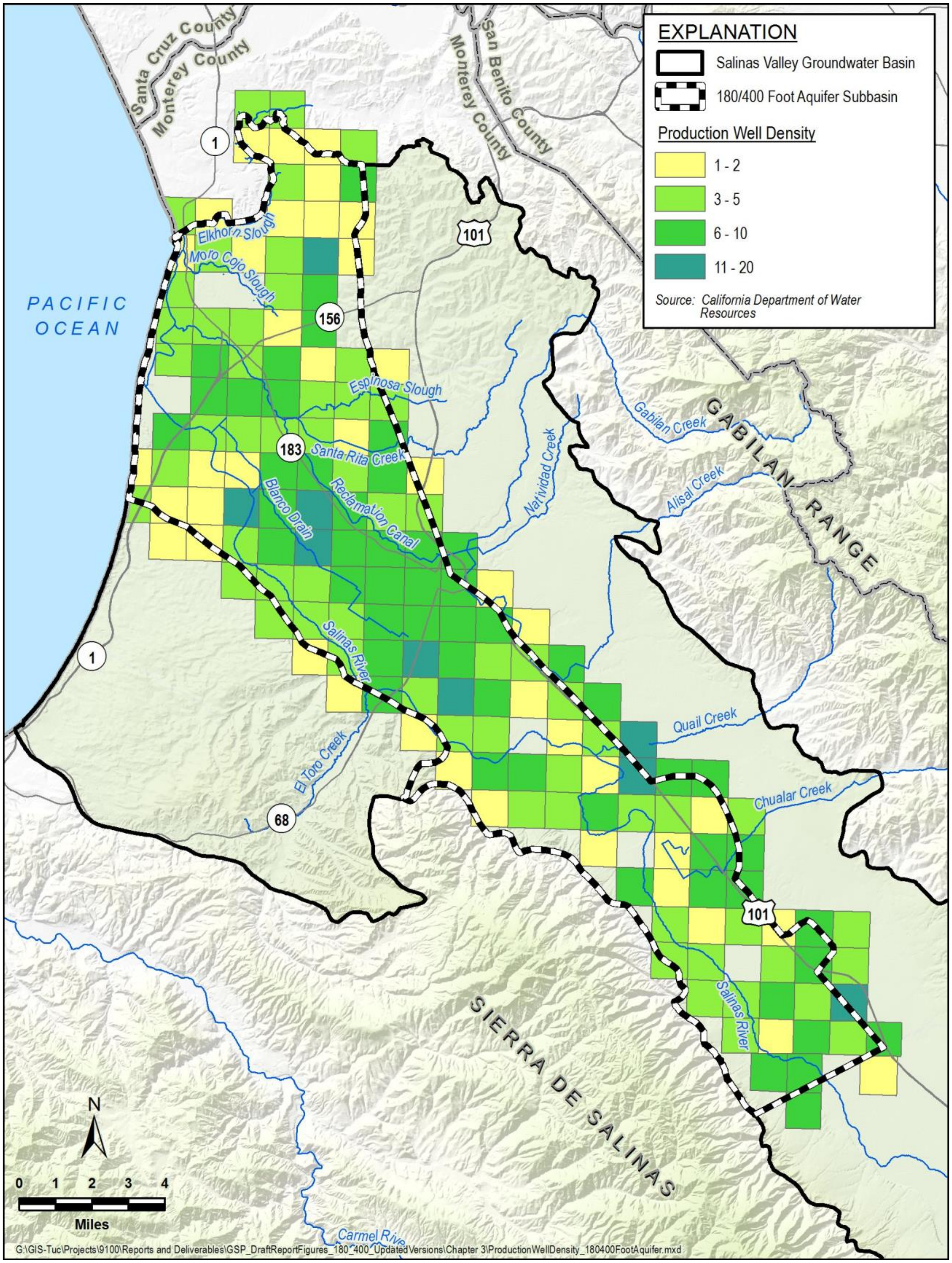


Figure 3-9. Density of Production Wells (Number of Wells per Square Mile)

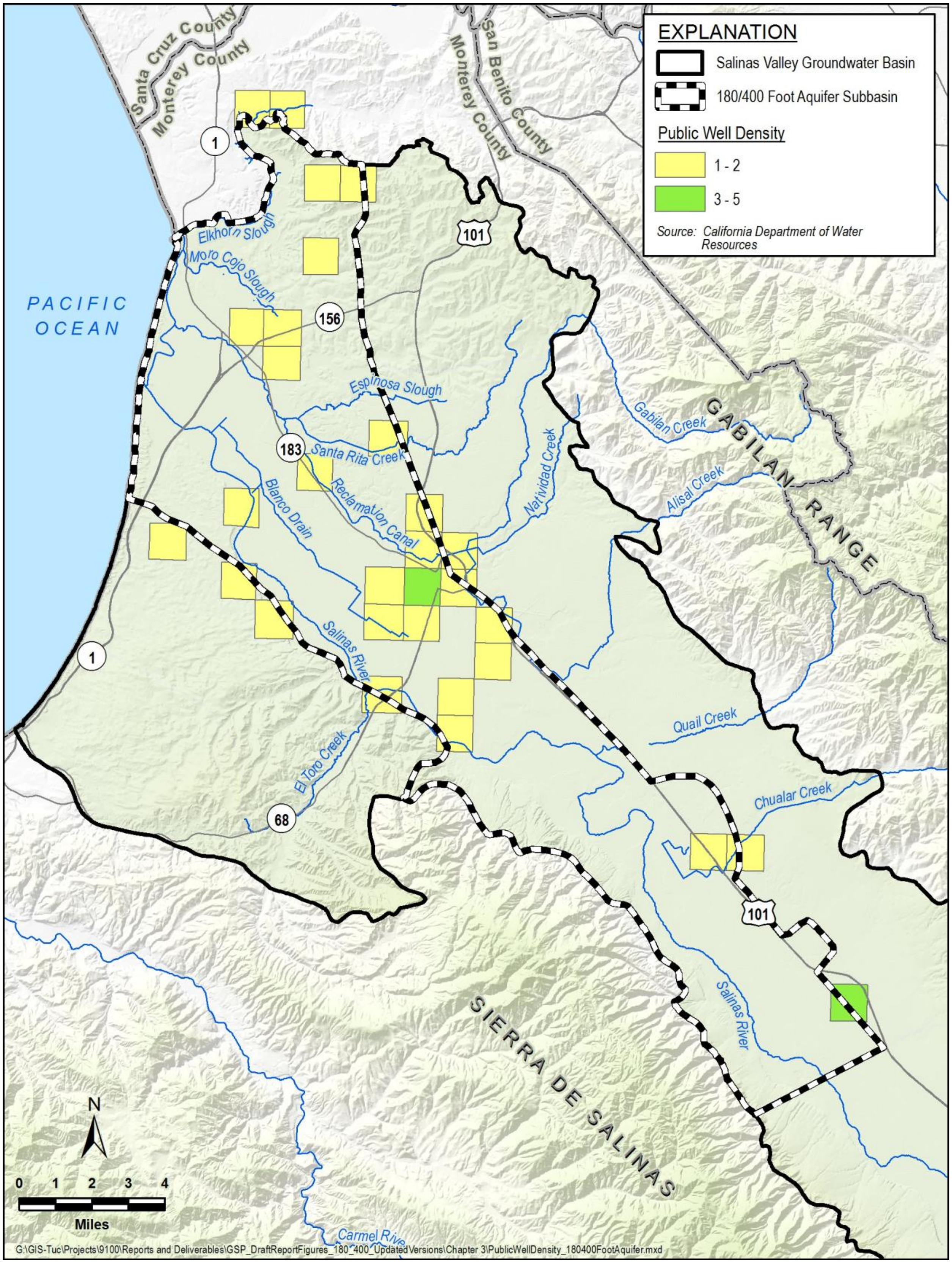


Figure 3-10. Density of Public Wells (Number of Wells per Square Mile)

3.4 Existing Monitoring Programs

3.4.1 Groundwater Elevation Monitoring

MCWRA operates existing groundwater elevation monitoring programs in the Salinas Valley Groundwater Basin, which are incorporated into the monitoring plan of this GSP Update as appropriate. MCWRA has annual fall, August, and monthly groundwater elevation monitoring programs, and is the responsible agency for the California Statewide Groundwater Elevation Monitoring (CASGEM) program in most areas of Monterey County. The existing groundwater elevation monitoring programs will be updated and improved to document the avoidance of undesirable results in the principal aquifers in the Subbasin.

MCWRA historically has monitored 21 wells within the 180/400-Foot Aquifer Subbasin as part of the CASGEM network. Twelve of the 180/400-Foot CASGEM monitoring wells are owned by MCWRA and the others are privately owned by owners who have volunteered the well for inclusion in the CASGEM program. MCWRA collects monthly groundwater elevation data from the CASGEM wells, except for a few that are monitored biannually, and reports the groundwater elevation data to DWR twice per year. The CASGEM wells have been migrated to the SGMA monitoring network and will be supplemented with 71 other wells that are already part of the MCWRA groundwater elevation monitoring networks. Groundwater elevation data from all wells in the monitoring network are publicly available. This network will be used for water elevation monitoring under this GSP Update, as described further in Chapter 7. It will be updated and improved as needed to monitor groundwater elevations for this Subbasin.

3.4.2 Groundwater Extraction Monitoring

MCWRA collects groundwater extraction information from all wells within Zones 2, 2A and 2B that have discharge pipes of 3 inches or greater in internal diameter. These zones include all of the 180/400-Foot Aquifer Subbasin. These data have been collected since 1993.

This network will be used for groundwater extraction monitoring under this GSP, as described in Chapter 7. SVBGSA will work with MCWRA to update and enhance the program to enable it to sufficiently monitor groundwater extractions for this Subbasin.

3.4.3 Groundwater Quality Monitoring

3.4.3.1 MCWRA Seawater Intrusion Monitoring

MCWRA monitors seawater intrusion in the Salinas Valley Groundwater Basin with a network of 156 dedicated monitoring and production wells, of which 136 located in the 180/400-Foot Aquifer Subbasin. The seawater intrusion monitoring network comprises a combination of production wells and dedicated monitoring wells. This network will be used for seawater intrusion monitoring under this GSP, as described in Chapter 7.

3.4.3.2 Other Groundwater Quality Monitoring

Groundwater quality is monitored under several different programs and by different agencies including the following:

- Municipal and community water purveyors must collect water quality samples on a routine basis for compliance monitoring and reporting to the SWRCB Division of Drinking Water (DDW). These purveyors include municipal systems; community water systems; non-transient, non-community water systems; and non-community water systems that provide drinking water to at least 15 service connections or serve an average of at least 25 people for at least 60 days a year.
- Local small or state small water system wells are regulated by the Monterey County Department of Public Health. Local small water systems serve 2 to 4 service connections and state small water systems serve 5 to 14 connections.
- To fulfill the groundwater quality regulatory requirements of the Irrigated Lands Regulatory Program (ILRP), the Central Coast Regional Water Quality Control Board (CCRWQCB) requires monitoring of both on-farm domestic wells and agricultural wells for irrigation and livestock supply.
- In addition to the ILRP, the CCRWQCB conducts groundwater quality monitoring at multiple sites as part of investigation or compliance monitoring programs. These sites are discussed further in Chapter 5.

For this GSP, groundwater quality data will be downloaded and reviewed from SWRCB's DDW for municipal public water system supply wells and the ILRP irrigation supply wells and on-farm domestic wells monitored under the CCRWQCB's Agricultural Order, as described in Section 3.6.2.

3.4.4 Surface Water Monitoring

Streamflow gauges operated by the U.S. Geological Survey (USGS) within the 180/400-Foot Aquifer Subbasin include:

- Reclamation Ditch near Salinas (USGS Site #11152650)
- Salinas River near Chualar (USGS Site #11152300)
- Salinas River near Spreckels (USGS Site #11152500)

Water levels in the Salinas River Lagoon are measured by MCWRA at Monte Road and near the slide gate to the Old Salinas River. The locations of the surface-water monitoring facilities are depicted on Figure 3-11.

On years when there are conservation releases from the Nacimiento and San Antonio Reservoirs, the MCWRA and USGS conduct the Salinas River Discharge Measurement Series (River Series) to monitor changes in streamflow along different river reaches. Reservoir releases are held constant for 5 days to ensure that the discharge measurements account for losses to the aquifer, stream vegetation, or evapotranspiration.

The SWRCB eWRIMS is used to collect surface water rights data in the Salinas River watershed for the points of diversion in the Subbasin that are shown on Figure 3-5. This includes monthly surface water diversions from the Salinas River and its tributaries.

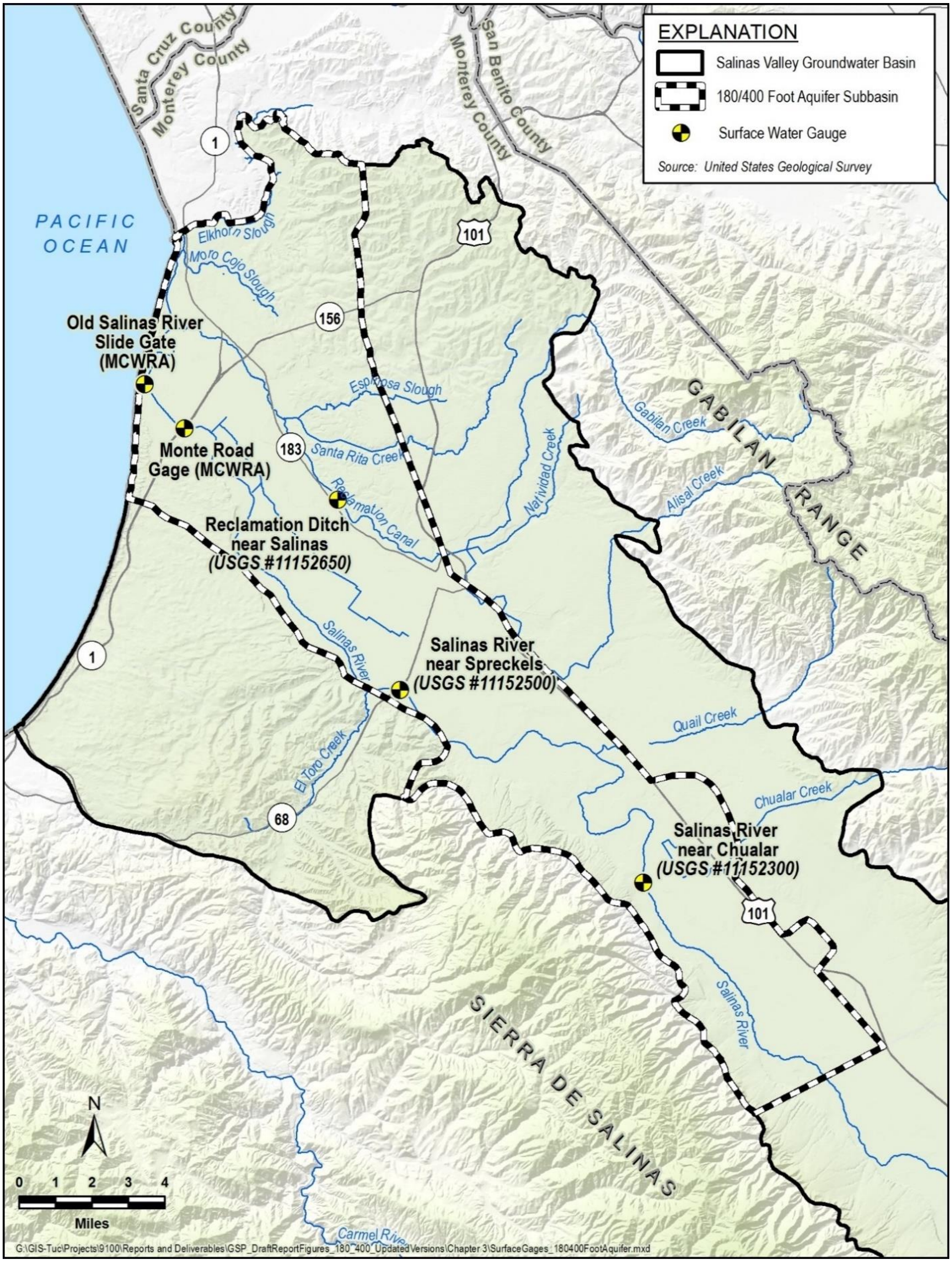


Figure 3-11. Surface Water Gauge Location

3.5 Existing Water Management Plans

3.5.1 Monterey County Groundwater Management Plan

MCWRA developed a Groundwater Management Plan (GMP) that is compliant with AB3030 and SB1938 legislation (MCWRA, 2006). This GMP exclusively covered the Salinas Valley Groundwater Basin in Monterey County. The original 2020 GSP supplanted the GMP as the management plan for the Subbasin, and this GSP Update replaces the 2020 GSP.

The GMP identified 3 objectives for groundwater management:

Objective 1: Development of Integrated Water Supplies to Meet Existing and Projected Water Requirements

Objective 2: Determination of Sustainable Yield and Avoidance of Overdraft

Objective 3: Preservation of Groundwater Quality for Beneficial Use

To meet these 3 objectives, the GMP identified 14 elements that should be implemented by MCWRA:

Plan Element 1: Monitoring of Groundwater Elevations, Quality, Production, and Subsidence

Plan Element 2: Monitoring of Surface Water Storage, Flow, and Quality

Plan Element 3: Determination of Basin Yield and Avoidance of Overdraft

Plan Element 4: Development of Regular and Dry Year Water Supply

Plan Element 5: Continuation of Conjunctive Use Operations

Plan Element 6: Short-Term and Long-Term Water Quality Management

Plan Element 7: Continued Integration of Recycled Water

Plan Element 8: Identification and Mitigation of Groundwater Contamination

Plan Element 9: Identification and Management of Recharge Areas and Wellhead Protection Areas

Plan Element 10: Identification of Well Construction, Abandonment, and Destruction Policies

Plan Element 11: Continuation of Local, State, and Federal Agency Relationships

Plan Element 12: Continuation of Public Education and Water Conservation Programs

Plan Element 13: Groundwater Management Reports

Plan Element 14: Provisions to Update the Groundwater Management Plan

3.5.2 Integrated Regional Water Management Plan

The Integrated Regional Water Management (IRWM) Plan for the Greater Monterey County Region was developed by the Greater Monterey County Regional Water Management Group (RWMG), which consists of government agencies, nonprofit organizations, educational organizations, water service districts, private water companies, and organizations representing agricultural, environmental, and community interests.

The 180/400-Foot Aquifer Subbasin falls within the IRWM Plan area. The IRWM Plan consists of a set of goals and objectives that were identified by the RWMG as being critical to address water resource issues within the planning area in the areas of:

- Water Supply
- Water Quality
- Flood Protection and Floodplain Management
- Environment
- Regional Communication and Cooperation
- Disadvantaged Communities
- Climate Change

The IRWM Plan includes more than 25 projects that could assist regional groundwater management (Greater Monterey County Regional Water Management Group, 2018).

3.5.3 Urban Water Management Plans

This section describes the urban water management plans (UWMPs) developed by California Water Service for part of the City of Salinas, California American Water Company for a sattelite system near Chualar, and Marina Coast Water District. ALCO Water Service also provides water to the City of Salinas and sent its Validated Water Loss Audit Report to DWR in 2017. Upon review, DWR found that the report addresses all the code requirements, and therefore ALCO Water Service did not need to submit an urban water management plan. The City of Gonzales is not required to have an urban water management plan.

3.5.3.1 California Water Service (Salinas District) Urban Water Management Plan

California Water Service serves a portion of the City of Salinas. Its 2015 UWMP (California

Water Service, 2016) describes the service area; reports historic and projected population; identifies historical and projected water demand by category such as single-family, multi-family, commercial, industrial, institutional/government, and other; and describes the distribution system and identifies system losses.

The UWMP describes the system's reliance on groundwater and California Water Service's support for efforts to avoid overdraft, including working cooperatively with MCWRA and participating in the development of this GSP Update. Specific activities that California Water Service intends to conduct include:

- Outreach to public agencies to ensure that the Company's presence, rights and interests, as well as historical and current resource management concerns are honored/incorporated within the GSA and GSP formulation process(es).
- Outreach to applicable local and regulatory agencies to ensure the Company's full participation, while also meeting the requirements and expectations set forth by SGMA.
- The enhanced use of digital/electronic groundwater monitoring equipment and other new technology aimed at measuring withdrawal rates, pumping water elevations, and key water quality parameters within the context of day-to-day operations.
- Full participation in the development of GSPs and formulation of groundwater models constructed in basins where the Company has an operating presence.
- Full participation in individual and/or joint projects aimed at mitigating seawater intrusion and other undesirable results.
- Inclusion of sound groundwater management principles and data in all applicable technical reports, studies, facility master plans, and urban water management, particularly as these undertakings relate or pertain to water resource adequacy and reliability.
- Inclusion of sound groundwater management principles and data in all general rate case filings and grant applications to ensure that resource management objectives remain visible and central to California Water Service's long-term planning/budgeting efforts.

The UWMP also addresses California Water Service's position on alternative supplies currently being developed for the Salinas Valley Groundwater Basin. California Water Service is evaluating the possibility of using up to 10,000 AF/yr. of water from the proposed Deep Water Desal LLC desalination plant at Moss Landing.

The UWMP addresses the need for California Water Service to implement a well replacement program to mitigate water quality impacts from nitrates, uranium, Methyl Tertiary Butyl Ether (MTBE), and sand contamination.

California Water Service's UWMP notes that groundwater will continue to remain as its sole supply due to uncertainties regarding the cost and implementation other options, such as surface water diversion or desalination. However, the UWMP recognizes that it would be beneficial for California Water Service to diversify its supply portfolio. California Water Service evaluated the impact of climate change on its water supply. The study found that climate change could result in a supply reduction of 6% to 7% by the end of the century.

3.5.3.2 California American Water Company (Chualar)

Cal-Am operates a satellite water system serving approximately 1,000 residents near Chualar. The operation of this system is described in Cal-Am's 2010 UWMP. The Cal-Am UWMP provides a description of the system, historical and projected water demands, and an assessment of current and future water supplies. Although the Cal-Am UWMP discusses future water supply options such as desalination, aquifer storage and recovery, and recycled water, none of these are applicable to the Chualar satellite system.

The Chualar system is entirely dependent on groundwater from the 180-Foot Aquifer and is far enough inland that it is not considered susceptible to seawater intrusion. The UWMP reports that water quality from the Chualar system wells is generally good.

3.5.3.3 Marina Coast Water District Urban Water Management Plan

The MCWD most recently updated its UWMP in 2015 (MCWD, 2016). The UWMP describes the service area; reports historical and projected population; identifies historical and projected water demand by category such as single-family, multi-family, commercial, industrial, institutional/government, and other; and describes the distribution system and identifies losses.

The MCWD currently relies solely on groundwater, although the UWMP notes that, "The District is located along the Salinas River, and MCWD Board of Directors has considered purchasing surface water rights in the Salinas River Basin as a means of meeting long-term (beyond 2030) demands." The UWMP further notes that, "…the total Ord Community groundwater supply of 6,600 AF/yr. falls short of the total 2030 Ord Community demand of 8,293 AF/yr. by 1,693 AF/yr. [and] …the Central Marina service area is not projected to exceed its current SVGB groundwater allocation from the Fort Ord Reuse Authority (FORA) within the planning period."

The MCWD UWMP includes a number of demand management measures including:

- Water Waste Prevention Ordinances
- Metering
- Conservation Pricing

- Public Education and Outreach
- Programs to Assess and Manage Distribution System Real Loss
- Water Conservation Program Coordination and Staffing Support
- Water Survey Programs for Residential Customers
- Residential Plumbing Retrofits
- Residential Ultra-Low Flow Toilet Replacement Programs
- High-Efficiency Washing Machine Rebate Programs
- Commercial, Industrial, and Institutional Accounts
- Landscape Conservation Programs and Incentives

3.6 Existing Water Regulatory Programs

3.6.1 Groundwater Export Prohibition

The MCWRA Act, § 52.21 prohibits the export of groundwater for uses outside the Salinas Valley Groundwater Basin from any part of the Basin, including the 180/400-Foot Aquifer Subbasin. In particular, the Act states:

> *For the purpose of preserving [the balance between extraction and recharge], no groundwater from that basin may be exported for any use outside the basin, except that use of water from the basin on any part of Fort Ord shall not be deemed such an export. If any export of water from the basin is attempted, the Agency may obtain from the superior court, and the court shall grant, injunctive relief prohibiting that exportation of groundwater.*

3.6.2 Agricultural Order

In 2021 the CCRWQCB issued Agricultural Order No. R3-2021-0040, the Proposed General Waste Discharge Requirements for Discharges from Irrigated Lands (CCRWQCB, 2021). The permit requires that growers implement practices to reduce nitrate leaching into groundwater and improve receiving water quality. Specific requirements for individual growers are structured into 3 phases based on the relative risk their operations pose to water quality. Each of the 3 phases encompass a different area of the Central Coast Basin. Monitoring results from this new Agricultural Order (Ag Order 4.0) will be incorporated into this GSP Update's groundwater quality network.

3.6.3 Water Quality Control Plan for the Central Coast Basins

The Water Quality Control Plan for the Central Coastal Basin (Basin Plan) was most recently updated in June 2019 (SWRCB, 2019). The objective of the Basin Plan is to outline how the quality of the surface water and groundwater in the Central Coast Region should be managed to provide the highest water quality reasonably possible. Water quality objectives for both groundwater and surface water are provided in the Basin Plan.

The Basin Plan lists beneficial users, describes the water quality that must be maintained to allow those uses, provides an implementation plan, details SWRCB and CCRWQCB plans and policies to protect water quality, and describes statewide and regional surveillance and monitoring programs. Present and potential future beneficial uses for waters in the Basin are municipal supply; agricultural supply; groundwater recharge; recreation; sport fishing; warm fresh water habitat; wildlife habitat; rare, threatened or endangered species habitat; and spawning, reproduction, and/or early development of fish.

3.6.4 Title 22 Drinking Water Program

The SWRCB DDW regulates public water systems in the State to ensure the delivery of safe drinking water to the public. A public water system is defined as a system for the provision of water for human consumption that has 15 or more service connections or regularly serves at least 25 individuals daily at least 60 days out of the year. Private domestic wells, wells associated with drinking water systems with fewer than 15 residential service connections, industrial, and irrigation wells are not regulated by the DDW.

The DDW enforces the monitoring requirements established in Title 22 of the California Code of Regulations (CCR) for public water system wells, and all the data collected must be reported to the DDW. Title 22 also designates the Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs) for various waterborne contaminants, including volatile organic compounds, non-volatile synthetic organic compounds, inorganic chemicals, radionuclides, disinfection byproducts, general physical constituents, and other parameters.

3.6.5 County Ordinance 5302 and 5303 Regarding Deep Aquifer Wells

Due to identified concerns regarding the risk of seawater intrusion into the Deep Aquifers the Monterey County Board of Supervisors adopted Ordinance No. 5302 in May 2018, pursuant to Government Code Section 65858. The ordinance was an Interim Urgency Ordinance, which took effect immediately upon adoption. The ordinance prohibited the acceptance or processing of any applications for new Deep Aquifer Wells beneath areas impacted by seawater intrusion, with stated exceptions including municipal wells and replacement wells. The ordinance was originally only effective for 45 days, but at the June 26, 2018 Monterey County Board of Supervisors meeting, the Board of Supervisors extended the ordinance to May 21, 2020, by adoption of Ordinance No. 5303. The Ordinance also required that all new wells in the Deep Aquifers meter groundwater extractions, monitor groundwater elevations and quality, and all data submitted to MCWRA and SVBGSA. Ordinances 5302 and 5303 have expired.

In December 2020, County ordinance No. 5339 was adopted and placed a 90-day moratorium on new well construction permit applications. The moratorium was adopted so the County could study the impact of the California Supreme Court's decision on 27 August 2020 in the case Protecting Our Water and Environmental Resources et al., v. County of Stanislaus, et al., (10 Cal.5th 479 (2020); "Protecting Our Water"). The decision may require environmental review, pursuant to the California Environmental Quality Act ("CEQA"), when the County considers applications to construct, repair, or destroy water wells if the decision to issue the permit involves the exercise of discretion by the decision-making authority. The County is currently waiting to finalize proposed modifications to its well construction ordinance and the moratorium on well construction permit applications has expired. Applications are currently being considered on a case-by-case basis.

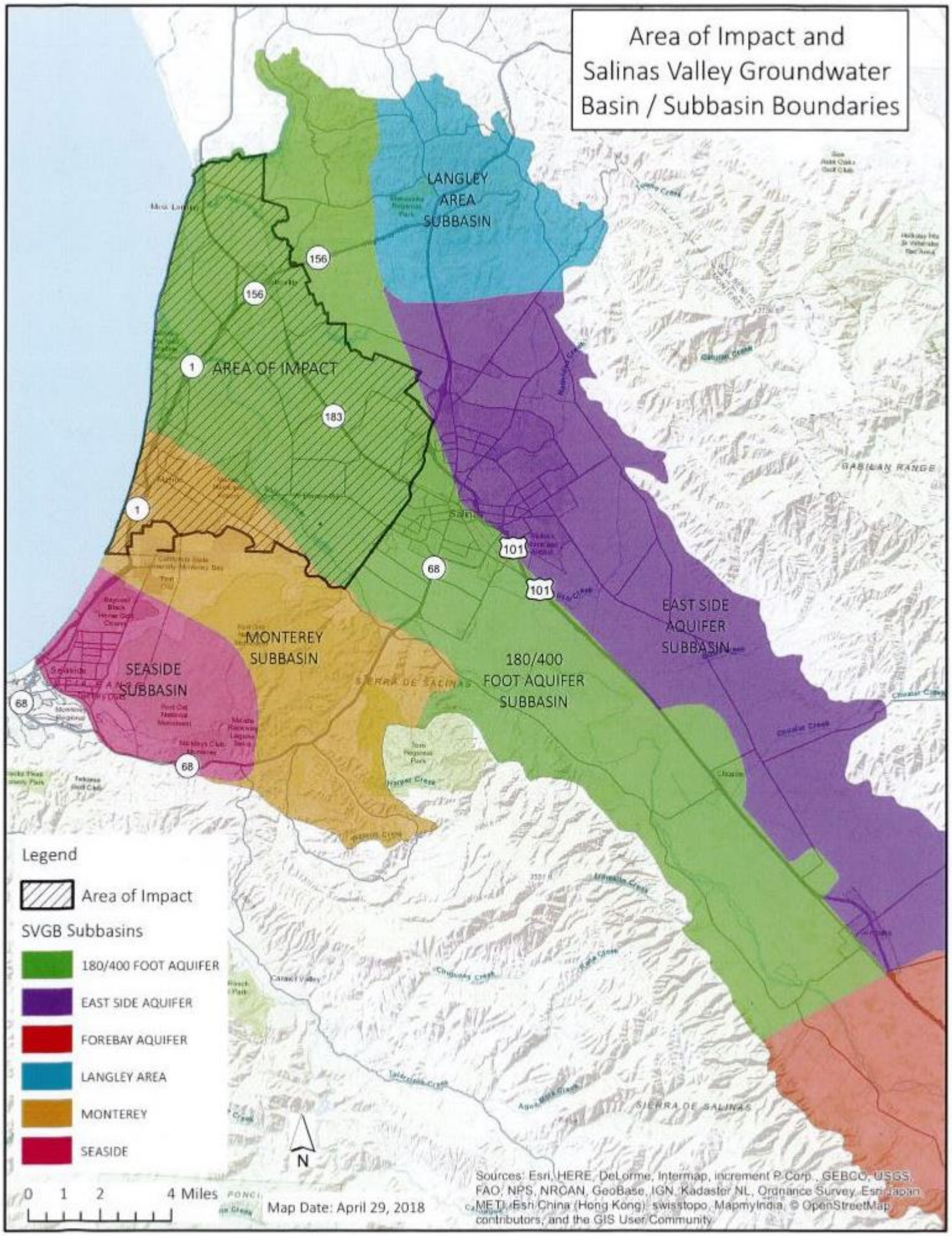


Figure 3-12. Map of Ordinance No. 5302 Area of Impact (Monterey County Board of Supervisors, 2018)

3.6.6 Water Resources Agency Ordinance 3709

Ordinance 3709, passed in 1993 by the Board of Supervisors of the Water Resources Agency, prohibits groundwater extractions and the drilling of new extraction wells in certain portions of the 180-Foot Aquifer after January 1, 1995. The Ordinance pertains to Territory A and Territory B.

3.6.7 Water Resources Agency Ordinance 3790

Ordinance 3790, passed in 1994, establishes regulations for the classification, operation, maintenance and destruction of groundwater wells in the Castroville Seawater Intrusion Project area, known as Zone 2B.

3.7 New Regulations, Ordinances, Enforcement, and Legal Action

SVBGSA has not promulgated any new regulations or ordinance since the original GSP submittal in January 2020. The status and any updates to existing ordinances of other agencies are included in their respective sections above. SVBGSA took no legal action in 2020 and 2021.

3.8 County Public Policy of Safe and Clean Water

To recognize the Human Right to Water, in December 2018 the County of Monterey established a public policy that every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes and that the human right to water extends to all residents of Monterey County, including disadvantaged individuals and groups and communities in rural and urban areas. The County intended for the policy to inform the County when implementing policies and regulations affecting water supply and usage and to help the County to focus on the issue of drinking water pollution in certain Monterey County domestic wells and water systems as well as potential future threats due to drought and a lack of available drinking water, while not impacting water rights or expanding or creating new County obligations.

3.9 Incorporating Existing Programs into the GSP and Limits on Operational Flexibility

Information from existing water resource monitoring, management, and regulatory programs have been incorporated into this GSP Update. They are taken into consideration during the preparation of the Sustainability Goal, when establishing Sustainable Management Criteria, and when developing Projects and Management Actions. This GSP Update has been developed to reflect the principles outlined in those existing local plans and builds off existing plans during GSP implementation. Some of the existing management plans and ordinances may limit operational flexibility. These potential limits to operational flexibility have already been incorporated into the projects and management actions included in this GSP Update. Examples of limits on operational flexibility include:

- The groundwater export prohibition included in the Monterey County Water Resources Agency Act prevents export of water out of the Salinas Valley Groundwater Basin. This prohibition is not expected to adversely affect SVBGSA's ability to reach sustainability.
- The Basin Plan and the Title 22 Drinking Water Program restrict the quality of water that can be recharged into the Subbasin.
- The Habitat Conservation Plan being developed by MCWRA on the Salinas River will limit operational flexibility for Nacimiento and San Antonio reservoir releases for groundwater recharge in the Basin.

The other monitoring, management, and regulatory programs do not limit the operational flexibility in this Subbasin.

3.10 Conjunctive Use Programs

The one conjunctive use project that operates in the 180/400-Foot Aquifer Subbasin is the SVWP. The SVWP is a conjunctive use project that includes reservoir releases for groundwater recharge and later use within the CSIP. CSIP provides a combination of recycled water, Salinas River water, and groundwater to irrigate 12,000 acres in the seawater-intruded coastal farmland surrounding Castroville. The extent of the current CSIP distribution area is shown on Figure 3-6. Recycled water from Monterey One Water's tertiary treatment Reclamation Plant is combined with surface water diverted at the Salinas River Diversion Facility and, when necessary, groundwater pumped from CSIP supplemental wells. When river water is available and the SRDF is operating, grower groundwater pumping has been reduced by about 80% during peak irrigation demand periods. However, it is currently necessary to conjunctively manage all three water sources to match irrigation demands with water supplies. Although CSIP has slowed the rate of seawater intrusion over the past twenty years, it has not halted seawater intrusion altogether, and the Subbasin is also experiencing declining groundwater elevations and overdraft.

3.11 Land Use Plans

3.11.1 Land Use Plans in the Subbasin

Land use is an important factor in water management. Monterey County and the cities of Gonzales, Marina, and Salinas have land use authority over all or portions of the 180/400-Foot Aquifer Subbasin. Each of these entities has developed a general plan that guides land use in the Subbasin. General descriptions of these land use plans and how implementation may affect groundwater management in the 180/400-Foot Aquifer Subbasin are included in Appendix 3B.

3.11.2 Land Use Plans Outside of Basin

Monterey County's General Plan is applicable throughout the unicorporated area of the County, including the adjoining Eastside Aquifer Subbasin and Forebay Aquifer Subbasin. The cities of Greenfield and Soledad have general plans with land use elements in the neighboring Forebay Aquifer Subbasin. Each of these entities has developed a general plan that guides land use in the their respective subbasins. Because Soledad is a member of the SVBGSA, management actions taken by the SVBGSA or the SVBGSA has a cooperation agreement with their water district will be in alignment with the concerns and plans of that city and the County. The SVBGSA and ASGSA have developed an Implementation Agreement that establishes that the ASGSA will implement the GSP in the Arroyo Seco Cone Management Area. The ASGSA was formed through agreement with the City of Greenfield. Therefore, it is unlikely that these land use plans will affect the ability of the SVBGSA to achieve sustainable groundwater management.

3.11.3 Well Permitting

The Public Service element of the Monterey County General Plan addresses permitting of individual wells in rural or suburban areas. Table 3-3 summarizes the Monterey County General Plan's water supply guidelines for the creation of new residential or commercial lots (Monterey County Housing and Community Development, 2010, Table PS-1). Table 3-4 depicts the decision matrix from the Monterey County General Plan for permitting new residential or commercial wells for existing lots (Monterey County Housing and Community Development, 2010, Table PS-2).

On August 29, 2018, the State Third Appellate District Court of Appeal published an opinion in *Environmental Law Foundation v. State Water Resources Control Board* (No. C083239), a case that has the potential to impact future permitting of wells near navigable surface waters to which they may be hydrologically connected. The Court of Appeal found that while groundwater itself is not protected by the public trust doctrine, the doctrine does protect navigable waters from harm caused by extraction of groundwater if it adversely affects public trust uses. Further, it found that Siskiyou County, as a subdivision of the State, shares responsibility for administering the public trust. Similarly, Monterey County is responsible for well permitting. Therefore, it has a responsibility to consider the potential impacts of groundwater withdrawals on public trust resources when permitting wells near areas where groundwater may be interconnected with navigable surface waters.

Moreover, California Supreme Court's decision in *Protecting Our Water and Environmental Resources v. County of Stanislaus* (2020) held that Stanislaus County could not categorically classify its issuance of groundwater well construction permits as ministerial decisions exempt from environmental review under the CEQA. Chapter 15.08 of the Monterey County Code sets forth the application and decision-making process for the County in considering applications for well construction permits. The Chapter sets forth certain technical requirements that appear to be purely ministerial in their application; however, the Chapter also gives the Health Officer discretion to impose unspecified conditions on a permit, grant variances, and deny an application if in his/her judgment it would defeat the purposes of the Chapter. The Monterey County Code has not yet been amended, so permits are currently issued according to Chapter 15.08 and the 2010 General Plan, as applicable. The Monterey County Health Department, Environmental Health Bureau issues well permits and receives input from the County of Monterey Housing & Community Development to determine what, if any, level of CEQA review is necessary.

Table 3-3. Monterey County Water Supply Guidelines for the Creation of New Residential or Commercial Lots

Major Land Groups	Water Well Guidelines
Public Lands	Individual Wells Permitted in Areas with Proven Long-Term Water Supply
Agriculture Lands	Individual Wells Permitted in Areas with Proven Long-Term Water Supply
Rural Lands	Individual Wells Permitted in Areas with Proven Long-Term Water Supply
Rural Centers	Public System; Individual Wells Allowed in limited situations
Community Areas	Public System

Table 3-4. Monterey County Well Permitting Guidelines for Existing Residential and Commercial Lots

Characteristics of Property	Water Connection Existing or Available from the Water System	Not Within a Water System or a Water Connection Unavailable
Greater than or equal to 2.5 Acres connected to a Public Sewage System or an on-site wastewater treatment system	Process Water Well Permit	Process Water Well Permit
Less than 2.5 Acres and connected to a Public Sewage System	Process Water Well Permit	Process Water Well Permit
Less than 2.5 Acres and connected to an on-site wastewater treatment system	Do not Process Water Well Permit	Process Water Well Permit

3.11.4 Effects of Land Use Plan Implementation on Water Demand

The GSA does not have authority over land use planning. However, the GSA will coordinate with the County on general plans and land use planning/zoning as needed when implementing the GSP.

A lawsuit filed against the County of Monterey’s 2010 General Plan led to a settlement agreement that affects water supplies. The settlement agreement requires the County of

Monterey to develop a study of the Basin within Zone 2C which largely overlaps the Basin and includes, among other items:

- An assessment of whether the total water demand for all uses designated in the General Plan for the year 2030 are likely to be reached or exceeded
- An evaluation and conclusions regarding future expected trends in groundwater elevations
- An evaluation and conclusions regarding expected future trends in seawater intrusion

Should the study conclude that:

- Total water demand for all uses is likely to be exceeded by 2030, or
- Groundwater elevations are likely to decline by 2030, or
- The seawater intrusion boundary is likely to advance inland by 2030

Then the study shall make recommendations on how to address those conditions.

The outcomes from this study may affect the GSP implementation. However, the GSP Update will consider multiple approaches to reach sustainable yield through the measures laid out in Chapter 9. The study and GSP implementation are two parallel efforts, and the results of the County's study will be reviewed when finalized and considered during GSP implementation. SGMA may preempt implementation of the County's study if it were to conflict with the purposes of SGMA and the efforts of the SVBGSA to attain sustainability in the Basin.

Monterey County has chosen to retain the USGS to develop the Salinas Valley Integrated Hydrologic Model (SVIHM), which will be used during implementation of this GSP Update. The USGS is currently planning to publicly release it in 2022.

3.11.5 Effects of GSP Implementation on Water Supply Assumptions

Implementation of this GSP Update is not anticipated to affect water supply assumptions of relevant land use plans over the planning and implementation horizon. This GSP Update lists potential projects and management actions to bring extraction within the sustainable yield, including the potential for pumping controls if needed. Changes in the cost of groundwater may affect whether surface water or groundwater is used. Land use changes may occur as a result of these activities and based on financial decisions by individual growers. However, there is no direct impact from the GSP implementation on land use management.

4 HYDROGEOLOGIC CONCEPTUAL MODEL

The HCM characterizes the geologic and hydrologic framework of the Subbasin in accordance with the GSP Regulations § 354.14. It is based on best available data, technical studies, and qualified maps that characterize the physical components and surface water/groundwater interaction in the Subbasin. This HCM provides comprehensive written descriptions and illustrated representations of subsurface conditions. The chapter describes the Subbasin characteristics and processes that govern the flow of water across the Subbasin boundaries, and outlines the general groundwater setting that may be encountered in the subsurface environment. Current and historical groundwater conditions are discussed in greater detail in the subsequent chapter. This current HCM in this GSP Update will be part of an iterative process where current conditions and data gaps are described, investigated, and then updated accordingly.

4.1 Subbasin Setting and Topography

The 180/400-Foot Aquifer Subbasin is at the northern, down-gradient end of the Salinas Valley Groundwater Basin, an approximately 90-mile long alluvial basin underlying the elongated, intermountain valley of the Salinas River. The Subbasin is oriented southeast to northwest, with the Salinas River draining towards the northwest into the Pacific Ocean at Monterey Bay (Figure 4-1).

The colored bands on Figure 4-1 show the topography of the Subbasin, derived from the USGS Digital Elevation Model (DEM). The Subbasin slopes at an average grade of approximately 5 feet/mile to the northwest toward the Pacific Ocean. Land surface elevations in the Subbasin range from approximately 500 feet above sea level along its border with the Sierra de Salinas to sea level at Monterey Bay.

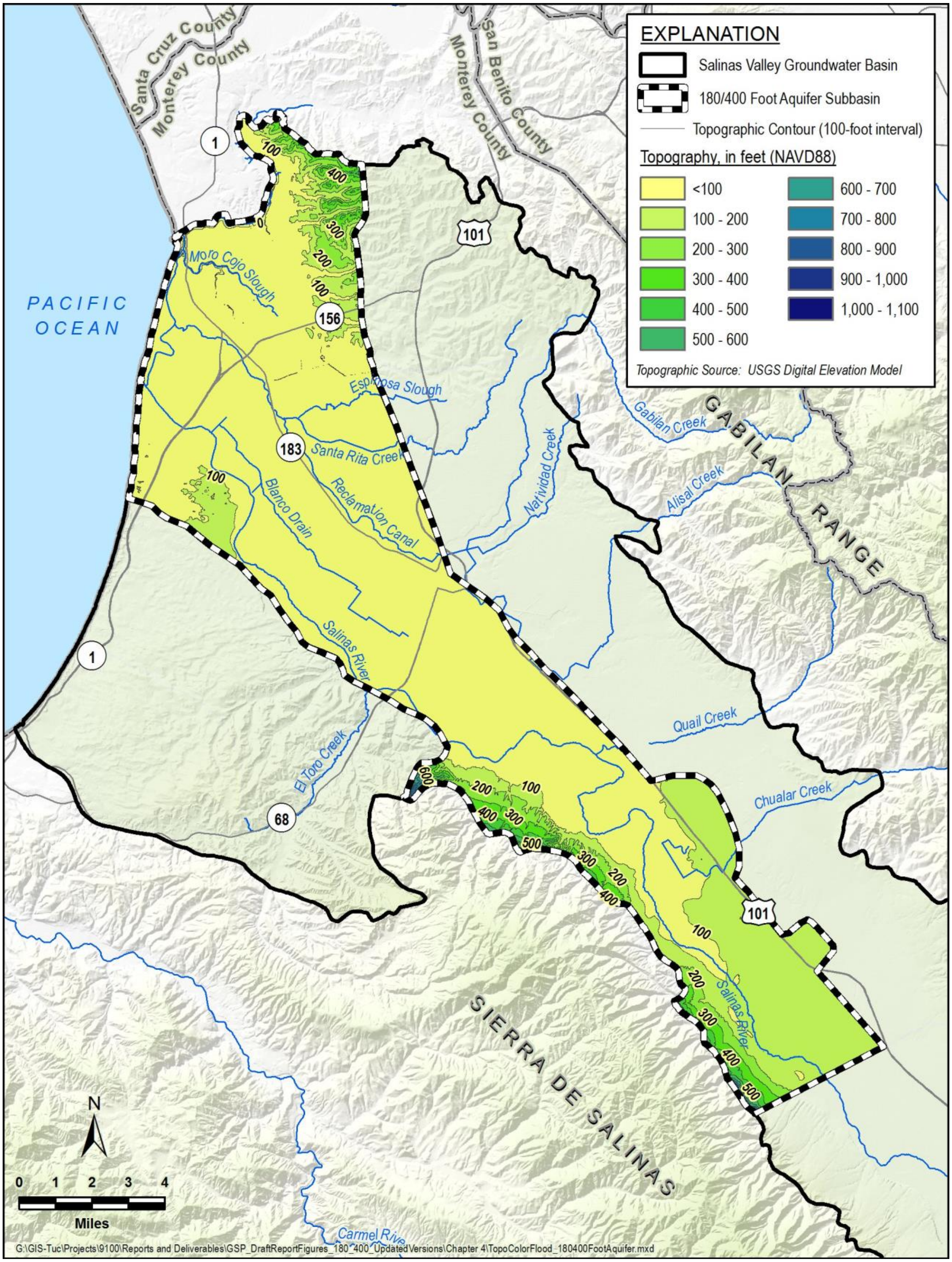


Figure 4-1. 180/400-Foot Aquifer Subbasin Topography

4.2 Subbasin Geology

The subbasin geology describes the physical framework in which groundwater occurs and moves. The geology of the Subbasin controls the locations and depths of aquifers and aquitards, as well as the subbasin boundaries. The geologic descriptions described here are derived from previously published scientific reports, and from investigations conducted by the USGS, State of California, and academic institutions.

The Subbasin was formed through periods of structural deformation and periods of marine and terrestrial sedimentation in a tectonically active area on the eastern edge of the Pacific Plate. Figure 4-2 presents a geologic map of the Subbasin and vicinity. This geologic map was adopted from the 2001 Digital Geologic Map of Monterey County as well as the California Geologic Survey's 2010 statewide geologic map (Rosenberg, 2001; Jennings, *et al.*, 2010). The locations of cross-sections used to define the principal aquifers in Section 4.4 are also shown on Figure 4-2. The legend on Figure 4-2 presents the age sequence of the geologic materials from the youngest unconsolidated Quaternary sediments to the oldest pre-Cambrian basement rock.

The geology of the 180/400-Foot Aquifer Subbasin is is characterized by alluvium, terrace deposits, the Paso Robles Formation, and the Aromas Red Sands Formation (DWR, 2004a). The geology is a result of both fluvial sedimentary deposits from the Salinas River and marine deposits from the Pacific Ocean. The majority of the sediments in this subbasin are a mix of sands, gravels, and clays.

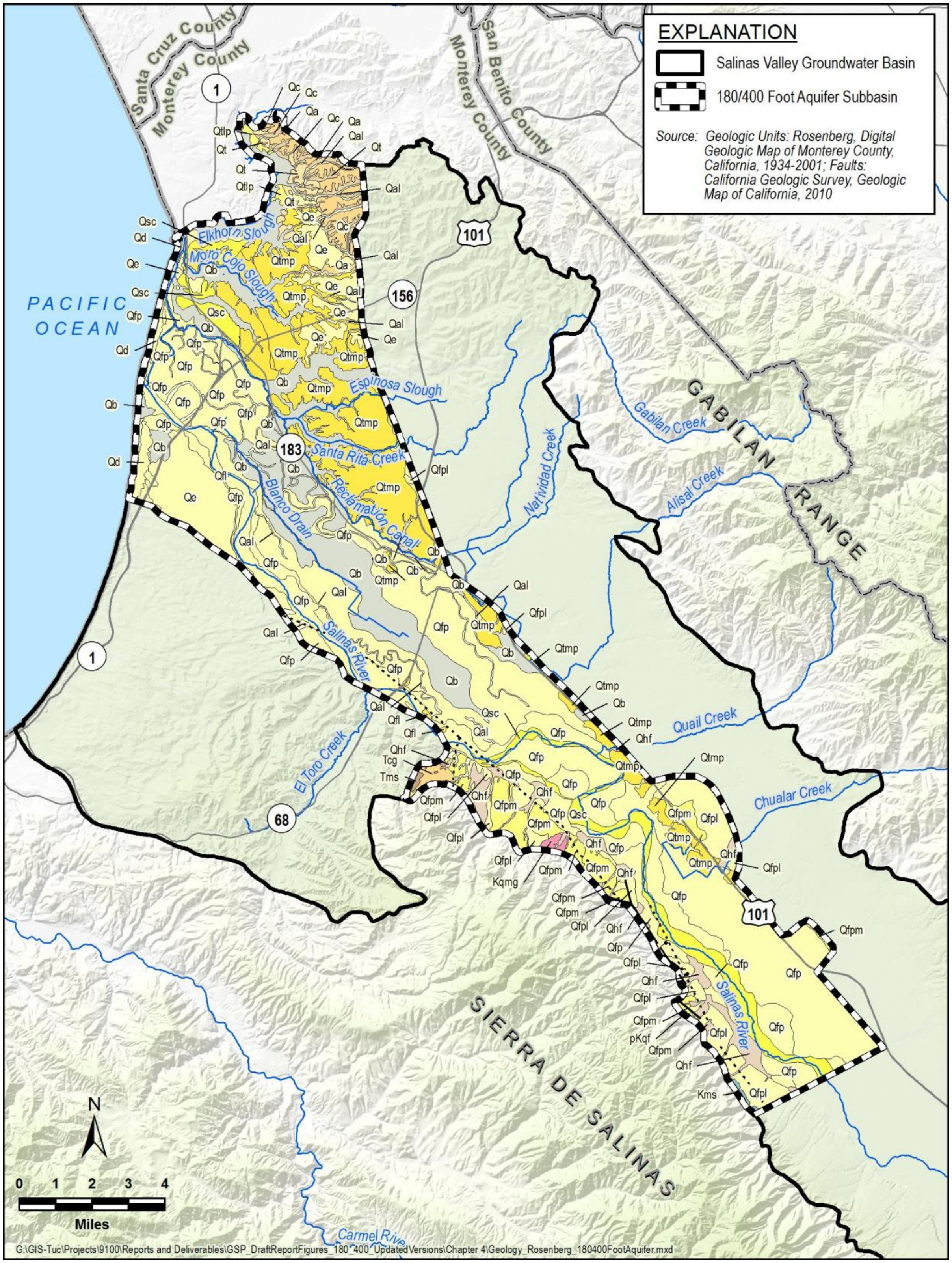


Figure 4-2. Subbasin Geology
(from Jennings, *et al*., 2010; Rosenberg, 2001)

FIGURE 4-2. EXPLANATION

QUATERNARY

Qal	Alluvial deposits, undifferentiated
Qb	Basin deposits
Qd	Dune deposits
Qfl	Artificial fill
Qfp	Flood-plain deposits, undifferentiated?
Qfpl	Alluvial fans, late Pleistocene
Qfpm	Alluvial fans, middle Pleistocene
Qhf	Alluvial fan deposits, Holocene
Qsc	Stream channel deposits
Qa	Aromas Sand, undifferentiated
Qbs	Beach sand
Qc	Colluvium
Qe	Eolian deposits
Qt	Fluvial terrace deposits, undifferentiated

QUATERNARY-TERTIARY

Qtmp	Fluvial terrace deposits, middle Pleistocene
Qtlp	Fluvial terrace deposits, late Pleistocene

TERTIARY

Tcg	Unnamed clastic sediments, sandstone and conglomerate
Tms	Unnamed clastic sediments

CRETACEOUS

Kms	Schist of Sierra de Salinas
Kqmg	Garnetiferous quartz monzonite of Pine Canyon
pKm	Marble
pKqf	Quartzofeldspathic rocks

GEOLOGIC FEATURES

———	fault, certain
·········	fault, concealed

4.2.1 Geologic Formations

Major geologic units present in the 180/400-Foot Aquifer Subbasin are described below, starting at the surface and moving through the geologic layers from youngest to oldest. Geologic descriptions are derived from a combination of sources (Jennings, *et al.*, 2010; Clark, *et al.*, 2000; Johnson, *et al.*, 1988; DWR, 2004). The corresponding designations on Figure 4-2 are provided in parentheses.

Quaternary Deposits

- *Alluvium from streams and small drainages (*Qsc, Qal, Qb, and Qfp*)* – These youngest units are the loose sediment in and along streams and drainages, or where streams have recently flooded. Qsc fills the bed of the Salinas River. Qal is found in more minor drainages. Both are moderately sorted and consist mostly of silt and sand with some areas of gravel. Clays mixed with silt, sand, and organic material have collected at the bottoms of past and present basins (Qb). Salinas River floodplain deposits (Qfp) are the dominant feature of the northern subbasin, stretching all the way across the valley in places. These loose sand and silt deposits are the foundation for the Subbasin's fertile agricultural lands.

- *Aromas Red Sands and similar (*Qa, Qe, and Qc*)* – The Aromas Red Sands Formation is comprised of lower fluvial sand units and upper aeolian sand units generally separated by interbedded clays and silty clays (DWR, 2004a). The Aromas Red Sands include partly consolidated, moderately to poorly sorted, silty clay, sand, and gravel (Qa). This unit is located at the northeastern end of the Subbasin along the boundary with the Lanlgey Area Subbasin. Eolian deposits (Qe) are transported by wind and are exclusively sand and finer grains, as gravel is too heavy to be carried by wind. Sand matching that of the Aromas Red Sands is also found in windblown deposits (Qe). These deposits can also be found along the boundary with the Langley Area Subbasin and as well as along the boundary with the Monterey Subbasin. Colluvium collects gradually over time as a result of gravity (Qc). These small, isolated deposits are found at the northeastern end of the Subbasin, where the topography is steeper. These small Holocene deposits were transported by a combination of runoff and gravity, not streamflow. Some sources refer to the windblown deposits as the Upper Aromas Red Sands.

- *Alluvial fans* (Qhf, Qfpl and Qfpm*)* – Alluvial fans are sediments deposited in a distributary manner at the base of mountain fronts where streams emerge (Kennedy/Jenks, 2004). They consist of weakly to moderately consolidated, moderately to poorly sorted sand, silt, and gravel deposits. Gravel content increases toward the head of the alluvial fans, while finer sediments such as clay and silt increase towards the furthest extents of the fans, interfingering with the silts and clays often found in floodplain and stream-channel deposits Late and middle Pleistocene alluvial fans (Qfpl and Qfpm, respectively) can be weakly to moderately consolidated.

- *Terrace deposits (*Qt, Qtmp, and Qtlp*)* – Terrace occur as the erosional remnants of former stream channels and floodplains. In 180/400-Foot Aquifer Subbasin, they can be found around the eastern boundary with the Langley Area and Eastside Aquifer Subbasins (DWR, 2004a). They are partially consolidated and consist mostly of sand mixed with silt and gravel. Some are known to be from the middle Pleistocene (Qtmp) and late Pleistocene (Qtlp). Others are of indeterminate age (Qt).

These quaternary deposits are sometimes grouped together in other reports as Alluvium or Valley Fill Deposits.

Quaternary-Tertiary Deposits

- *Paso Robles Formation* (QTcl and QTp, not shown on map) – The Paso Robles Formation underlies the entire Subbasin but is rarely exposed at the surface. This Pliocene to lower Pleistocene unit is composed of lenticular beds of sand, gravel, silt, and clay from terrestrial deposition (Thorup, 1976; Durbin, et al., 1978). The depositional environment is largely fluvial but also includes alluvial fan, lake and floodplain deposition (Durbin, 1974; Harding ESE, 2001; Thorup, 1976; Greene, 1970). The alternating beds of fine and coarse materials typically have thicknesses of 20 to 60 feet (Durbin, et al., 1978). Durham (1974) reports that the thickness of the Formation is variable due to erosion of the upper part of the unit; and that the Formation is approximately 1,500 feet thick near Spreckels and 1,000 feet thick near the City of Salinas. Through much of the Subbasin, this is the deepest unit and the underlying marine deposits typically do not yield high rates of fresh water.

Tertiary Deposits

- *Purisima Formation* (Tp, not shown on map) – The Purisima Formation underlies much of the Subbasin; however, it is also not exposed at the surface (DWR, 2004a). This Pliocene unit consists of interbedded siltstone, sandstone, conglomerate, clay and shale deposited in a shallow marine environment (Greene, 1977; Harding ESE, 2001). The Purisima Formation is ranges from 500 to 1,000 feet in thickness (WRIME, 2003).

- *Santa Margarita Sandstone* (Tsm, not shown on map) – The Santa Margarita Sandstone is not exposed at the surface in this Subbasin. Conformably overlying the Monterey Formation, this Miocene unit consists of white, arkosic sandstone made of very fine to coarse sand. It has very thick beds and some localized cross-bedding. In some areas, the Santa Margarita Sandstone directly underlies the Paso Robles Formation where the Purisima Formation is absent (Greene, 1977).

- *Monterey Formation* (Tm, not shown on map) – The Monterey Formation is also not exposed at the surface in this Subbasin. This Miocene unit consists of shale and mudstone deposited in a shallow marine environment (Harding ESE, 2001; Greene, 1977). This unit typically underlies the Salinas Valley Groundwater Basin and acts as a boundary for vertical groundwater flow.

Cretaceous Rocks

The Sierra de Salinas, which borders the Subbasin to the southwest, is composed of metamorphic (Kms, pKm, and pKqf) and igneous (Kqmg)rocks and is important as a geologic boundary in the Subbasin and greater Salinas Valley Groundwater Basin as well.

4.2.2 Restrictions to Flow

There are no known structural features that restrict groundwater flow within the 180/400-Foot Aquifer Subbasin, such as geologic folds or faults.

4.2.3 Soils

The soils of the Subbasin are derived from the underlying geologic formations and influenced by the historical and current patterns of climate and hydrology. Soil types can influence groundwater recharge and the placement of recharge projects. Productive agriculture in the Subbasin is supported by deep, dark, fertile soils. The arable soils of the Subbasin historically are classified into 4 groups (Carpenter and Cosby 1925): residual soils, old valley-filling soils, young valley-filling soils, and recent-alluvial soils.

More recent surveys classify the soils into categories based on detailed soil taxonomy (U.S. Department of Agriculture, 2018). Figure 4-3 is a composite soil map of soils in the Subbasin from the USDA Natural Resources Conservation Service (NRCS) and the Gridded Soil Survey Geographic (gSSURGO) Database that is produced by the National Cooperative Soil Survey (NCSS).

The Subbasin is dominated by 4 soil orders: mollisols, entisols, vertisols, and alfisols. Minor soils include histosols and isceptisols. The 4 major soil orders are described below.

- **Mollisols** are the most widespread soil order in the 180/400-Foot Aquifer Subbasin. Mollisols are characterized by a dark surface horizon, indicative of high organic content. The organic content often originates from roots of surficial grasses or similar vegetation. They are highly fertile and often alkaline rich (calcium and magnesium). Mollisols can have any moisture regime, but enough available moisture to support perennial grasses is typical.
- **Entisols** are the predominant order along the river corridor. Entisols are mineral soils without distinct soil horizons because they have not been in place long enough for distinct horizons to develop. These soils are often found in areas of recent deposition

such as active flood plains, river basins, and areas prone to landslides. These soils may be found near active tributaries in the Subbasin.

- **Vertisols** are present in some areas on the Subbasin lowlands. Vertisols are predominantly clayey soils with high shrink-swell potential. Vertisols are present in climates that have distinct wet and dry seasons. During the dry season these soils commonly have deep, wide cracks. During the wet season these soils trend to have water pooling on the surface due to the high clay content.
- **Alfisols** are present along the margins of the Subbasin. Alfisols are known to have natural fertility both from clay acumination in the subsurface horizons and from leaf litter when under forested conditions. This order of soils is commonly associated with high base minerals such as calcium, magnesium, sodium, and potassium.

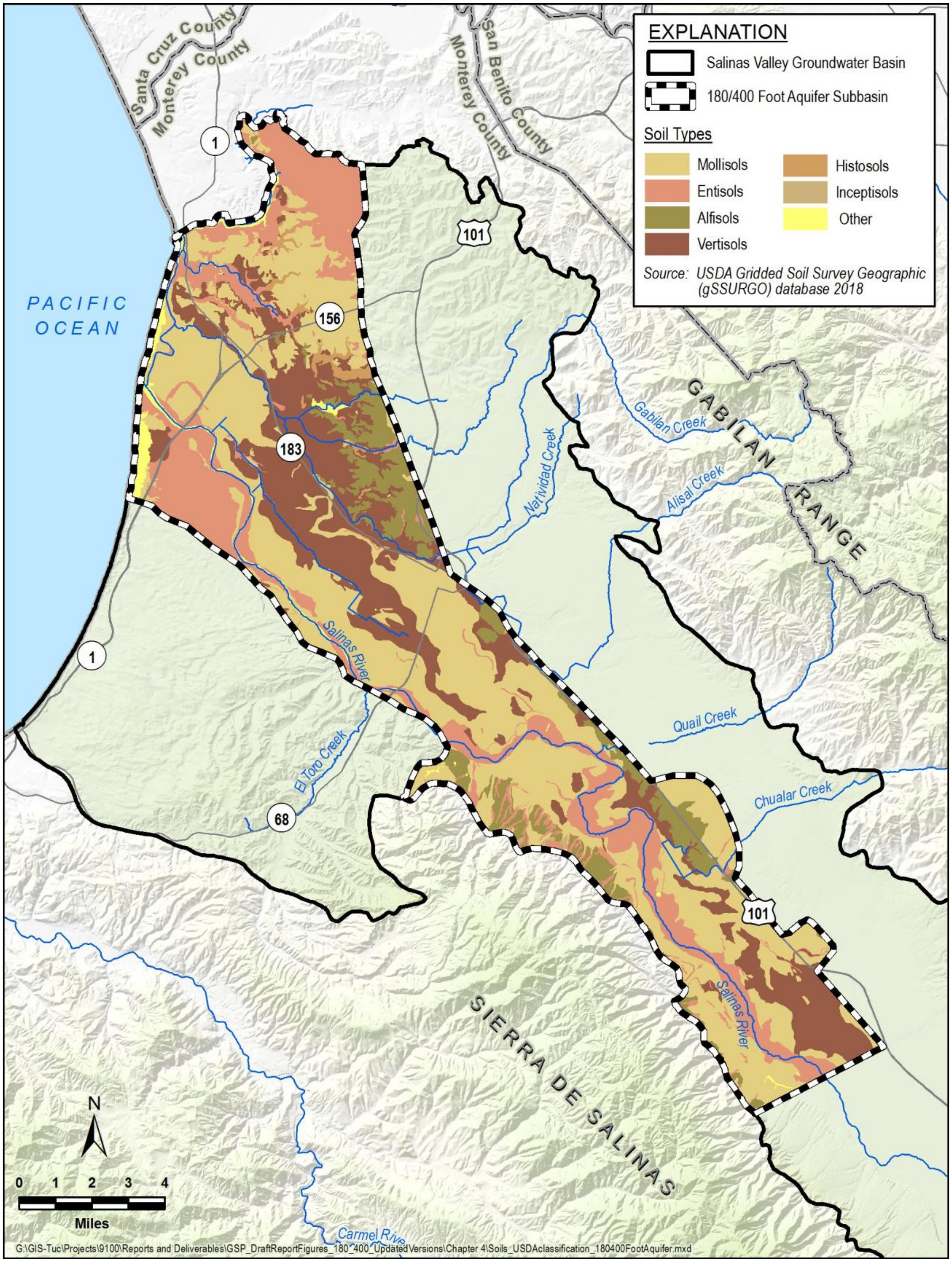


Figure 4-3. Composite Soils Map

4.3 Subbasin Extent

The subbasin extents describe both the lateral and vertical extents of the Subbasin. The Subbasin extents are defined by the California Department of Water Resources (DWR) and are documented in Bulletin 118, (DWR, 2003; DWR, 2016a). Figure 4-1 illustrates the extent of the Subbasin.

4.3.1 Lateral Subbasin Boundaries

The 180/400-Foot Aquifer Subbasin is laterally bounded by a combination of subbasin boundaries and physical boundaries of the Salinas Valley Groundwater Basin, all shown on Figure 1-1.

4.3.1.1 Boundaries with Adjacent Subbasins

The 180/400-Foot Aquifer Subbasin is bounded by the following subbasins:

- **The Forebay Aquifer Subbasin**. The southern boundary with the adjacent Forebay Subbasin is near the town of Gonzales (DWR, 2004a). It is the approximate southern limit of the regional clay layers that are the defining characteristic of the 180/400-Foot Aquifer Subbasin. There may be reasonable hydraulic connectivity with the Forebay Subbasin, although the principal aquifers change from relatively unconfined to confined near this boundary.
- **The Eastside Aquifer Subbasin**. The eastern boundary with the adjacent Eastside Subbasin generally follows the trace of Highway 101 and coincides with the northeastern limit of confining conditions in the 180/400-Foot Aquifer Subbasin. An analysis of stratigraphic correlations concluded that there is a change in the depositional facies near this boundary, with tributary alluvial fan deposits on the east side of the boundary and Salinas River fluvial deposits on the west side of the boundary (Kennedy-Jenks, 2004). Previous studies of groundwater flow across this boundary indicate that there is restricted hydraulic connectivity between the subbasins.
- **The Langley Area Subbasin**. The northern boundary with the Langley Subbasin generally coincides with the presence of Pleistocene Aromas Red Sands that are indicative of the Langley Subbasin (DWR, 2004b). Although the Langley Subbasin is not on the valley floor, there are no reported hydraulic barriers separating these subbasins and therefore the GSP needs to consider potential for groundwater flow between these adjacent subbasins.
- **The Monterey Subbasin**. The western boundary with the Monterey Subbasin is based on topographic rise that coincides with a buried trace of the King City-Reliz fault. This fault may impact groundwater flow between subbasins beneath a cover of Holocene sand

dunes (Durbin, et al., 1978). There is potential for groundwater flow between these two subbasins.

4.3.1.2 Physical Basin Boundaries

The 180/400-Foot Aquifer Subbasin is bounded by the following physical feature:

- **The Monterey Bay shoreline**. The northern Subbasin boundary is defined by the Monterey Bay shoreline. The Subbasin aquifers extend across this boundary into the subsurface underlying Monterey Bay and there are no hydrogeologic barriers limiting groundwater flow across this coastal boundary.
- **Elkhorn Slough**. The northern boundary of the Subbasin follows the current course of Elkhorn Slough; corresponding to a paleo-drainage of the Salinas River (DWR, 2003). Elkhorn Slough separates the 180/400-Foot Aquifer Subbasin from the Pajaro Valley Groundwater Basin. This paleo-drainage is a 400-Foot deep, buried, clay-filled boundary that limits groundwater flow between these basins (Durbin, et al., 1978).
- **The Sierra de Salinas**. The southwest extension of the King City fault corresponds to the contact between the Quaternary deposits and the low-permeability granitic and metamorphic basement rock of the Sierra de Salinas. This geologic contact creates a groundwater flow barrier and the southwestern hydrogeologic boundary of the Subbasin.

4.3.2 Vertical Subbasin Boundaries

The base, or bottom, of the Subbasin does not contain a sharp interface between permeable sediments and lower-permeability basement rock across the entire Subbasin. While a sharp interface between alluvium and the underlying granitic rocks exists near the Sierra de Salinas, the usable portion of the Subbasin does not always include the full thickness of Alluvium. Previous investigations have estimated that the entire sedimentary sequence in the Salinas Valley Groundwater Basin might range between 10,000 and 15,000 feet thick. However, the productive freshwater principal aquifers in this Subbasin are at shallower depths.

With increasing depth, 2 factors limit the viability of the sediments as productive, principal aquifers:

1. Increased consolidation and cementation of the sediments decrease well yields.
2. Deeper strata contain poor-quality brackish water unsuitable for most uses.

Because these factors gradually change with depth, there is not a sharp well-defined bottom of the aquifers throughout the Salinas Valley Groundwater Basin. This GSP adopts the bottom of the aquifer that was defined by the USGS (Durbin, *et al.*, 1978) and extrapolates that surface to the Subbasin's boundary. Figure 4-4 is a map of elevation contours of the bottom of the

Subbasin. Figure 4-5 shows a contour map of depth to the bottom of the Subbasin prepared using the extrapolated bottom elevation and ground surface elevation.

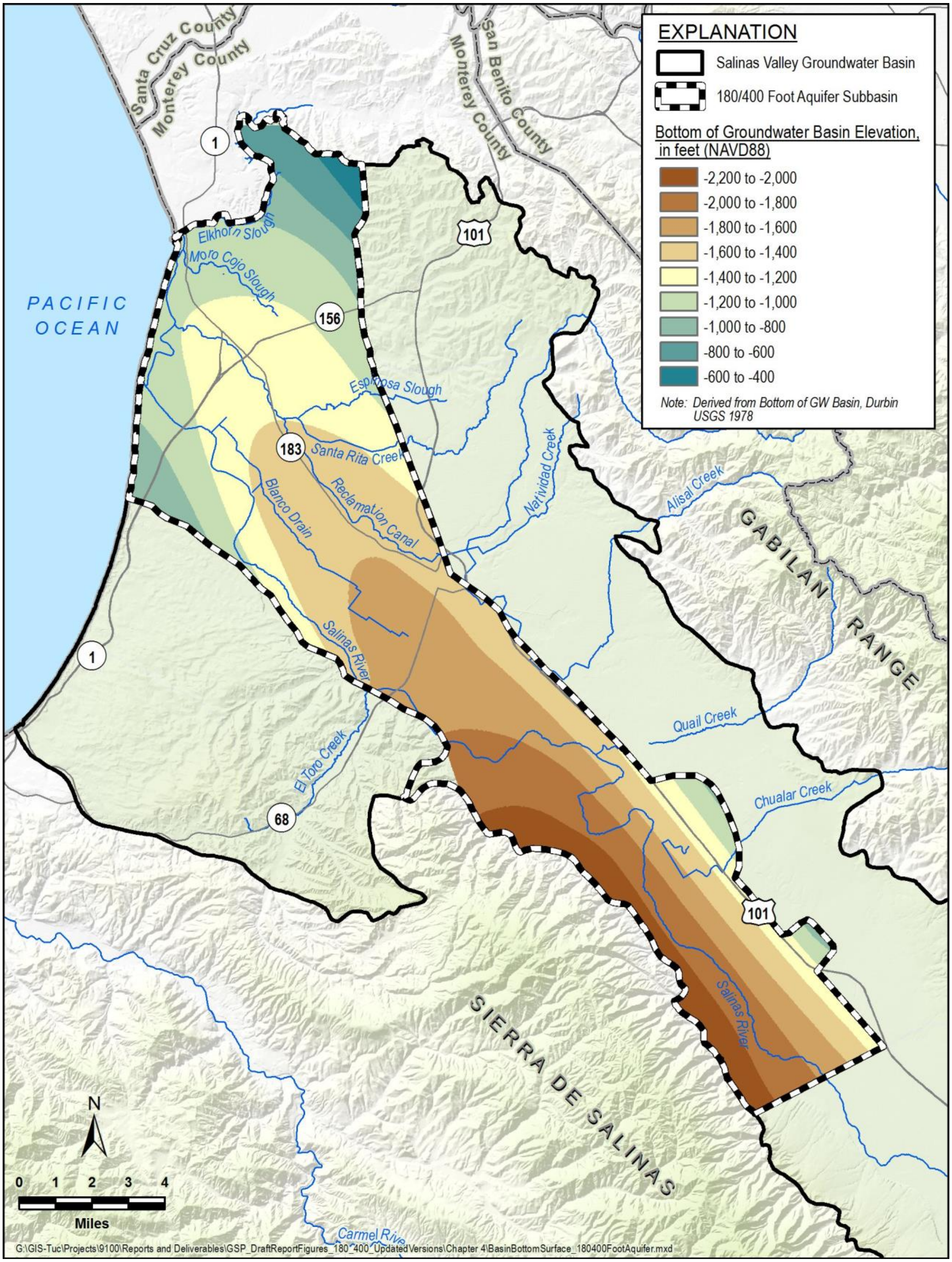


Figure 4-4. Elevation of the Bottom of the 180/400-Foot Aquifer Subbasin

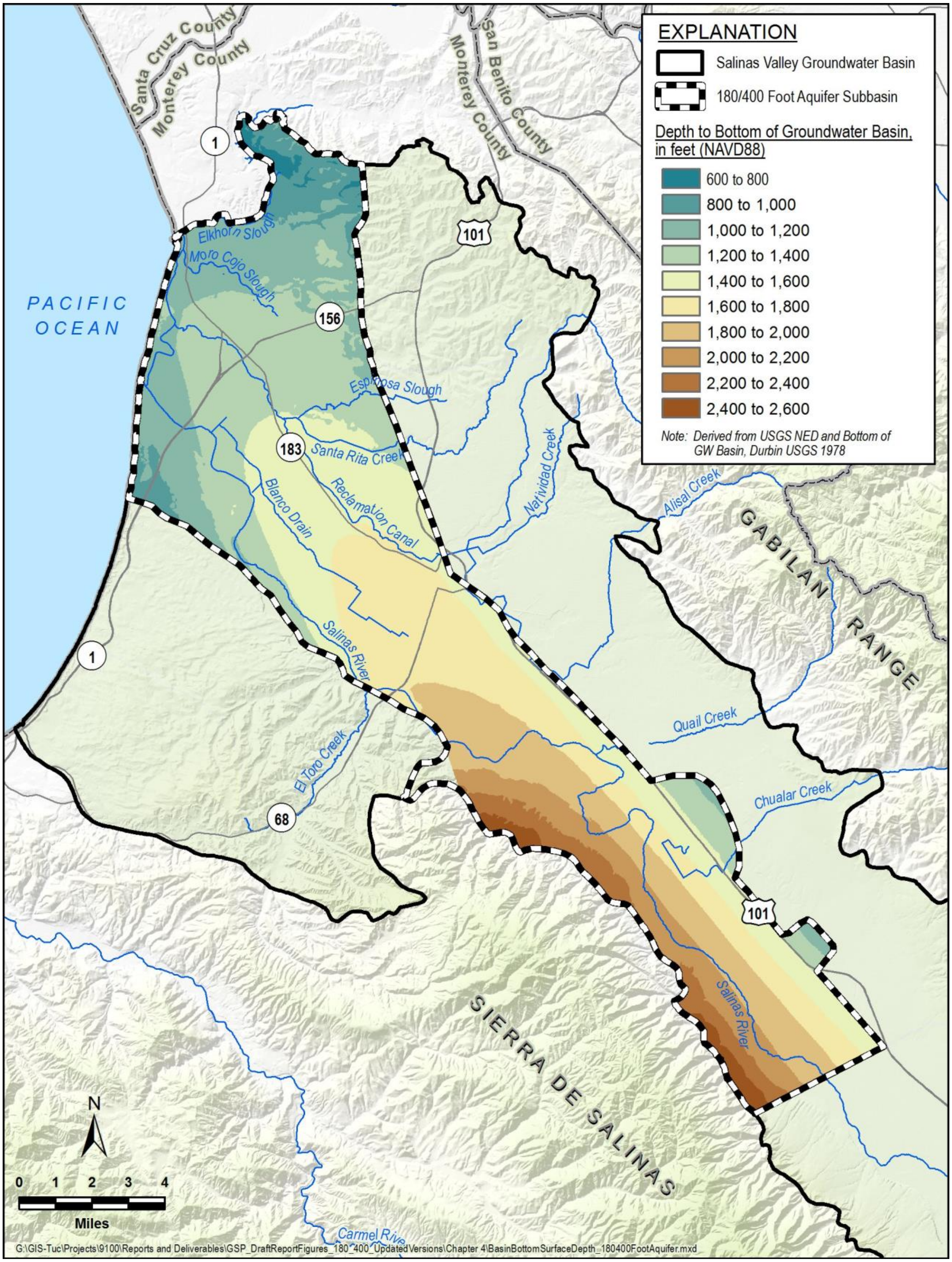


Figure 4-5. Depth to Bottom of the 180/400-Foot Aquifer Subbasin, in feet

4.4 Subbasin Hydrogeology

The Subbasin hydrogeology details the principal aquifers and aquitards that occur in the subbasin, inventories known aquifer properties, and identifies naturally occurring groundwater inputs and outputs which will be incorporated into the groundwater budgets described in Chapter 6. This section also includes cross-sections which give graphical representations of what is described in the following subsections.

Groundwater in the 180/400-Foot Aquifer Subbasin is primarily produced from alluvial deposits belonging to 3 geologic units: the Holocene Alluvium, the Quaternary Older Alluvium, and the Pliocene Paso Robles Formation described above. Although these 3 geologic formations differ in age, they have similar distributions of sediment type and layering; and in practice it is difficult to distinguish between these formations during borehole drilling. For purposes of groundwater development in the Subbasin, these geologic units are collectively referred to as alluvium.

Although groundwater can be found throughout most of the Holocene Alluvium and the Quaternary Older Alluvium, not all groundwater is part of a principal aquifer. SGMA defines a principal aquifer as "…aquifers or aquifer systems that store, transmit, and yield significant or economic quantities of groundwater to wells, springs, or surface water systems" (CCR, 2016). All the groundwater encountered in the Subbasin is a part of the overall groundwater system, but the focus of this GSP is on the principal aquifers.Within the 180/400-Foot Aquifer there are three principal aquifers: the 180-Foot Aquifer, the 400-Foot Aquifer, and the Deep Aquifers.

The most recent, detailed hydrostratigraphic analysis of the 180/400-Foot Aquifer Subbasin was published in 2004 with an update in 2015 (Kennedy/Jenks, 2004; Brown and Caldwell, 2015).

4.4.1 Principal Aquifers and Aquitards

The shallowest water-bearing sediments are thin, laterally discontinuous, and do not constitute a significant source of water for the Subbasin. These shallow sediments are therefore not considered a principal aquifer. These sediments are generally within 30 feet of the ground surface and are part of the Holocene Alluvium unit. Although these sediments are a minor source of water due to their poor quality and low yield, some small domestic wells draw water from this zone (Kennedy-Jenks, 2004; DWR, 2003; Showalter, 1984). Groundwater in these sediments is hydraulically connected to the Salinas River but is assumed to be relatively poorly connected to the underlying productive principal aquifers due to the presence of the underlying Salinas Valley Aquitard.

Beneath the shallow seidments, the following series of aquitards and principal aquifers have long been recognized in a multitude of studies and reports. They are the distinguishing hydrostratigraphic features of this Subbasin.

- Salinas Valley Aquitard
- 180-Foot Aquifer
- 180/400-Foot Aquitard
- 400-Foot Aquifer
- 400-Foot/Deep Aquitard
- Deep Aquifers

4.4.1.1 Salinas Valley Aquitard

The Salinas Valley Aquitard is the shallowest, relatively continuous hydrogeologic feature in the Subbasin. The aquitard is composed of blue or yellow sandy clay layers with minor interbedded sand layers (DWR, 2003). The Salinas Valley Aquitard correlates to the Pleistocene Older Alluvium stratigraphic unit and was deposited in a shallow sea during a period of relatively high sea level.

Figure 4-6 shows the lateral and vertical extent of the Salinas Valley Aquitard. Laterally, the Salinas Valley Aquitard extends from Monterey Bay in the north to Chualar in the south, and to an irregular contact in the east that is roughly represented by the DWR-designated boundary with the Eastside Subbasin (DWR, 2003). Most of the Salinas Valley Aquitard is generally encountered at depths of less than 30 feet. Close to Monterey Bay, the Salinas Valley Aquitard is over 100 feet thick but thins to 10 feet near the City of Salinas, eventually pinching out near Chualar and east of the City of Salinas (DWR, 1975). While this clay layer is relatively continuous in the northern portion of the Valley, it is not monolithic. The clay layer is missing in some areas and pinches out in certain areas. In these intermittent areas, the shallow sediments may be in hydrologic connection with the 180-Foot Aquifer, and may be a conduit for recharge. This is espacially pertinent for places where the Salinas River flows over these gaps and may provide recharge to the alluvial sediments and principal aquifers below. These locations are illustrated where there is no Salinas Valley Aquitard shading where the Salinas Valley River is mapped on Figure 4-6.

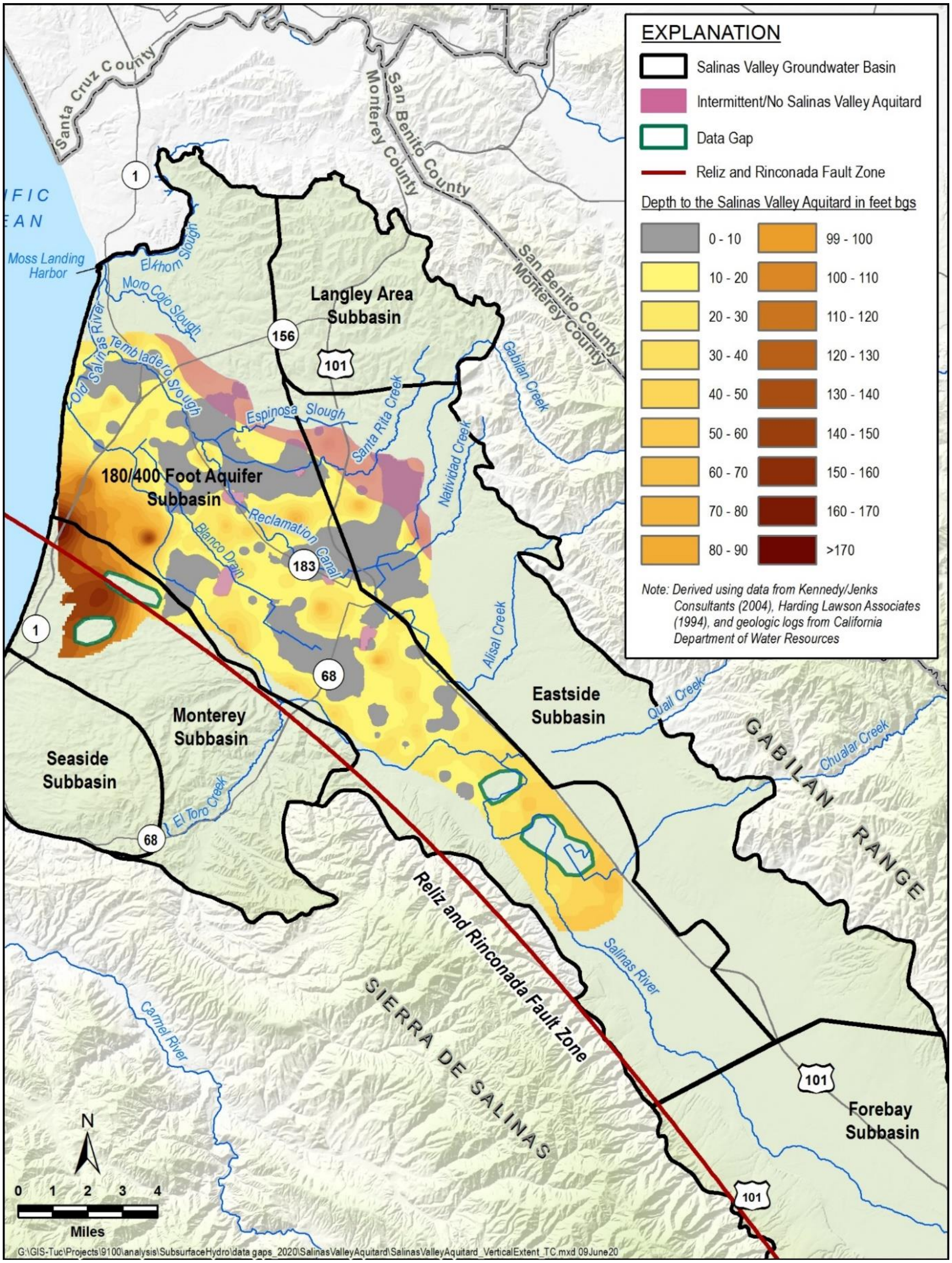


Figure 4-6. Lateral and Vertical Extent of the Salinas Valley Aquitard

4.4.1.2 180-Foot Aquifer

The Salinas Valley Aquitard overlies and confines the 180-Foot Aquifer. The 180-Foot Aquifer is the shallowest laterally extensive principal aquifer in the 180/400-Foot Aquifer Subbasin. This aquifer consists of interconnected sand and gravel beds that are from 50 to 150 feet thick. The sand and gravel layers are interlayered with clay lenses. This aquifer is correlated to the Older Alluvium or upper Aromas Sand formations (Harding ESE, 2001; Kennedy-Jenks, 2004). The 180-Foot Aquifer is exposed on the floor of the Monterey Bay (Todd Engineers, 1989).

The primary uses of the 180-Foot Aquifer are for domestic, irrigation, and municipal water supply.

4.4.1.3 180/400-Foot Aquitard

The base of the 180-Foot Aquifer is an aquitard consisting of interlayered clay and sand layers, including a marine blue clay layer similar to the Salinas Valley Aquitard (DWR, 2003). This aquitard is known as the 180/400-Foot Aquitard. It is widespread in the Subbasin but varies in thickness and quality, and areas of hydrologic connection between the 400-Foot and 180-Foot Aquifers are known to exist (Kennedy-Jenks, 2004). In areas where the 180/400-Foot Aquitard is thin or discontinuous, seawater in the 180-Foot Aquifer can migrate downward into the 400-Foot Aquifer in response to pumping (Kennedy-Jenks, 2004).

4.4.1.4 400-Foot Aquifer

The 180/400-Foot Aquitard overlies and confines the 400-Foot Aquifer. The 400-Foot Aquifer is a hydrostratigraphic layer of sand and gravel with varying degrees of interbedded clay layers. It is usually encountered between 270 and 470 feet below ground surface. This hydrogeologic unit correlates to the Aromas Red Sands and the upper part of the Paso Robles Formation. Near the City of Salinas, the 400-Foot Aquifer is a single permeable bed approximately 200 feet thick; but in other areas the aquifer is split into multiple permeable zones by clay layers (DWR, 1973). The upper portion of the 400-Foot Aquifer merges and interfingers with the 180-Foot Aquifer in some areas where the 180/400-Foot Aquitard is missing (DWR, 1973).

The primary uses of the 400-Foot Aquifer are for domestic, irrigation, and municipal water supply.

4.4.1.5 400-Foot/Deep Aquitard

The base of the 400-Foot Aquifer is the 400-Foot/Deep Aquitard. The 400-Foot/Deep Aquitard is primarily comprised of several blue marine clay layers. This aquitard can be several hundred feet thick (Kennedy-Jenks, 2004; Brown and Caldwell, 2015), consisting of mostly clay with sand and gravel lenses. This heterogeneous nature of the aquitard indicates there may be potential parthways for downward migration of water from the 400-Foot Aquifer to the Deep Aquifers.

4.4.1.6 Deep Aquifers

The 400-Foot/Deep Aquitard overlies and confines the Deep Aquifers. The Deep Aquifers, also referred to as the 900-Foot and 1500-Foot Aquifers, are up to 900 feet thick and have alternating sandy-gravel layers and clay layers which do not differentiate into distinct aquifer and aquitard units (DWR, 2003). The Deep Aquifers correlate to the lower Paso Robles, Purisima, and Santa Margarita formations where they exist. The Deep Aquifers overlie the low permeability Monterey Formation. While the Deep Aquifers are relatively poorly studied, some well owners have indicated that there are different portions of the Deep Aquifers with different water qualities. No public data exists to substantiate these statements.

The Deep Aquifers are used primarily for irrigation and municipal water supply, particularly where seawater has intruded overlying principal aquifers.

4.4.1.7 Cross Sections

Three cross-sections parallel and perpendicular to the long axis of the Subbasin are shown on Figure 4-7, Figure 4-8, and Figure 4-9. The cross-section on Figure 4-7 is adopted from the State of the Salinas River Groundwater Basin report (Brown and Caldwell, 2015). The cross-sections on Figure 4-8 and Figure 4-9 are adapted from the *Final Report, Hydrostratigraphic Analysis of the Northern Salinas Valley* (Kennedy-Jenks, 2004). The location of these cross-sections is depicted on Figure 4-2.

Cross-section A-A’ extends down the length of the 180/400-Foot Aquifer Subbasin. Cross-section C-C’ and cross-section E-E’ extend across the width of the Subbasin. The finer sediments are grouped in the regions with hatch lines, or the shaded regions for cross-section A-A’; the coarser sediments have no hatching or shading. The generalized relationships of finer or coarser sediments between boreholes should be interpreted with caution and an understanding the distal and proximal sedimentation of alluvial fans as it relates to the overall climatic setting over geologic time.

The cross-sections are based on geologic logs provided in California Department of Water Resources (DWR) Water Well Drillers Reports. Geologic log descriptions were grouped into hydrologic units as follows:

- Fine-grained sediments such as clay, silt, sandy clay, and gravelly clay are shown as aquitards.
- Coarse-grained sediments such as sand, gravel, and sand-gravel mixtures are shown as aquifers.
- Sediments logged as gravel/clay, sand/clay, and sand/gravel/clay are interpreted to consist of interbedded coarse-grained and fine-grained deposits and are included with aquifer materials.

In some cases, the logs may be old, the depth resolution poor, or the lithologic distinction suspect, and therefore the lithology shown on the well logs should not be viewed as precise.

The 3 cross-sections show the discontinuous and interbedded nature of the thin lenses of alluvial sediments. The cross-sections show generalized areas, both vertically and horizontally, where coarse material is prevalent, however, individual lenses of coarse material are not traceable over long distances and do not correlate well between boreholes (Kennedy/Jenks, 2004).

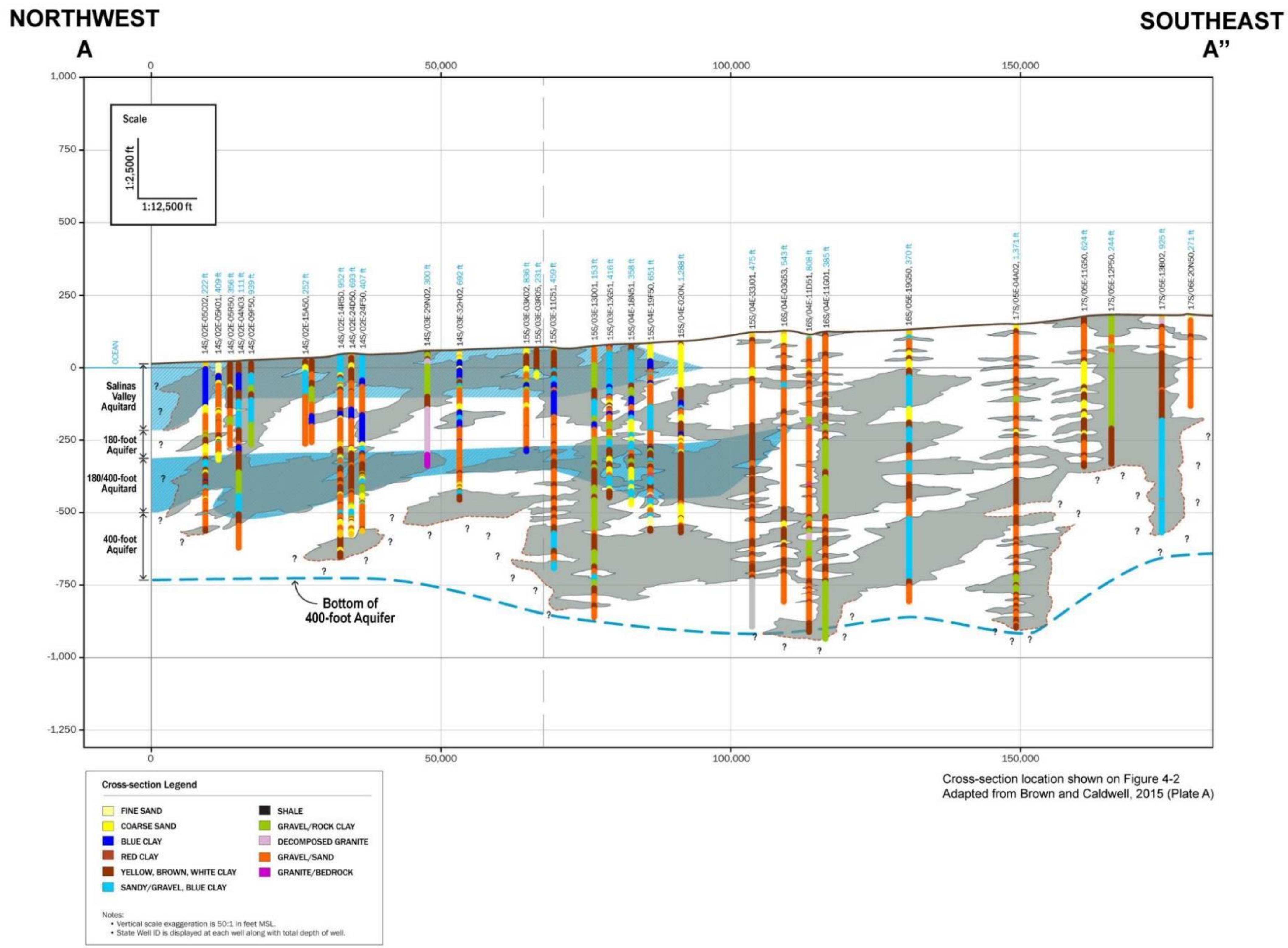


Figure 4-7. Cross-Section A-A'

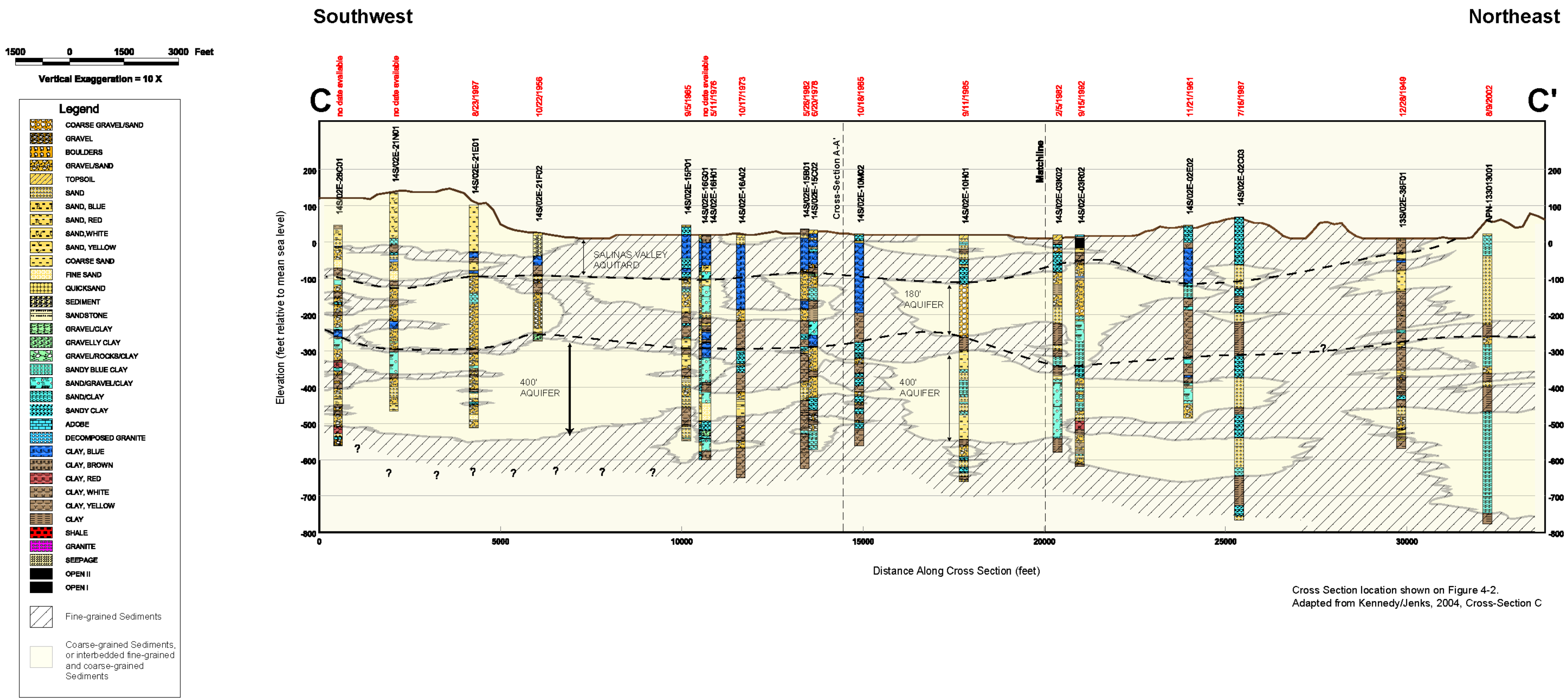


Figure 4-8. Cross-Section C-C'

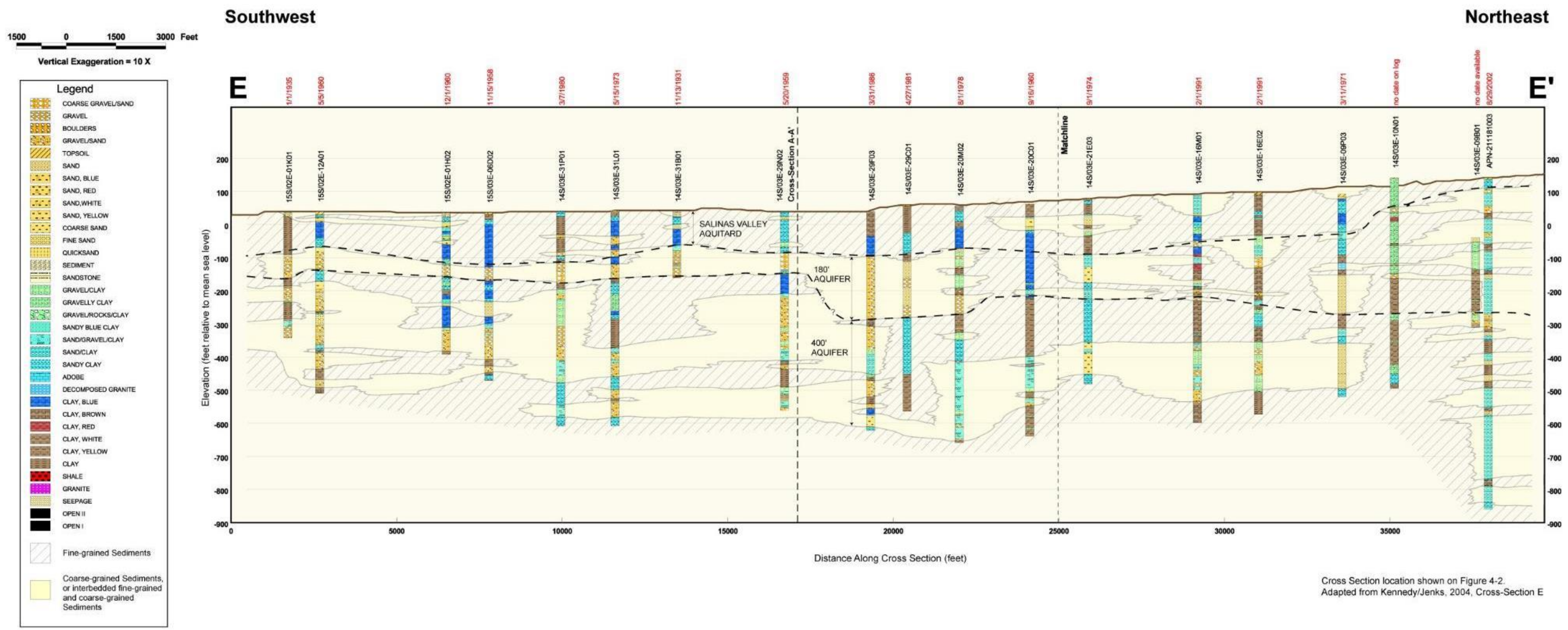


Figure 4-9. Cross-Section E-E'

4.4.2 Aquifer Properties

Aquifer properties define how groundwater is stored and how groundwater moves in the subsurface. This information is needed to understand current groundwater conditions, to predict future groundwater conditions, and to assess strategies for achieving sustainability.

The values and distribution of aquifer properties in the 180/400-Foot Aquifer Subbasin have not been well characterized and documented. The relatively sparse amount of measured aquifer properties throughout the Subbasin is considered a data gap that can be addressed during implementation of the GSP.

Although hydrogeologic properties have not been measured at many specific locations in the Subbasin, the aquifer properties have been estimated through the process of numerical model calibration. Aquifer property calibration has been completed for numerous published modeling studies including studies by Durbin (1974), Yates (1988), WRIME (2003), and the SVIHM that is used to develop this GSP.

There are 2 general types of aquifer properties relevant to groundwater management:

- **Aquifer storage properties.** These properties control the relationship between the volume of groundwater stored in the aquifer and the groundwater elevations measured in the aquifer.
- **Groundwater transmission properties.** These properties control the relationship between hydraulic gradients and the rate of groundwater flow.

4.4.2.1 Aquifer Storage Properties

The aquifer properties that characterize the relation between groundwater elevation and amount of water stored in an aquifer are specific yield for unconfined aquifers, and specific storage for confined aquifers. Storativity, or storage coefficient, is equal to specific storage multiplied by the aquifer saturated thickness for confined aquifers. Both specific yield and specific storage are measured in units of cubic feet of water per cubic feet of aquifer material. These ratios are often expressed as a percentage.

- **Specific yield**, or drainable porosity, is the amount of water that drains from pores when an unconfined aquifer is dewatered. Often specific yield values range from 8% to 20%. Estimated specific yield values complied by DWR for Subbasin range from 6% to 16% (DWR, 2004a).
- **Specific storage** is the amount of water derived from a unit volume of a confined aquifer due to a unit decline in pressure change in the aquifer. Specific storage values are dimensionless, and often on the order of $5x10^{-4}$ to $1x10^{-5}$. Estimated specific storage values compiled by the USGS for the Subbasin range from $1.2x10^{-4}$ to $2.9x10^{-4}$.

Detailed aquifer property values specific to the Subbasin were not available at the time of this GSP Update development. This is a data gap that will be filled during implementation.

4.4.2.2 Groundwater Transmission Properties

Hydraulic conductivity measures the ability of an aquifer to transmit water. Hydraulic conductivity is expressed in units of length per unit time, such as feet per day. Materials with higher hydraulic conductivities, such as sands and gravels, transmit groundwater more readily than units with lower hydraulic conductivities, such as clay. Transmissivity is equal to the hydraulic conductivity multiplied by the aquifer thickness. Few estimates of either hydraulic conductivity or transmissivity exist for the Subbasin.

Specific capacity of a well is sometimes used as a surrogate for estimating aquifer transmissivity. The specific capacity of a well is the ratio between the well production rate in gallons per minute (gpm) and the water level drawdown in the well during pumping, measured in feet. Specific capacity is moderately well correlated, and approximately proportional to, aquifer transmissivity. Durbin, et al. (1978) reported the following well yields and specific capacity estimates:

- Fluvial deposits that constitute the shallowest productive zones in most of the Subbasin, including the 180-Foot aquifer, have well yields of 500 to 4,000 gpm and an average specific capacity of approximately 70 gpm/ft.
- In the 400-Foot aquifer, well yields range from 300 to 4,000 gpm and average 1,200 gpm, with specific capacity averaging about 30 gpm/ft.

These values suggest that the principal aquifers have relatively high transmissivities and hydraulic conductivities. Wells completed in the principal aquifers can produce substantial amounts of water with limited drawdown.

4.4.3 Primary Aquifer Uses

The primary uses of groundwater from the three aquifers include domestic, irrigation, and municipal water supply uses (DWR, 2004a).

4.4.4 Natural Recharge Areas

Natural recharge areas allow rainfall, local runoff, and streamflow to replenish aquifers by percolating through the subsurface. Identifying areas of potentially significant natural recharge can inform water budgets and help government planners promote good groundwater management by incorporating recharge areas into land use plans. This section only identifies areas of natural recharge; quantitative information about all natural and anthropogenic (man-made) recharge is provided in Chapter 6.

Natural groundwater recharge occurs through the following processes:

- Infiltration of surface water from the Salinas River and tributary channels originating in the Sierra de Salinas and Gabilan Range
- Deep percolation of excess applied irrigation water
- Deep percolation of infiltrating precipitation
- Subsurface inflow from the adjacent Subbasins

The first three mechanisms of recharge are dependent on the absence of the Salinas Valley Aquitard to allow for hydrologic connection from the surface to the principal aquifers. Infiltration of surface water and deep percolation of precipitation are both surficial sources of natural groundwater recharge. An area's capacity for surficial groundwater recharge is dependent on a combination of factors, including steepness of grade, soil surface conditions such as paving or compaction, and ability of soil to transmit water past the root zone. To assist agricultural communities in California with assessing groundwater recharge potential, a consortium of researchers at University of California Davis developed a Soil Agricultural Groundwater Banking Index (SAGBI) and generated maps of recharge potential in agricultural areas of California (O'Geen, *et al.*, 2015). Figure 4-10 presents the SAGBI index map for the 180/400-Foot Aquifer Subbasin. This map ranks soil suitability for groundwater recharge based on 5 major factors including: deep percolation, root zone residence time, topography, chemical limitations, and soil surface condition. Areas with excellent recharge properties are shown in green. Areas with poor recharge properties are shown in red. Not all land is classified, but this map provides helpful guidance on where natural recharge likely occurs.

Areas with the highest potential for recharge are along the Salinas River. Although Figure 4-10 shows these areas of good potential recharge in the 180/400-Foot Aquifer Subbasin, recharge to the principal aquifers of the Subbasin is very limited because of the low permeability Salinas Valley Aquitard. It is likely that only limited surficial recharge in the 180/400-Foot Aquifer Subbasin reaches the productive 180-Foot Aquifer or the 400-Foot Aquifer. This demonstrates the limited utility of potential recharge maps that are based on soil properties. This map should not be used as the sole data source for identifying recharge areas that will directly benefit the extensive principal aquifers in the 180/400-Foot Aquifer Subbasin..

Subsurface recharge is primarily from inflow from the adjacent Forebay Aquifer Subbasin to the south (DWR, 2004a). This inflow is estimated to be 21,000 acre-feet on an annual basis. Total natural recharge is estimated to be 117,000 acre-feet (DWR, 2004a).

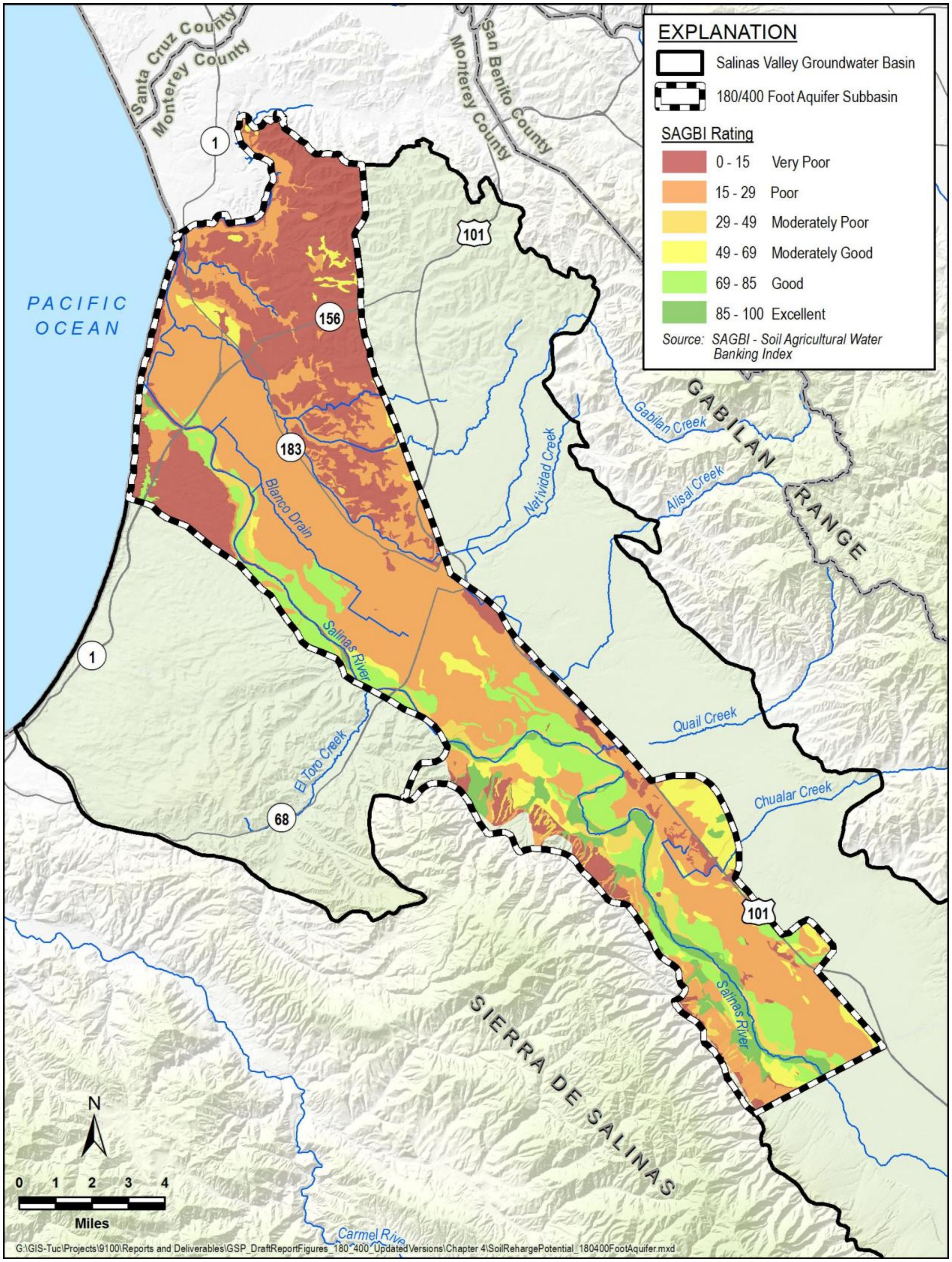


Figure 4-10. SAGBI Soils Map for the 180/400-Foot Aquifer Subbasin

4.4.5 Natural Discharge Areas

Natural discharge areas are areas where groundwater naturally leaves aquifers through flow to adjoining basins or percolation to the ground surface. Identifying areas of potentially significant natural discharge can inform water budgets and help locate important environmental uses of groundwater. Chapter 6 provides quantitative information about all natural and anthropogenic discharge.

Natural groundwater discharge areas within the Subbasin include wetlands and other surface water bodies that receive groundwater discharge to surface water bodies and evapotranspiration (ET) by vegetation types commonly associated with the sub-surface presence of groundwater. There are no springs and seeps in the Subbasin as identified in the National Hydrology Dataset (NHD). Natural groundwater discharge to streams–primarily, the Salinas River and its tributaries–has not been mapped to date.

4.4.5.1 Potential Interconnected Surface Water

Figure 4-11 shows locations of interconnected surface water, in the 180/400-Foot Aquifer Subbasin evaluated on a monthly basis over the entire model period from 1967 to 2017. This analysis also excludes the period from June to September assuming that the majority of flow in the river during these months is from conservation releases from the reservoirs. The blue cells indicate areas where surface water is connected to groundwater for more than 50% of the number of months in the model period and are designated as areas of interconnected surface water. The clear cells require further evaluation to determine whether the sustainable management criteria, discussed in Chapter 8, apply, because they represent areas that have interconnection less than 50% of the model period or are likely underlain by the Salinas Valley Aquitard and therefore surface water is disconnected from the principal aquifers. Interconnection between surface water and groundwater can vary both in time and space. Annual and seasonal analyses are currently under development. The gray cells show locations of canals, drains, or connectors and were excluded from the analysis. These ISW locations are based on simulated results from the preliminary SVIHM, which is calibrated to measured groundwater levels and streamflows. Although seepage along the ISW reaches is based on assumed channel and aquifer parameters as model inputs, the preliminary SVIHM is the best available tool to estimate ISW locations. The model construction and uncertainty are described in Chapter 6 of this GSP Update. This map does not show the extent of interconnection which will be estimated in Chapter 5. Interconnection between surface water and groundwater can vary both in time and space. A seasonal analysis is included in Appendix 4A. Figure 4-11 is based on provisional version of the SVIHM[1] and is subject to change.

[1] These data (model and/or model results) are preliminary or provisional and are subject to revision. This model and model results are being provided to meet the need for timely best science. The model has not received final approval by the U.S. Geological Survey (USGS). No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the model and related material nor shall the fact of release constitute any such warranty. The model is provided on the condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the model.

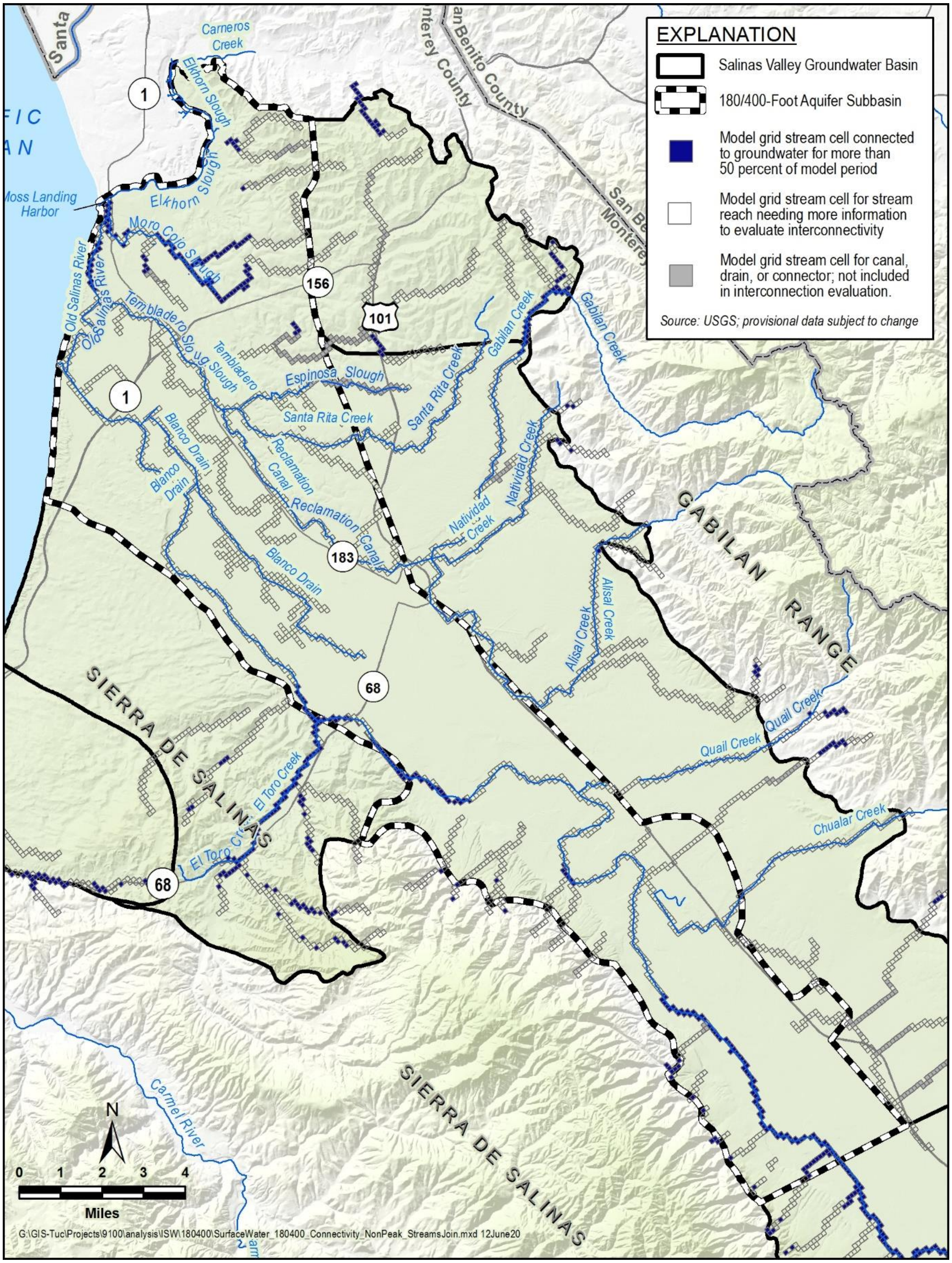


Figure 4-11. Locations of Interconnected Surface Water

4.4.5.2 Groundwater Dependent Ecosystems

GDEs refer to ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface. Two main types of ecosystems are commonly associated with groundwater: wetlands associated with the surface expression of groundwater and vegetation that typically draws water from a shallow water table.

GDEs may provide critical habitat for threatened or endangered species. Areas designated as critical habitat for threatened or endangered species contain the physical or biological features that are essential to the conservation of these species, and may need special management or protection (USFWS, 2017). A list of threatened and endangered species that might rely on groundwater dependent ecosystems (GDEs) in the Subbasin was compiled using information from the U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), and The Nature Conservancy (TNC). Several steps were taken to determine which threatened and endangered species were likely found in the Subbasin and of those, which were likely to rely on GDE habitat. A list of threatened and endangered species for Monterey County was downloaded from the USFWS website and cross-referenced to species identified in the CDFW California Natural Diversity Database. The threatened and endangered species for Monterey County was further cross-referenced with the TNC Critical Species LookBook to identify which species are likely to depend on groundwater, as indicated in Table 4-1.

Ten threatened and endangered species, including the Southern California Steelhead, and the California Red-legged Frog, were identified as likely to rely directly on groundwater in Monterey County, several of which may be found in the Subbasin. Ten species were identified as likely to rely indirectly on groundwater, and the remaining species are unknown with respect to whether they directly rely on GDEs or groundwater. All species listed have the potential for groundwater dependence. There are 8 species that appear in both the federal and state list for threatened or endangered species.

Table 4-1. Federal and State Listed Threatened and Endangered Species, and Respective Groundwater Dependence for Monterey County

Groundwater Dependence	Common Name	Federal Status	State Status
Direct	California black rail	-	Threatened
	California red-legged frog	Threatened	-
	California Ridgway's rail	Endangered	Endangered
	longfin smelt	-	Threatened
	Santa Cruz long-toed salamander	Endangered	Endangered
	steelhead - central California coast DPS	Threatened	-
	steelhead - south-central California coast DPS	Threatened	-
	Tidewater Goby	Endangered	-
	tricolored blackbird	-	Threatened
Direct and Indirect	arroyo toad	Endangered	-
Indirect	bald eagle	-	Endangered
	bank swallow	-	Threatened
	Belding's savannah sparrow	-	Endangered
	California condor	Endangered	Endangered
	California least tern	Endangered	Endangered
	least Bell's vireo	Endangered	Endangered
	southwestern willow flycatcher	Endangered	Endangered
	Swainson's hawk	-	Threatened
	willow flycatcher	-	Endangered
Unknown	Bay checkerspot butterfly	Threatened	-
	California tiger salamander	Threatened	Threatened
	foothill yellow-legged frog	-	Endangered
	San Joaquin kit fox	Endangered	Threatened
	short-tailed albatross	Endangered	-
	Smith's blue butterfly	Endangered	-
	vernal pool fairy shrimp	Threatened	-

The areas in the 180/400-Foot Aquifer Subbasin where GDEs may be found are mainly along the Salinas River, and in tributary canyons and washes where shallow alluvium is present. The shallow alluvium along the Salinas River may be saturated, but more investigation is needed to determine potential locations of a continuous saturated zone that connects to the principal aquifers. Moreover, the presence of the Salinas Valley Aquitard likely prevents connection of GDEs to the principal aquifer throughout much of the 180/400-Foot Aquifer Subbasin, except in areas where the Salinas Valley Aquitard is discontinuous or not present. For a more refined analysis of the connection of surface water to the principal aquifer below, a more detailed analysis of the near surface stratigraphy is needed, along with the extent and continuity of the Salinas Valley Aquitard.

Figure 4-12 shows the distribution of potential GDEs within the Subbasin based on the Natural Communities Commonly Associated with Groundwater (NCCAG) Dataset. However, vegetation above the Salinas Valley Aquitard are likely not connected to the principal aquifers, and therefore are not groundwater dependent. The NCCAG dataset maps vegetation, wetlands, springs, and seeps in California that are commonly associated with groundwater. These include: 1) wetland features commonly associated with the surface expression of groundwater under natural, unmodified conditions; and 2) phreatophytes. This map does not account for the depth to groundwater or level of interconnection between surface water and groundwater.

The NCCAG dataset and the additional shallow groundwater analysis are not a determination of GDEs by DWR or SVBGSA, but rather represent the best available data to provide a starting point for this GSP Update, as well as to direct monitoring, fill data gaps, guide implementation, and support other field activities initiated or partnered by the SVBGSA. Field data are needed to ascertain the degree to which identified ecosystems are groundwater dependent, rather than sustained by soil moisture. This field data will be gathered during GSP implementation through collaborative field studies and then added here for other GSP updates.

Additional resources that contributed to an initial mapping of GDE locations are the CDFW Vegetation Classification and Mapping program (VegCAMP), the USFWS National Wetlands Inventory, and the USFWS online mapping tool for listed species critical habitat, as described in the methodology for the NCCAG development which is publicly accessible on the NC dataset website: https://gis.water.ca.gov/app/NCDatasetViewer/.

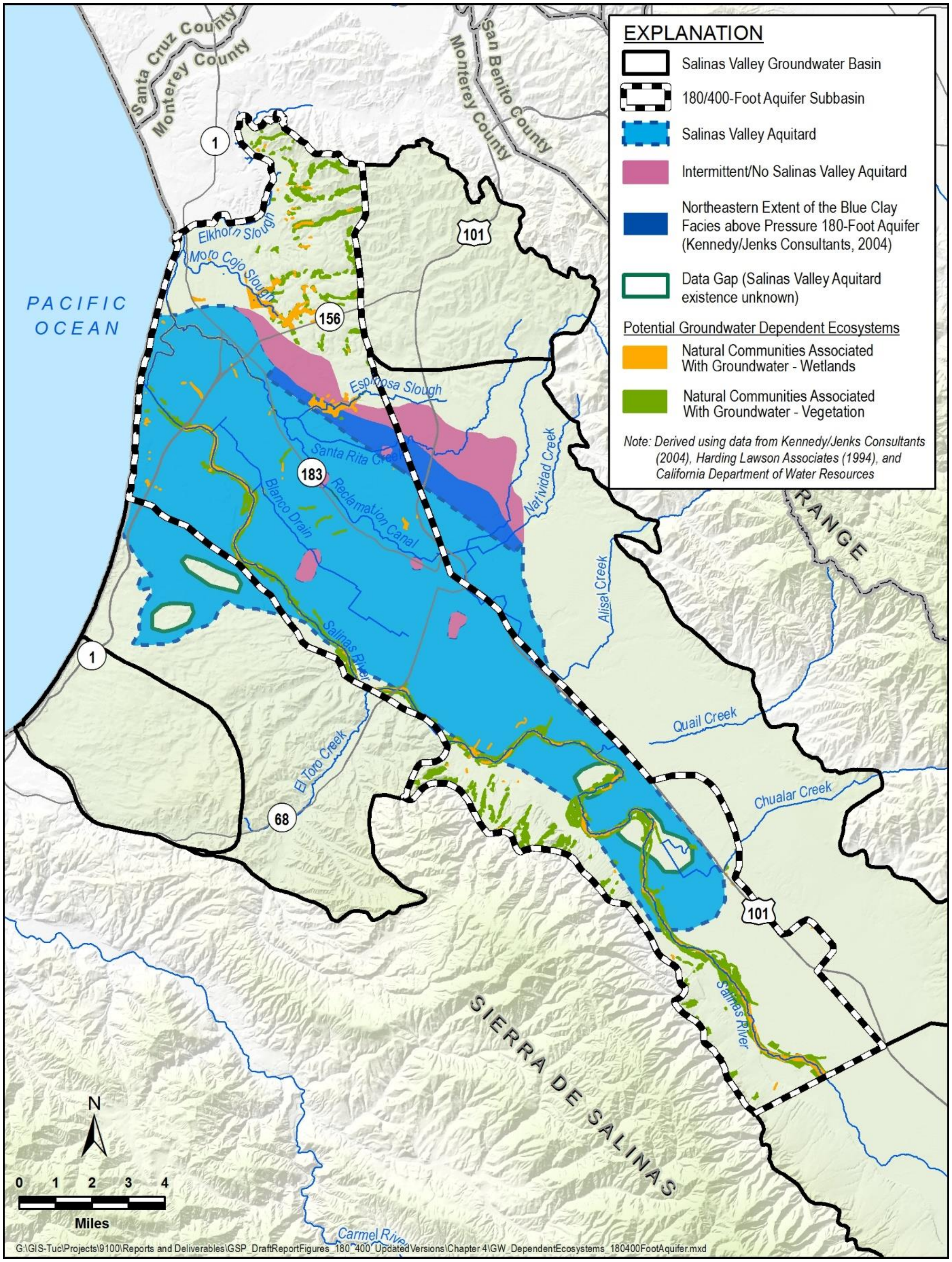


Figure 4-12. Natural Communities Associated with Groundwater

4.5 Surface Water Bodies

The primary surface water body in the Subbasin is the Salinas River. This river runs the entire length of the Subbasin and is fed by local tributaries (Figure 4-13). The following surface water bodies and river are located outside of the Subbasin but are important controls on the rate and timing of Salinas River flows into the Subbasin:

- Two reservoirs constructed to control flooding and to increase recharge from Salinas River are located outside of the Subbasin, but are important controls on the rate and timing of Salinas River flows in the Subbasin:
    - Nacimiento Reservoir, in San Luis Obispo County, was constructed in 1957 and has a storage capacity of 377,900 AF (MCWRA, 2015).
    - San Antonio Reservoir, in Monterey County, was constructed in 1967 and has a storage capacity of 335,000 AF (MCWRA, 2015).
- Arroyo Seco, a tributary with a 275 square mile drainage area that has no dams in its drainage basin and is characterized by both very high flood flows and extended dry periods.

Agricultural diversions and the construction of dams on the Salinas River and its tributaries have altered the river's hydrology, and the river no longer exhibits the seasonal variation in flows that were observed before the mid-20th century. The restoration of natural flows to the Salinas River is not within the scope of this GSP.

Within the Subbasin, two constructed canals convey surface water across the valley floor, as shown on Figure 4-13. Reclamation Ditch #1665 (Rec Ditch) was originally constructed in 1917 and is operated in part by MCWRA for flood management. The ditch flows southeast to northwest and drains the stormwater detention from Smith Lake and Carr Lake before flowing northwest towards Castroville, discharging into Tembladero Slough, and then flowing into the Old Salinas River Channel and ultimately into Moss Landing Harbor. The Blanco Drain, also known as Storm Maintenance District No. 2, is a drainage system that covers approximately 6,400 acres of farmland, predominately receiving agricultural return flow from tile drains in the dry season and stormwater runoff in the wet season. The Blanco Drain discharges into the Salinas River.

The mouth of the Salinas River forms a lagoon; and its outflow to Monterey Bay is blocked by sand dunes except during winter high-water flows. MCWRA operates a slide-gate to transfer water through a culvert from the lagoon into Old Salinas River during the wet season for flood control (MCWRA, 2014). The Old Salinas River discharges through tide gates at Potrero Road into Moss Landing Harbor and ultimately the Monterey Bay.

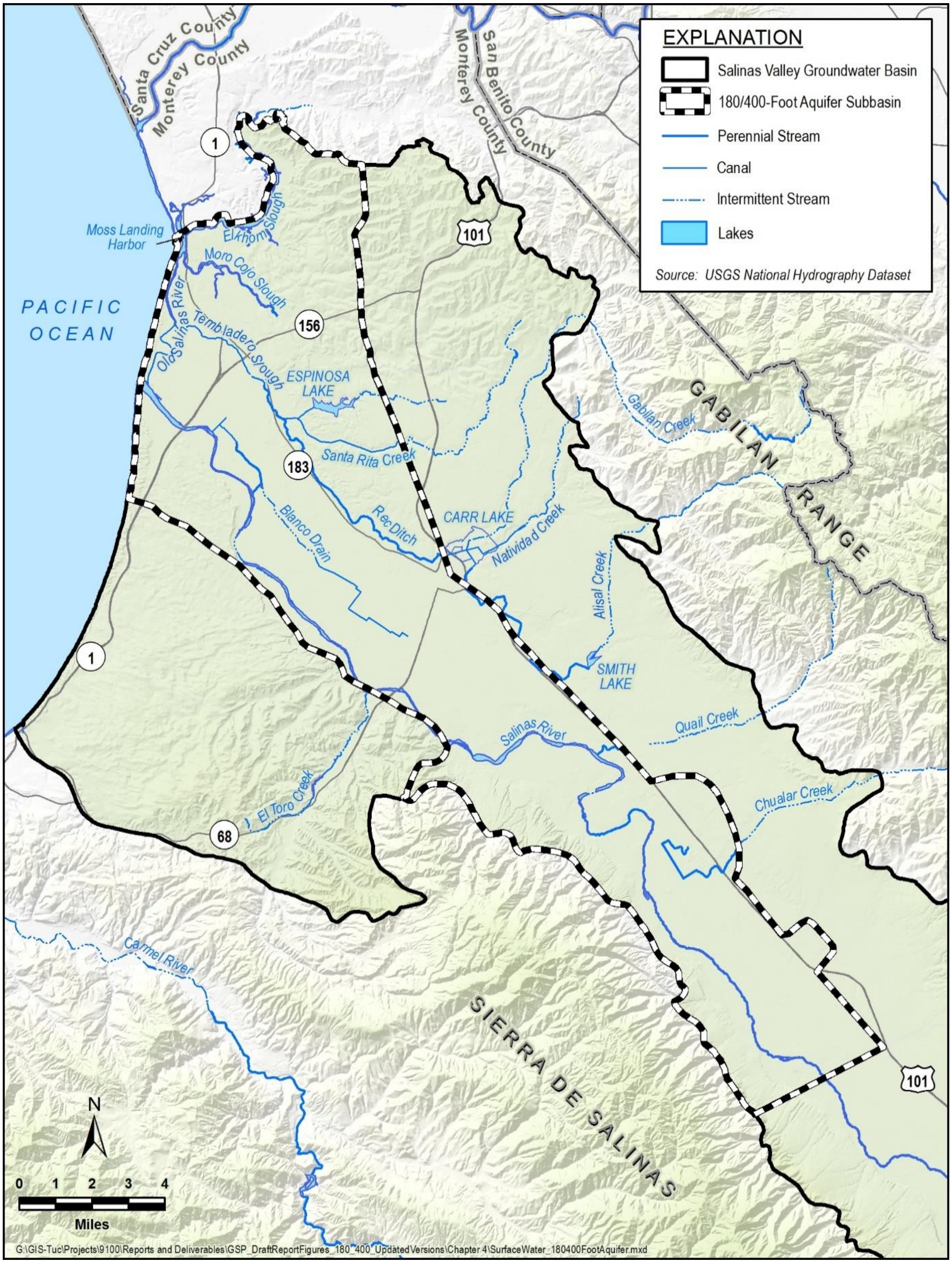


Figure 4-13. Surface Water Bodies in the 180/400-Foot Aquifer Subbasin

4.5.1 Watersheds

Figure 4-14 shows several watersheds that contribute small tributary streams to the Salinas River in the 180/400-Foot Aquifer Subbasin. From the boundary with the Forebay Subbasin to the Pacific Ocean from the Eastside Subbasin to the Sierra de Salinas and the Monterey Subbasin, the HUC12 watersheds within the 180/400-Foot Aquifer Subbasin are as follows:

- Limekiln Creek-Salinas River
- Johnson Creek
- Chualar Creek
- 180600051507-Salinas River
- El Toro Creek
- Quail Creek
- Alisal Creek-Salinas River
- Monterey Bay
- Natividad Creek-Gabilan Creek
- Alisal Slough-Tembladero Slough
- Elkhorn Slough

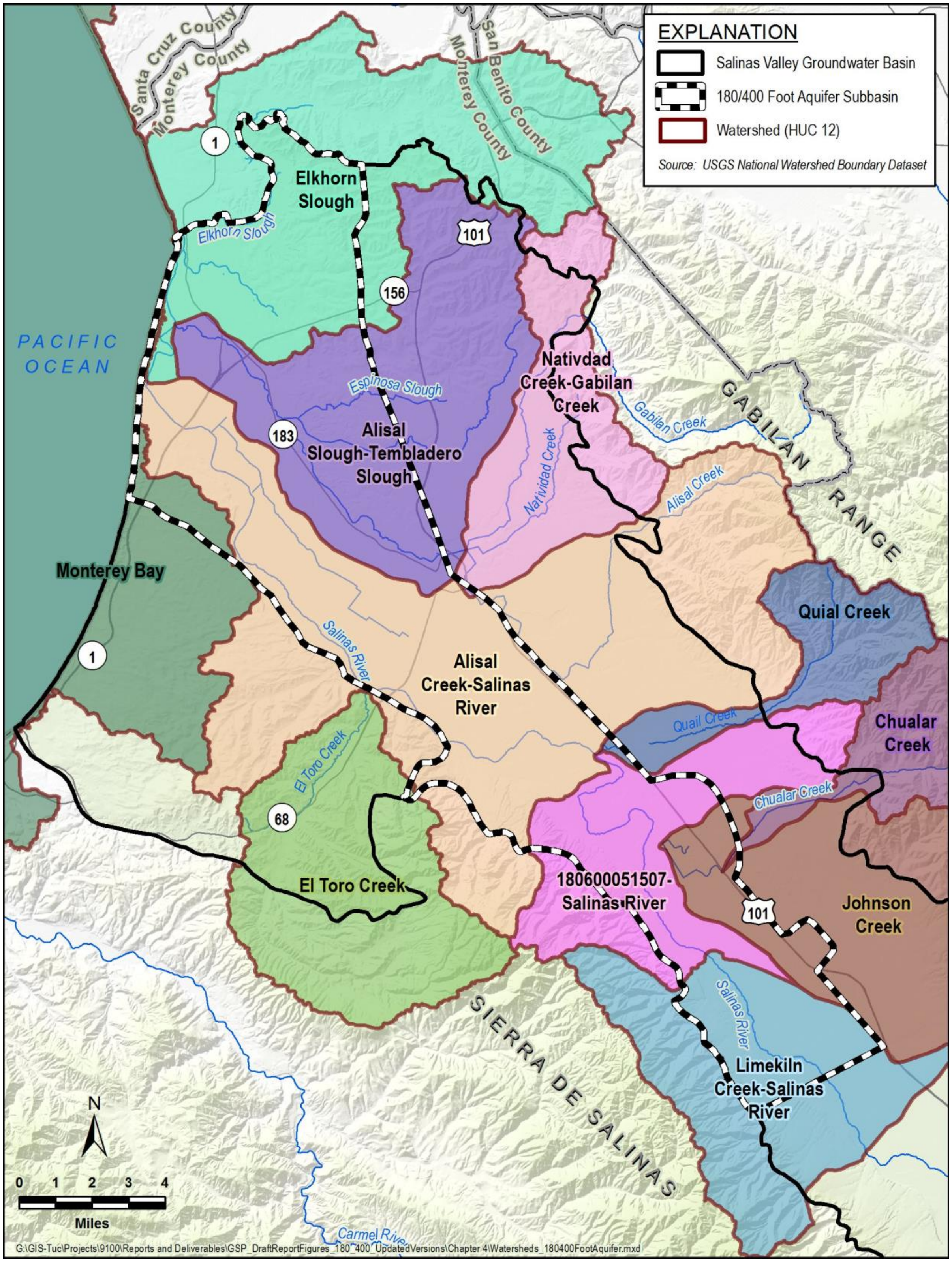


Figure 4-14. HUC12 Watersheds within the 180/400-Foot Aquifer Subbasin

4.10.2 Imported Water Supplies

There is no water imported into the 180/400-Foot Aquifer Subbasin from outside the Salinas River watershed.

4.11 Water Quality

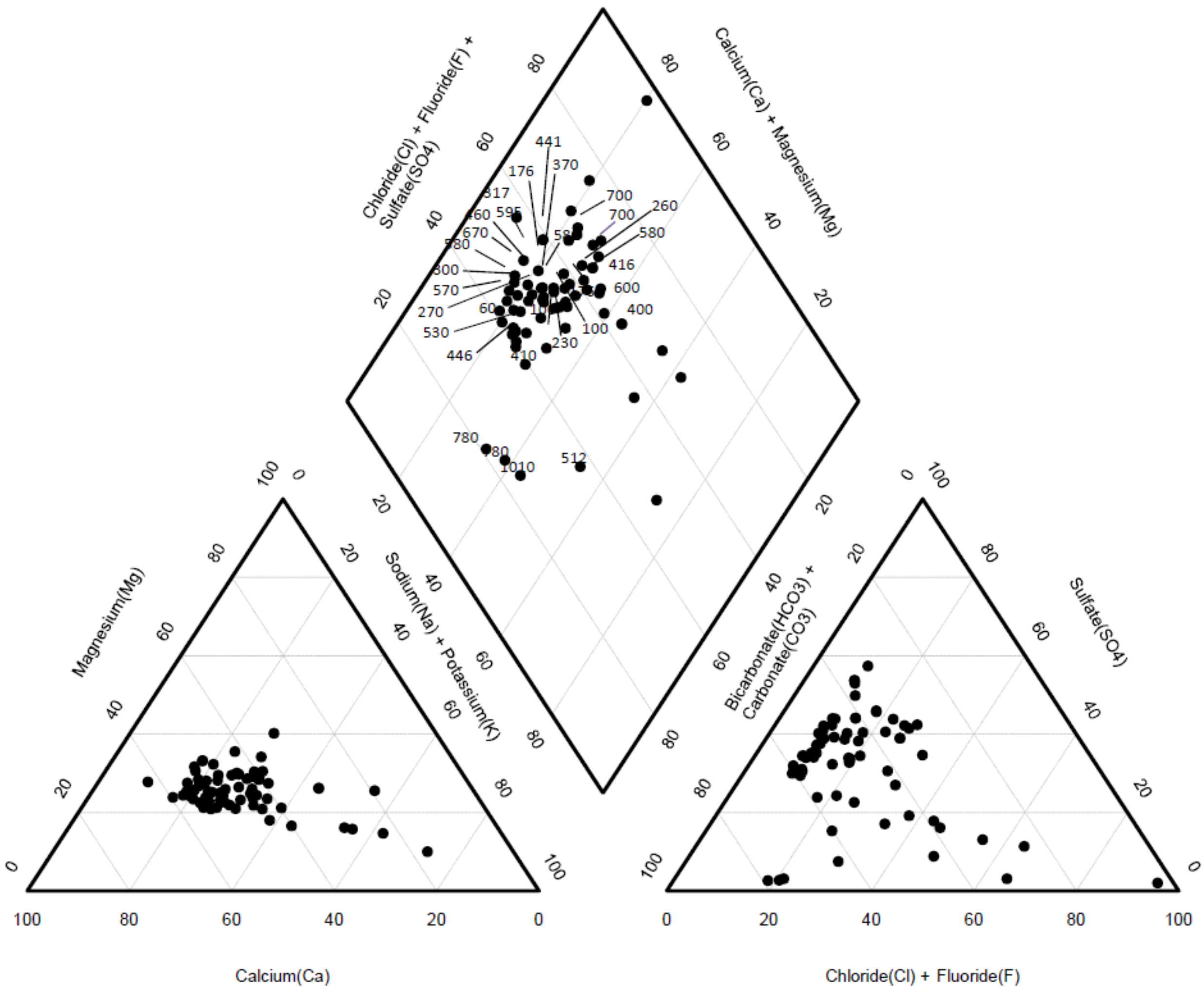
Natural groundwater quality can determine how much treatment may be needed prior to being used for municipal uses, or how the water may impact crop production. This chapter presents a general discussion of the natural groundwater quality in the Subbasin, focusing on general minerals. This discussion is based on data from previous reports. Discussion of the distribution and concentrations of specific constituents of concern (COC) is presented in Chapter 5.

4.11.1 General Mineral Chemistry

The major ion chemistry of the Salinas Valley Groundwater Basin groundwater is summarized on the *Distribution of Groundwater Nitrate Concentrations, Salinas Valley, California* report, prepared for the Central Coast Groundwater Coalition (CCGC) (HydroFocus, 2014). This report was a response to the Central Coast Regional Water Quality Control Board (CCRWQCB) requirement for monitoring elevated nitrate concentrations near drinking water supply wells. The report included the results of extensive groundwater quality sampling and thus provided a good characterization of the Subbasin's general mineral water quality.

General water chemistry provides a baseline of understanding of the water by showing major ions that are dissolved in the groundwater. The major ions that are dissolved can inform users if the water is more alkaline or more acidic. In many areas with more alkaline water, which has more dissolved cations such as calcium, magnesium, and sodium, many users report their water as being 'hard'.

Figure 4-15 presents a piper diagram from the CCGC report that plots major ion data from within and near the Subbasin. The diagram provides a means of representing the proportions of major anions and cations in water samples. The lower left triangle of the piper diagram plots the relative abundance of cations in groundwater samples. The lower right triangle of the piper diagram plots the relative abundance of anions in groundwater samples. The diamond in the middle of the diagram combines the cation and anion abundances into a single plot. Groundwater samples with similar general mineral chemistries will group together on these diagrams. The data plotted on Figure 4-15 show that most groundwater samples are of a similar type and plot in a single cluster. The samples are generally of a magnesium bicarbonate type, which is a more alkaline type of water. However, there are outlier samples that are higher in sodium and potassium than the other samples, and are most noticeable in the dots that plot in the middle and right portions of the cation triangle. Piper diagrams do not provide spatial information about groundwater samples, and therefore it is difficult to assess the source of the sodium and/or potassium in the outlier samples.



Note: Well depths indicated when available.

Figure 4-15. Piper Diagram of 180/400-Foot Aquifer Subbasin Representing Major Anions and Cations in Water Samples (Source: CCGC, 2015)

4.11.2 Seawater intrusion

Groundwater pumping has lowered groundwater elevations to a point that allows seawater to flow into the Subbasin from the Monterey Bay. Increased salt concentrations from seawater intrusion, measured as TDS or chloride concentration, are considered a nuisance for domestic or municipal uses rather than a health or toxicity concern. Additionally, increased salt concentrations from seawater intrusion may impact the ability to use groundwater for irrigation.

The impact of seawater intrusion on the beneficial uses of groundwater occurs at concentrations much lower than that of seawater. The TDS of seawater is approximately 35,000 mg/L. The State of California has adopted a recommended Secondary Maximum Contaminant Level (SMCL) for TDS of 500 mg/L, and a short term maximum SMCL of 1,500 mg/L. Groundwater with total dissolved solids of 3,000 mg/L or less, however, is considered to be suitable, or potentially suitable, for beneficial uses in accordance with SWRCB Resolution No. 88-63 as adopted in its entirety in the Central Coast Regional Water Quality Control Board's Basin Plan. The TDS limit for agricultural use is crop dependent: a 10% loss of yield in lettuce crops has been observed at a TDS of 750 mg/L; a 10% loss of yield in tomatoes has been observed at a TDS of 1,150 mg/L (Ayers and Westcot, 1985).

The current seawater intrusion conditions are described more fully in Chapter 5.

4.12 Data Gaps and Uncertainty of the HCM

Data gaps of the 180/400-Foot Aquifer Subbasin include:

- There are very few measurements of aquifer properties such as hydraulic conductivity and specific yield in the Subbasin, particularly to highlight the differences and connectivity between the principal aquifers.
- The hydrostratigraphy, vertical and horizontal extents, and potential recharge areas for the Deep Aquifers are poorly known.
- Areas of Salinas River recharge and discharge have not been mapped.

These data gaps have led to some minor uncertainties in how the principal aquifers function, and the SVBGSA will minimize these uncertainties by filling data gaps. As described in Chapter 7, the GSP Update will include ongoing data collection and monitoring recommendations that will allow continued refinement and quantification of the groundwater system. Chapter 10 includes activities to address the identified data gaps and improve the HCM.

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