Flooding and Sea Level Rise Work Group Meeting

Santa Clara County
Climate Collaborative

February 3, 2026

Meeting Objectives

- Share Work Group and Santa Clara County Climate Collaborative (SC4) updates
- Learn more about Valley Water Groundwater Study results and implications
- Provide input to develop nature-based solutions training

Agenda

I. **Welcome and Introductions**

II. **Work Group Updates and Priorities**

III. **Valley Water Groundwater Study Overview**

IV. **Nature-Based Solutions Training Development**

V. **Next Steps**

Introductions

Please introduce yourself:

- Name
- Organization
- What was something fun you did over the holidays or so far in the new year?

Work Group Updates and Priorities

SC4 Work Group Updates

Equity in Community (EiCWG) Work Group: Adopted a Governance and Action Plan; next meeting scheduled for February 18 at Veggielution, featuring a panel discussion on food systems and food justice.

Heat and Air Quality Resilience (HAQR) Work Group: Preparing for upcoming funding opportunities (e.g., LCI Extreme Heat and Community Resilience Program); next meeting scheduled for February 25.

Santa Clara Valley Urban Forestry Alliance (SCVUFA): Reviewing 2nd draft of the UFMP; next meeting scheduled for February 18.

Climate Pollution Reduction Grant (CPRG) Work Group: Submitted Comprehensive Climate Action Plan (CCAP) to EPA in December, 2025; next meeting scheduled for March 18.

Resilience Hubs Work Group: Exploring co-location opportunities and site selection; next meeting scheduled for March 3.

Priority Areas Identified in Dec 2025

Develop monitoring metrics

Identify funding opportunities

Collect model policies and guidelines for flood resiliency

Funding and Grant Updates

- SB 1 Track 1 Project Update
- SB 1 Track 2 Funding Opportunity

Member Updates and Sharing

- What are your organization's priorities for the year?
  - How can our Work Group help facilitate this?

Valley Water Groundwater Presentation

Jason Gurdak, Valley Water

Uncertainties and Limitations of Groundwater Emergence Maps for Santa Clara County

Jason Gurdak, PhD, Groundwater Management Unit Manager

Groundwater emergence at Baylands Park

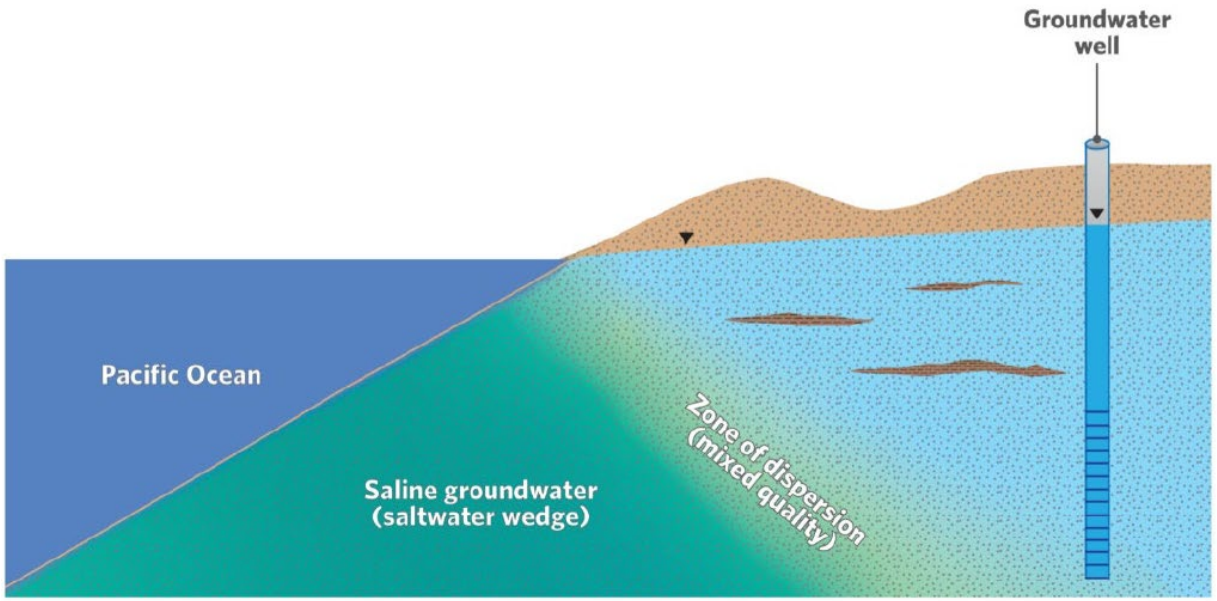
Photo credit: Michael MacWilliams (used with permission)

Valley Water

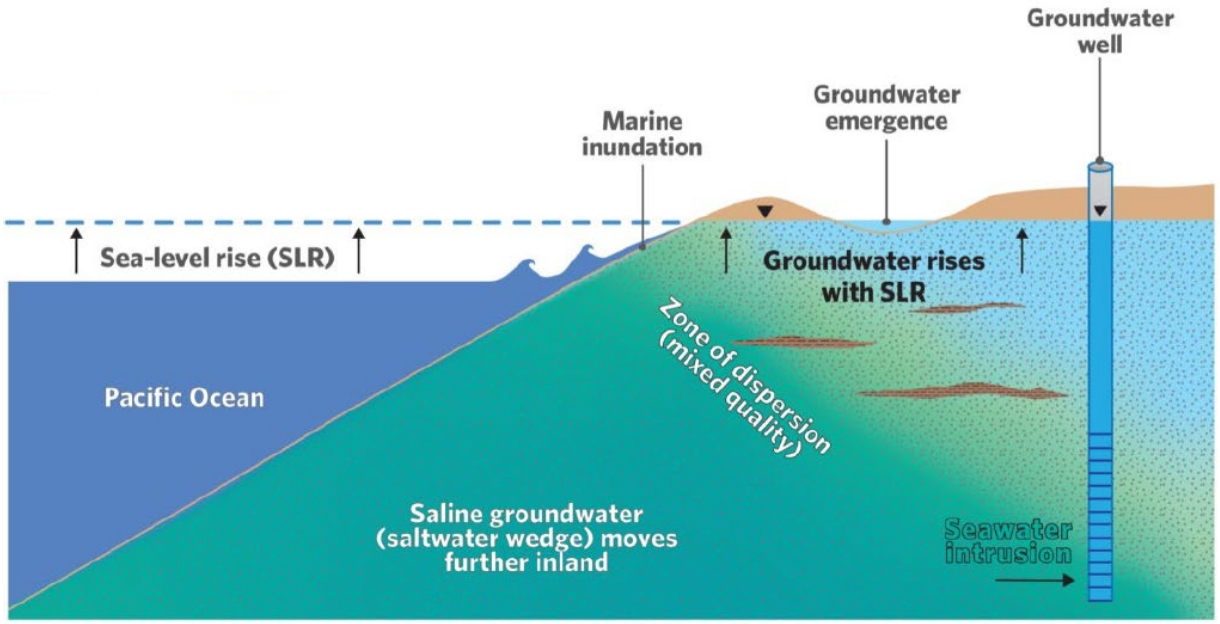
Sea-Level Rise, Seawater Intrusion, & Groundwater Emergence

Generalized coastal unconfined aquifer

No Sea-Level Rise



With Sea-Level Rise



Aquifer
Salt water and mixed quality transition zone
Aquitard
Pacific Ocean
Groundwater table

Valley Water

Previous Studies and News Coverage

2017

Journal of Hydrology: Regional Studies 11 (2017) 234–249

Contents lists available at ScienceDirect

Journal of Hydrology: Regional Studies

journal homepage: www.elsevier.com/locate/ejrh

Sea-level rise and coastal groundwater inundation and shoaling at select sites in California, USA

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Groundwater shoaling
California

ABSTRACT

Study region: The study region spans coastal California, USA, and focuses on three primary sites: Arcata, Stinson Beach, and Malibu Lagoon.
Study focus: 1 m and 2 m sea-level rise (SLR) projections were used to assess vulnerability to SLR-driven groundwater emergence and shoaling at select low-lying, coastal sites in California. Separate and combined inundation scenarios for SLR and groundwater emergence were developed using digital elevation models of study site topography and groundwater surfaces constructed from well data or published groundwater level contours.
New hydrological insights for the region: SLR impacts are a serious concern in coastal California which has a long (~1800 km) and populous coastline. Information on the possible importance of SLR-driven groundwater inundation in California is limited. In this study, the potential for SLR-driven groundwater inundation at three sites (Arcata, Stinson Beach, and Malibu Lagoon) was investigated under 1 m and 2 m SLR scenarios. These sites provide insight into the vulnerability of Northern California coastal plains, coastal developments built on beach sand or sand spits, and developed areas around coastal lagoons associated with seasonal streams and berms. Northern California coastal plains with abundant shal-

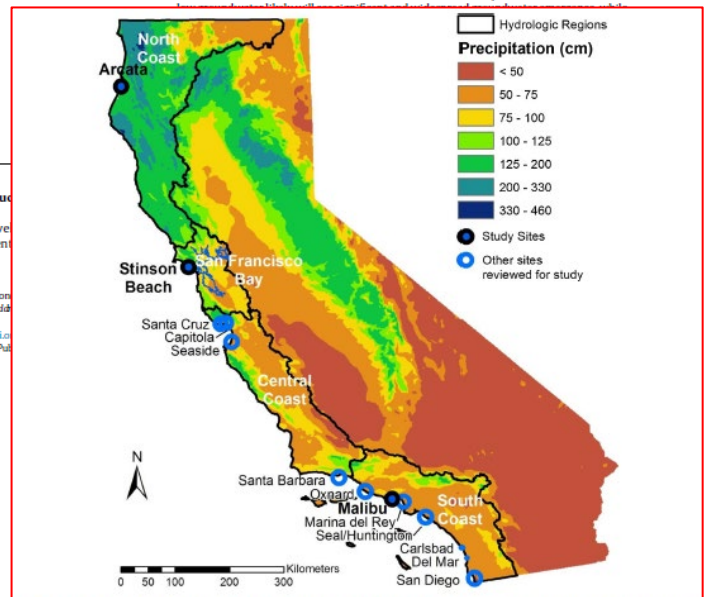

Fig. 1. Map of California showing the 4 coastal hydrologic regions (HRs), study sites and other locations referenced in the text, and average annual precipitation (1981–2010) for the State (https://earthworks.stanford.edu/catalog/stanford-td754wr4701). San Francisco Bay is outlined in blue within its HR.

2019

water

MDPI

Article

A Rapid Assessment Method to Identify Potential Groundwater Flooding Hotspots as Sea Levels Rise in Coastal Cities

Ellen Plane [1,*], Kristina Hill [1,*] and Christine May [2]

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check for updates

Abstract: Sea level rise (SLR) will cause shallow unconfined coastal aquifers to rise. Rising groundwater can emerge as surface flooding and impact buried infrastructure, soil behavior, human health, and nearshore ecosystems. Higher groundwater can also reduce infiltration rates for stormwater, adding to surface flooding problems. Levees and seawalls may not prevent these impacts. Pumping may accelerate land subsidence rates, thereby exacerbating flooding problems associated with SLR. Public agenci
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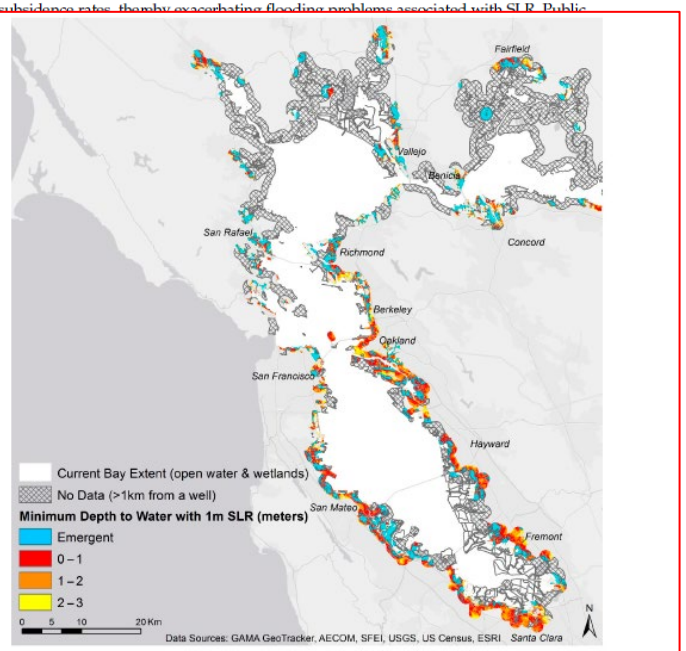

Figure 6. Future groundwater flooding. This map shows areas where groundwater is likely to emerge as surface flooding with 1 m of sea level rise (SLR). However, ponding may not necessarily occur in all of these areas, as the model does not account for surface discharge.

2022 to 2024

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SCIENCE

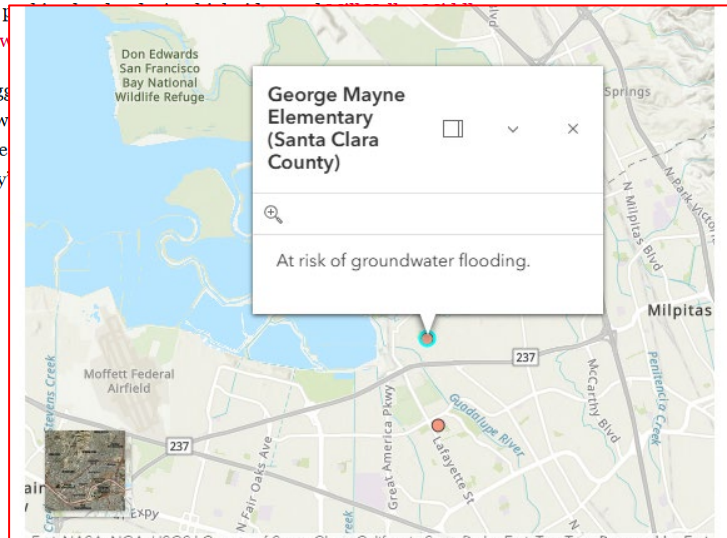
See Which Bay Area Schools Are at Risk From Rising Seas

By Katie Worth, Climate Central; Sirui Zhu, Climate Central; Ezra David Romero, KQED Aug 5, 2024 Save Article

Fifty-two Bay Area public schools sit so close to the bay's high-tide line that they're already at risk of being inundated with ocean and ground water, and their risk will grow as seas continue to rise, according to an analysis by KQED and Climate Central.

Some schools already cope with routine floods, like Marin County's Redwood High School, which has installed a pump to keep its p
School, w

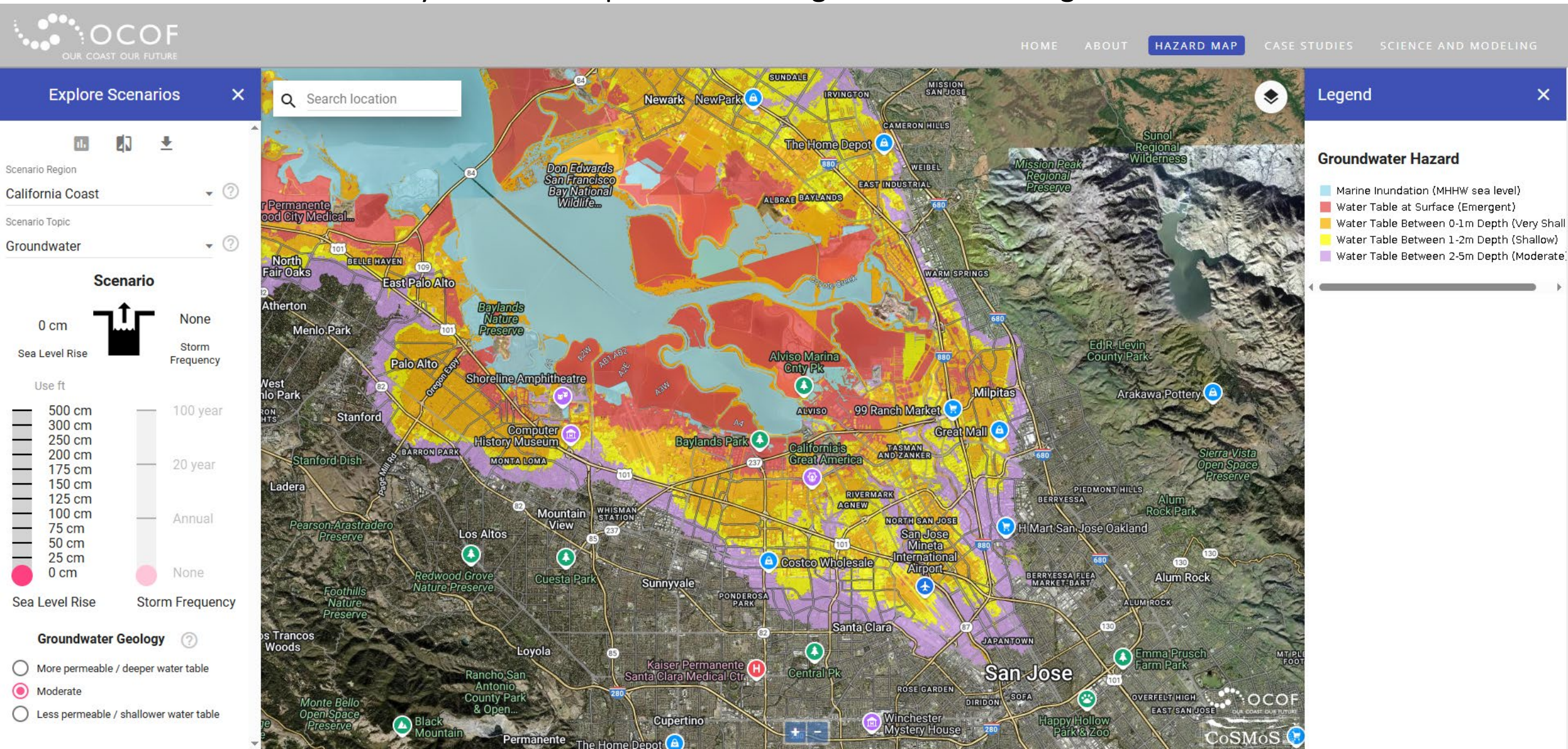
"The bigg
groundw
high tide
Berkeley'



(Map produced by Matthew Green/KQED)

Example: Groundwater Emergence Map

Why does the map overestimate groundwater emergence? https://ourcoastourfuture.org/hazard-map/



Study Purpose & Scope

Local Groundwater Management Agency:

1. Advance understanding of tides, seawater intrusion, and sea-level rise on groundwater rise and emergence at land surface, focus on shallow aquifer near the Bay

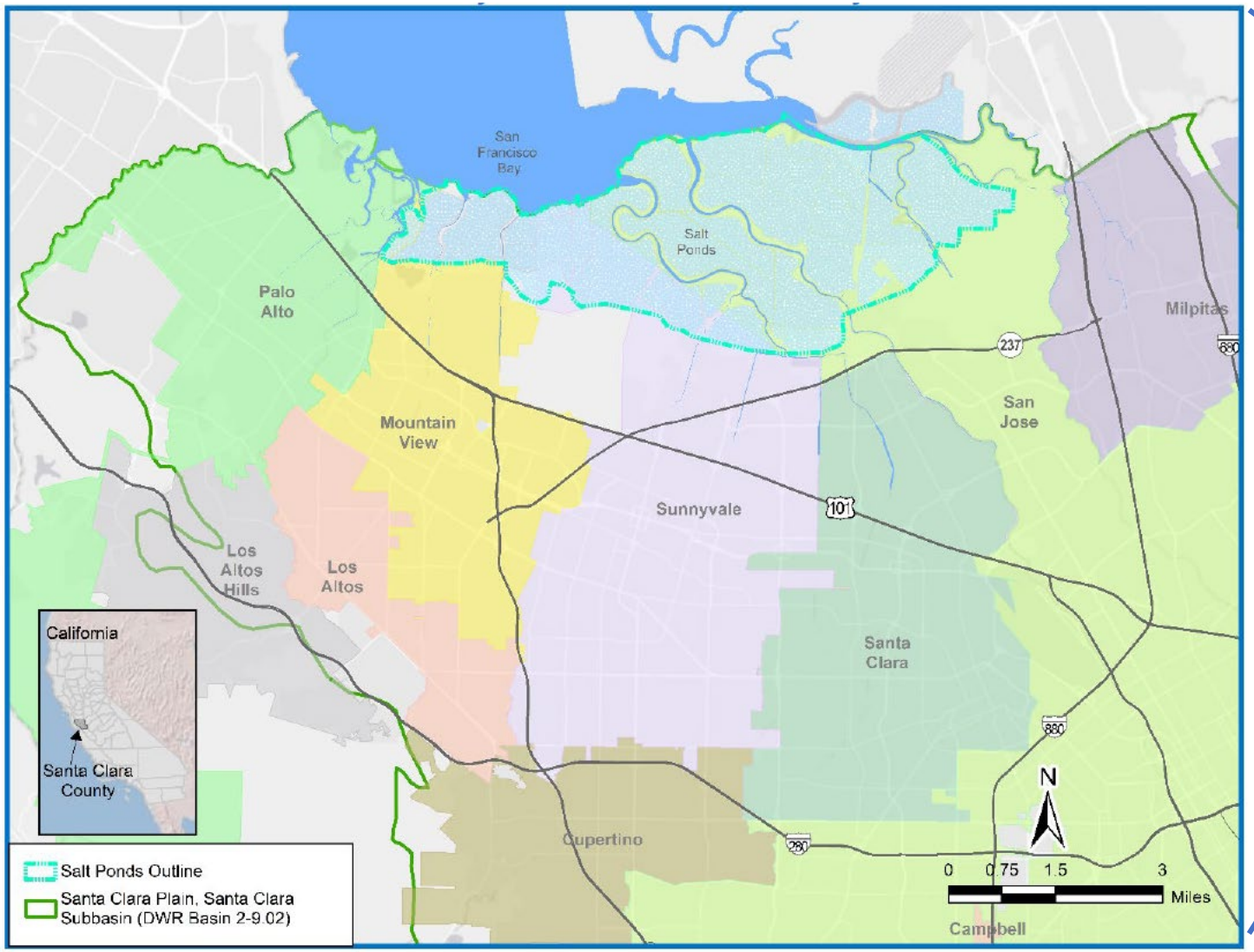
2. Create maps of existing and future groundwater rise and emergence

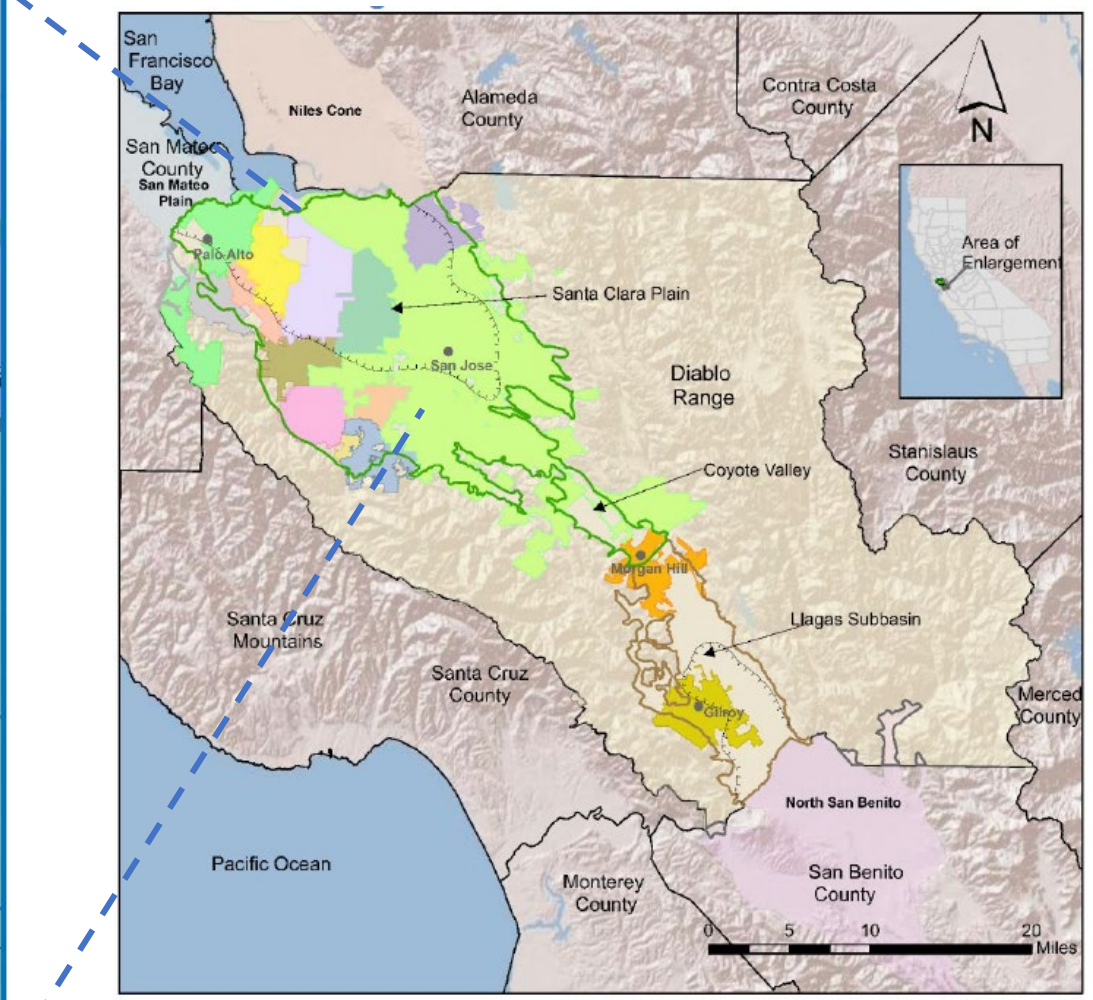
3. Fact Sheet: non-technical overview for the public and policymakers and
   Report: technical details for groundwater science, engineering, and management practitioners

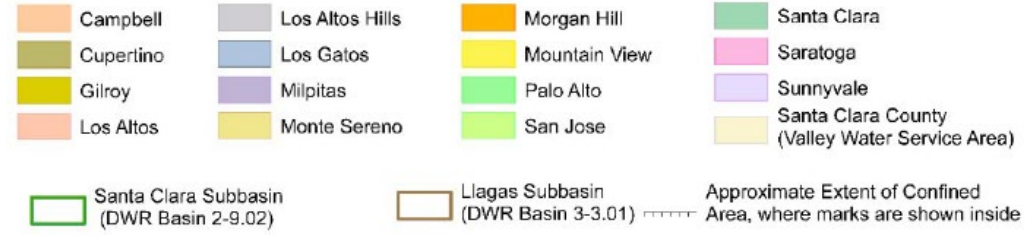
Today's presentation:

- Inherent uncertainties, limitations, and appropriate use of groundwater rise and emergence maps to help communities make best-informed decisions

Study Area: Santa Clara Subbasin



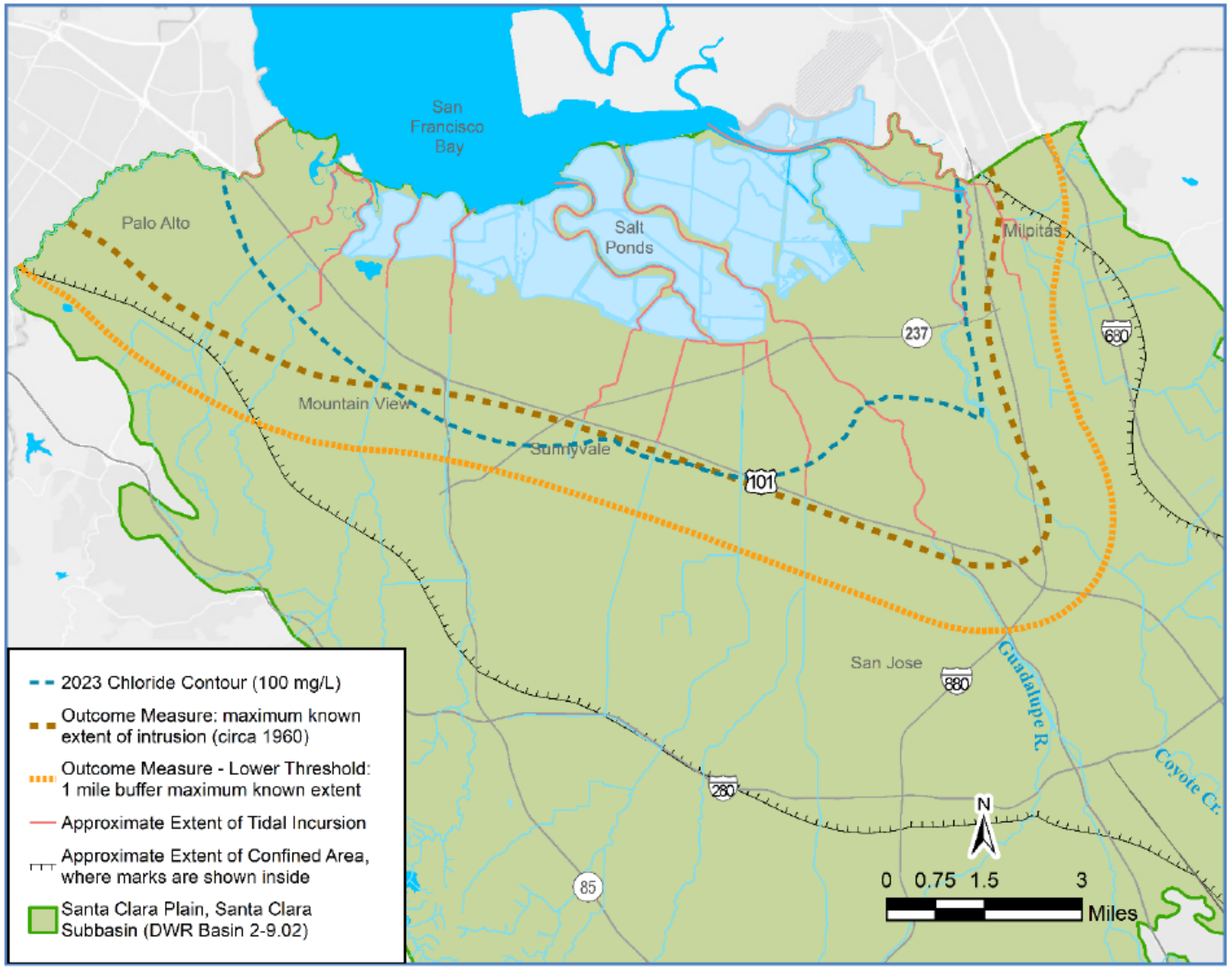




Valley Water

SGMA Alternative Plan

Seawater Intrusion Outcome Measure: 100 mg/L chloride isocontour area



Study Approach & Methods

1. Monitoring networks

2. Hydrogeologic Conceptual Model

3. Tidal analysis – (not covered today)
   - Inland extent of tidally influenced streams and groundwater levels and quality
   - Takeaway: Tidal pressure waves propagate rapidly through groundwater levels

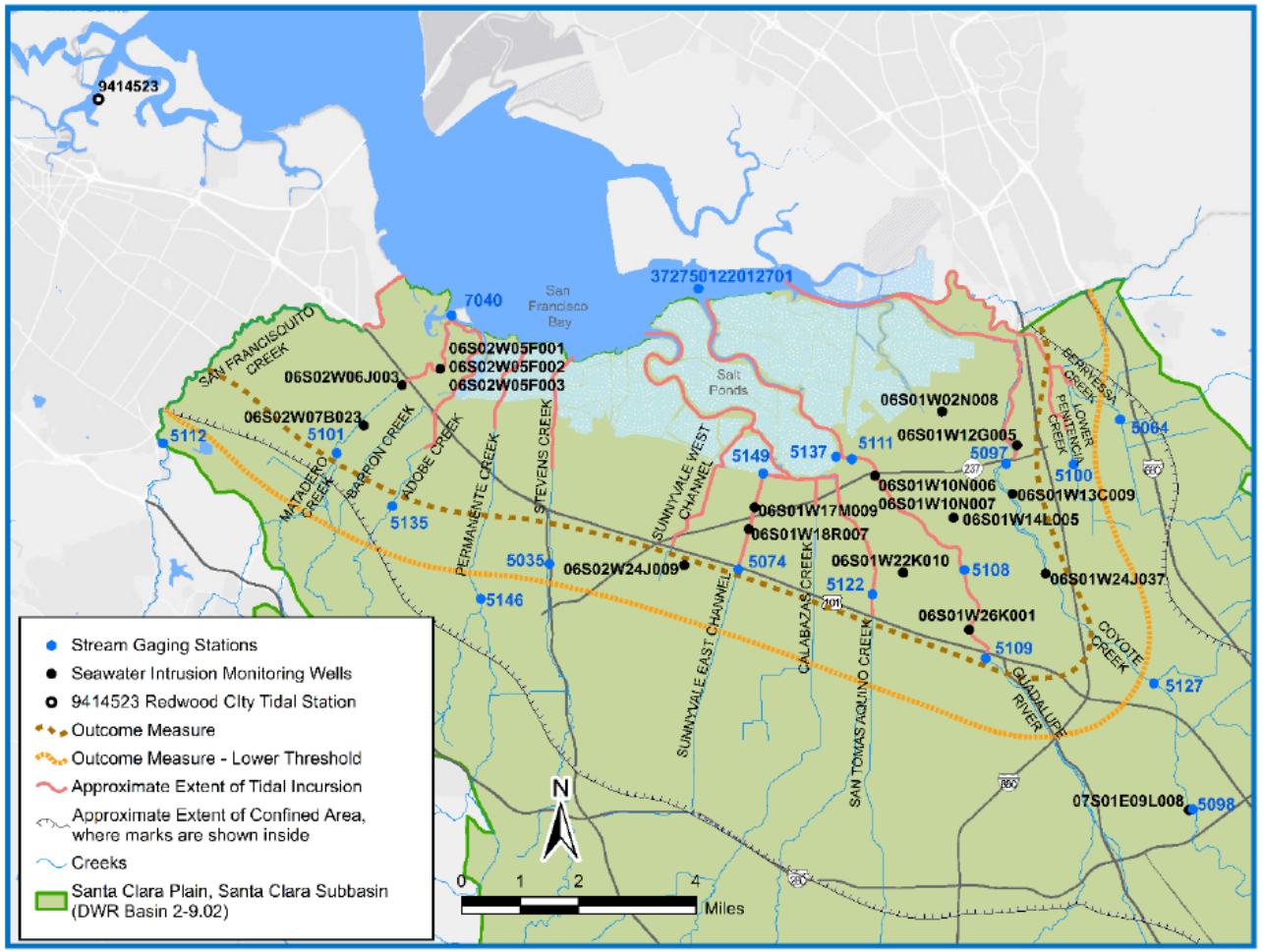
4. Maps of existing and future groundwater rise and emergence
   - Followed previous studies GIS approach and assumptions:
     - Linear (1:1) response between sea-level rise and groundwater rise & emergence
   - Advancements:
     - Validation w/ independent groundwater levels & king tide field observations
     - Evaluated interpolation methods

Monitoring Networks & Hydrogeologic Conceptual Model

Stream gaging stations, seawater intrusion monitoring wells, and tide station

Shallow semi-/confined aquifer average conditions:

- Aquifer depth & thickness: 54 & 12 feet
- Overlying clay thickness: 46 feet



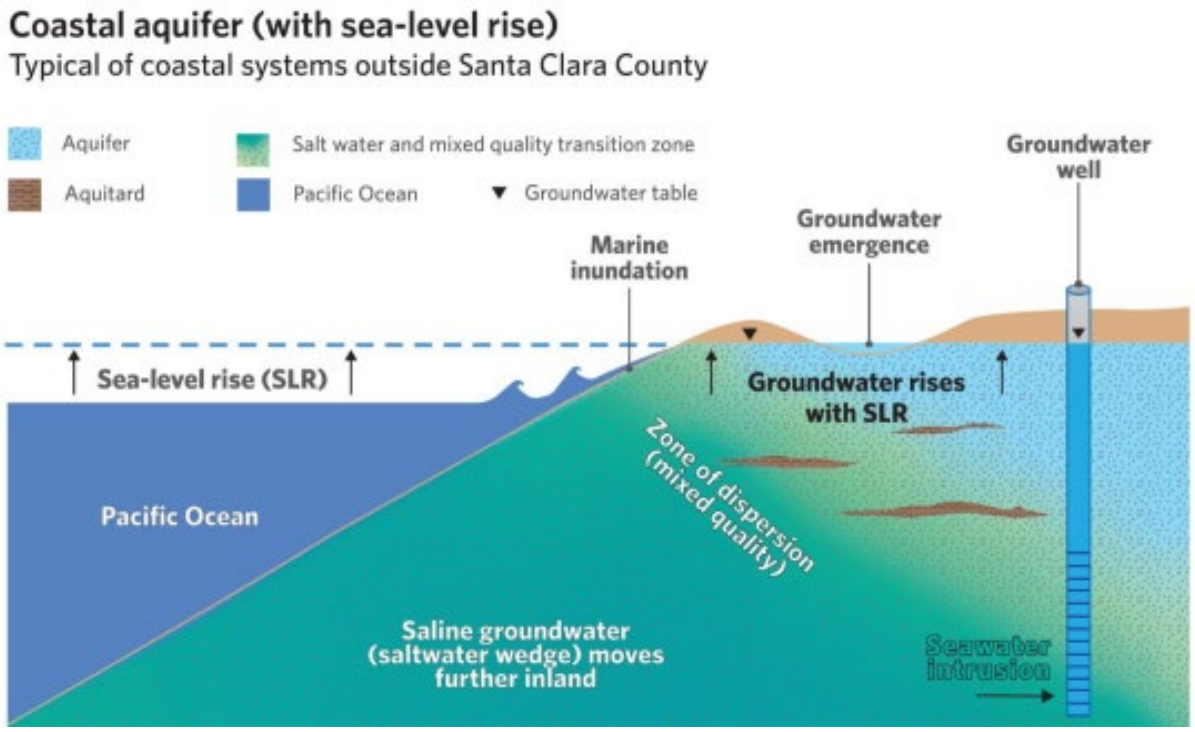
Bay mud

Regional aquitard and thick clay layers

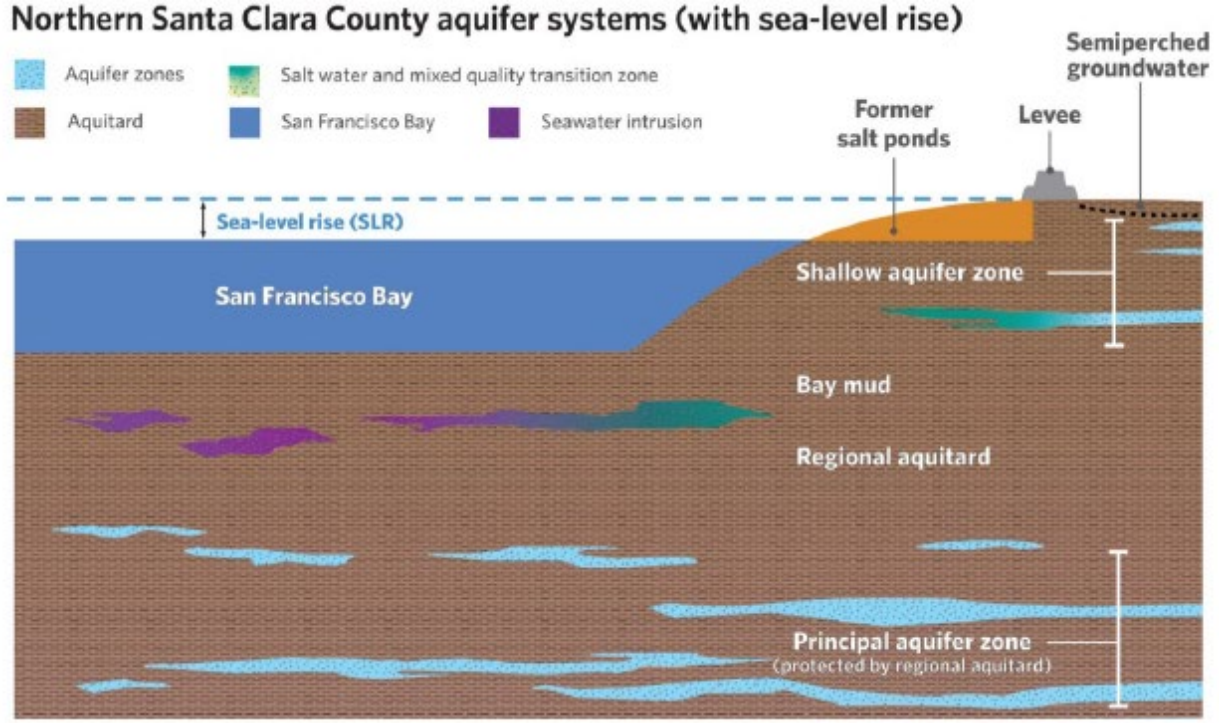
Aquifers Not Connected to the Bay

- Primary reason maps overestimate groundwater emergence:
  - Semi-/confined aquifers separated by Bay mud and thick clay layers
  - Monitoring wells: potentiometric surface (not water table) used to create maps

Previous Studies Assume:
Unconfined aquifer connected to the Bay and 1:1 response with SLR and groundwater rise

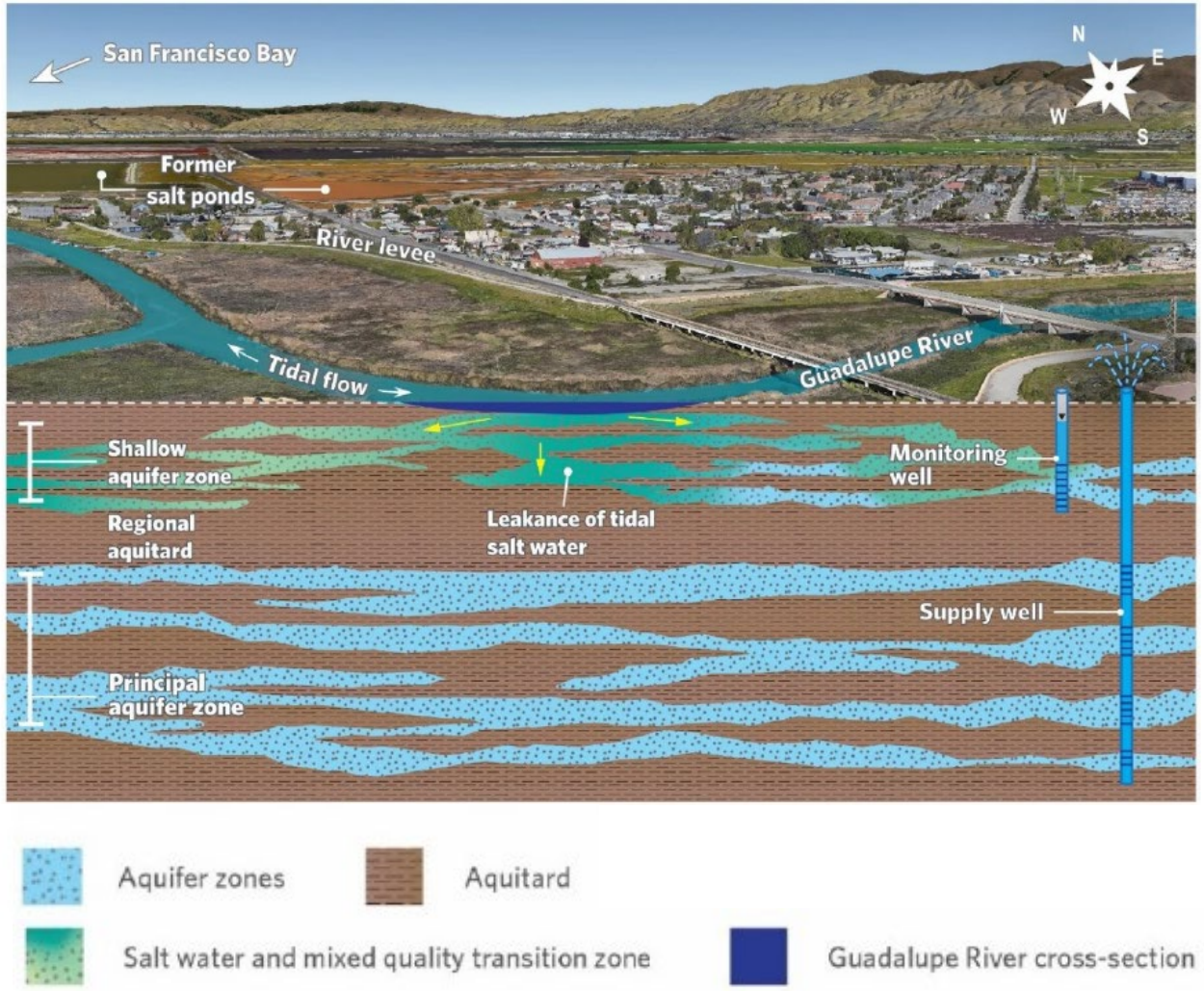


Hydrogeologic Conceptual Model:
Thin, discontinuous semi-/confined aquifers not connected to the Bay:

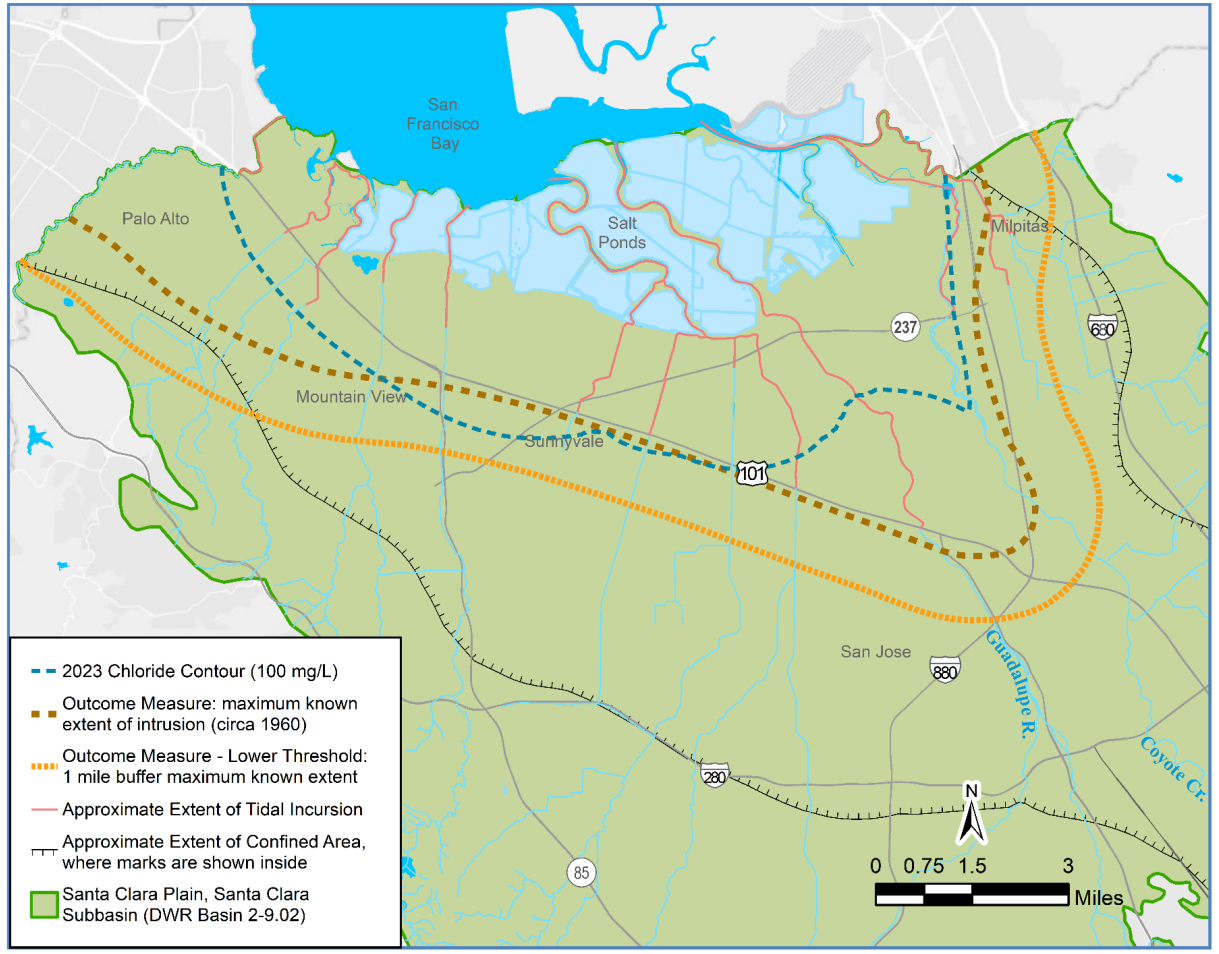


Seawater Intrusion from Tidal Streams

Saltwater leakance from tidal streams is dominant seawater intrusion mechanism



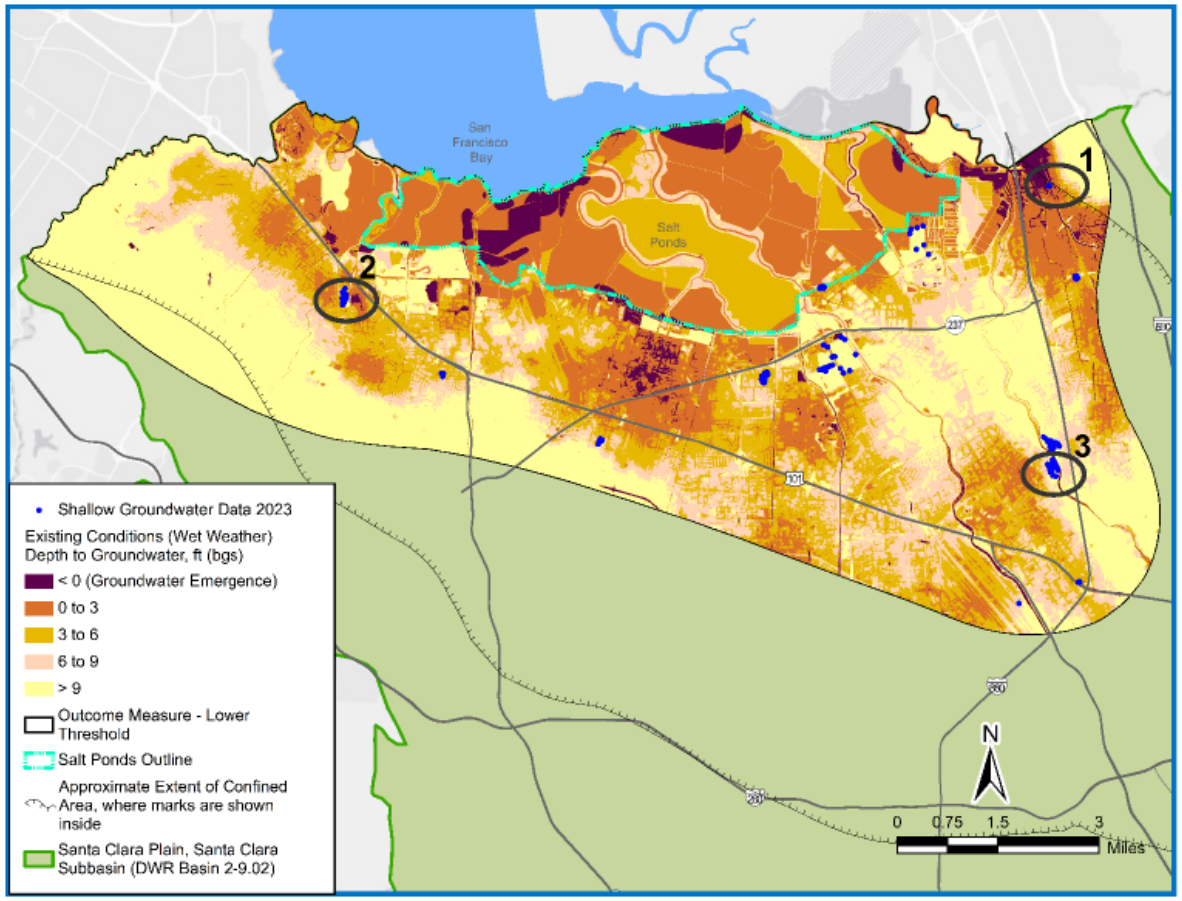
Tidal extent coincides with historical, maximum extent of seawater intrusion



Map of Existing Conditions & Validation

Map of existing shallow and emergent groundwater:

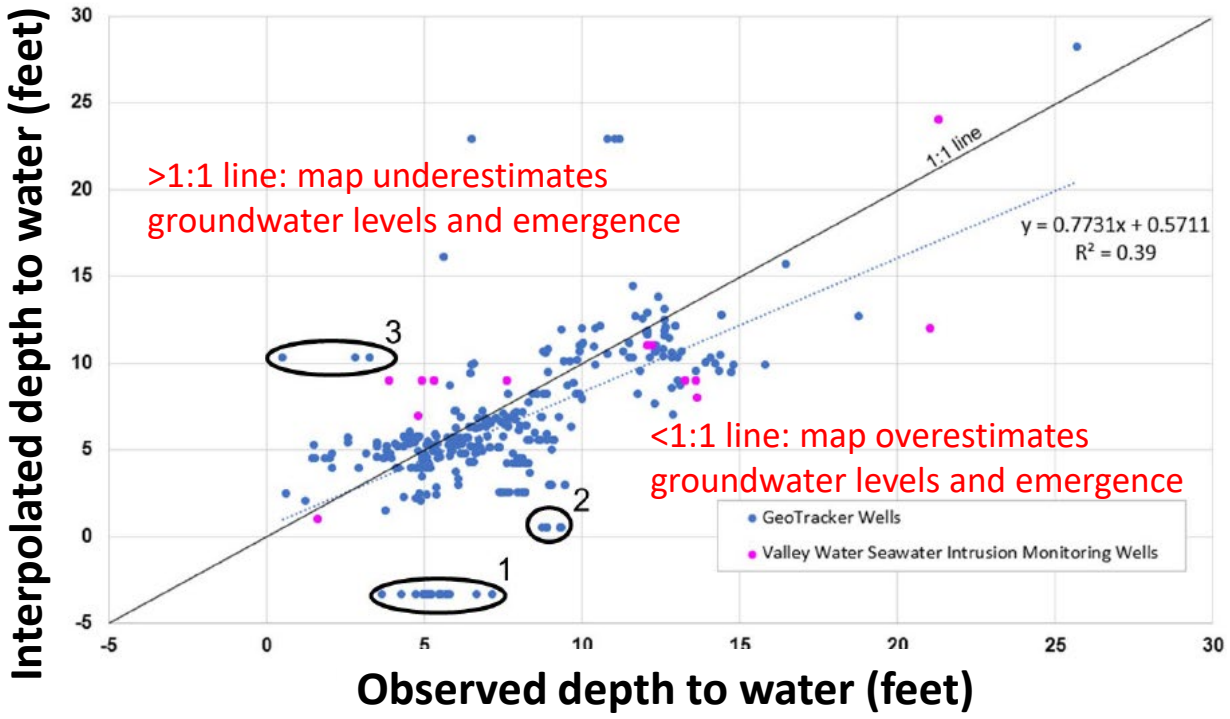
- Temporal composite of highest observed groundwater levels (2000 to 2020), interpolated with spline method
- Theoretical highest-case scenario for shallow groundwater



Notes: Wells in circles 1, 2, and 3 correspond to the data points in circles 1, 2, and 3 in Figure C-6. This figure is modified from Figure C-1.

70% of 317 independent validation wells indicate map overestimates observed groundwater levels & emergence:

- Based on 2023 groundwater levels



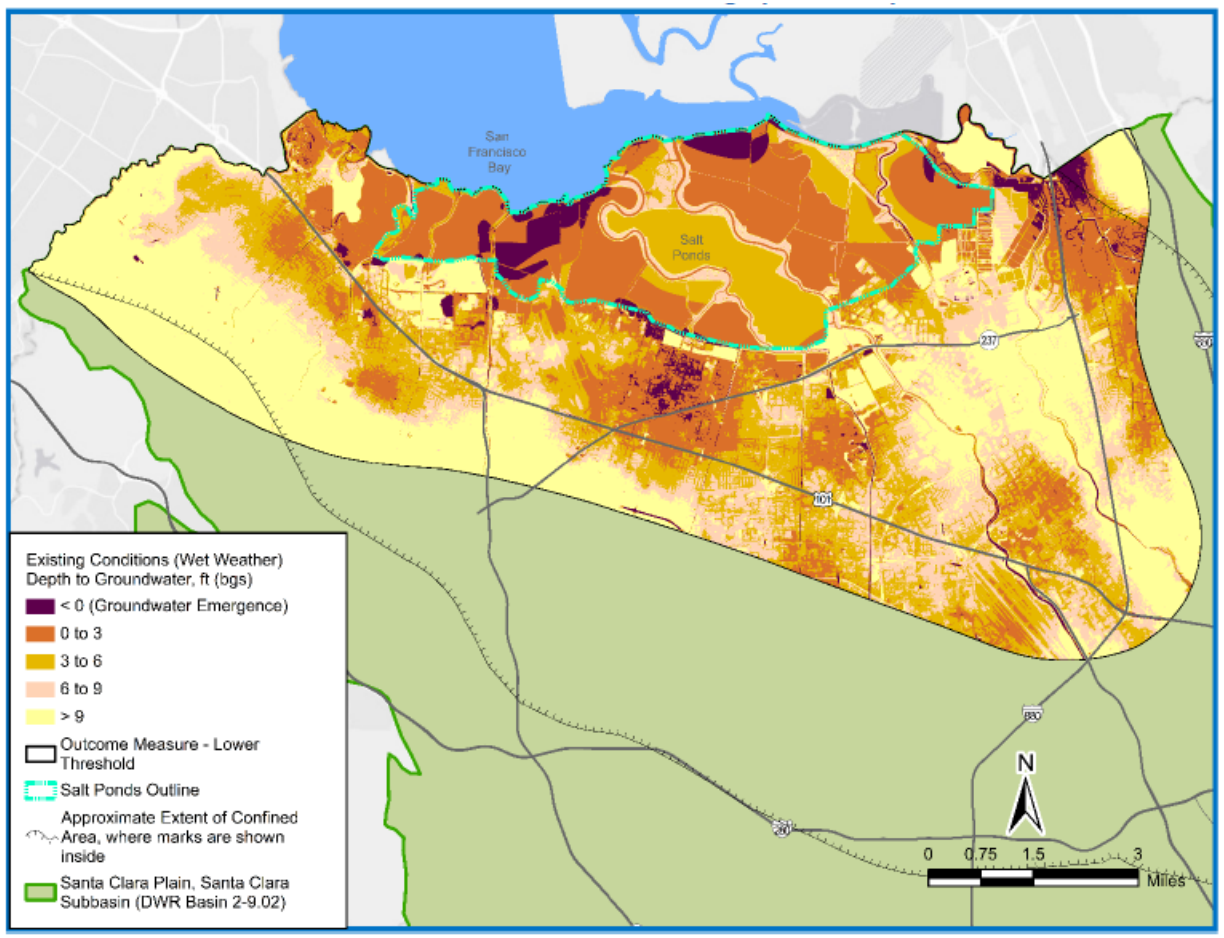
Major Findings

Interpolation Methods Matter

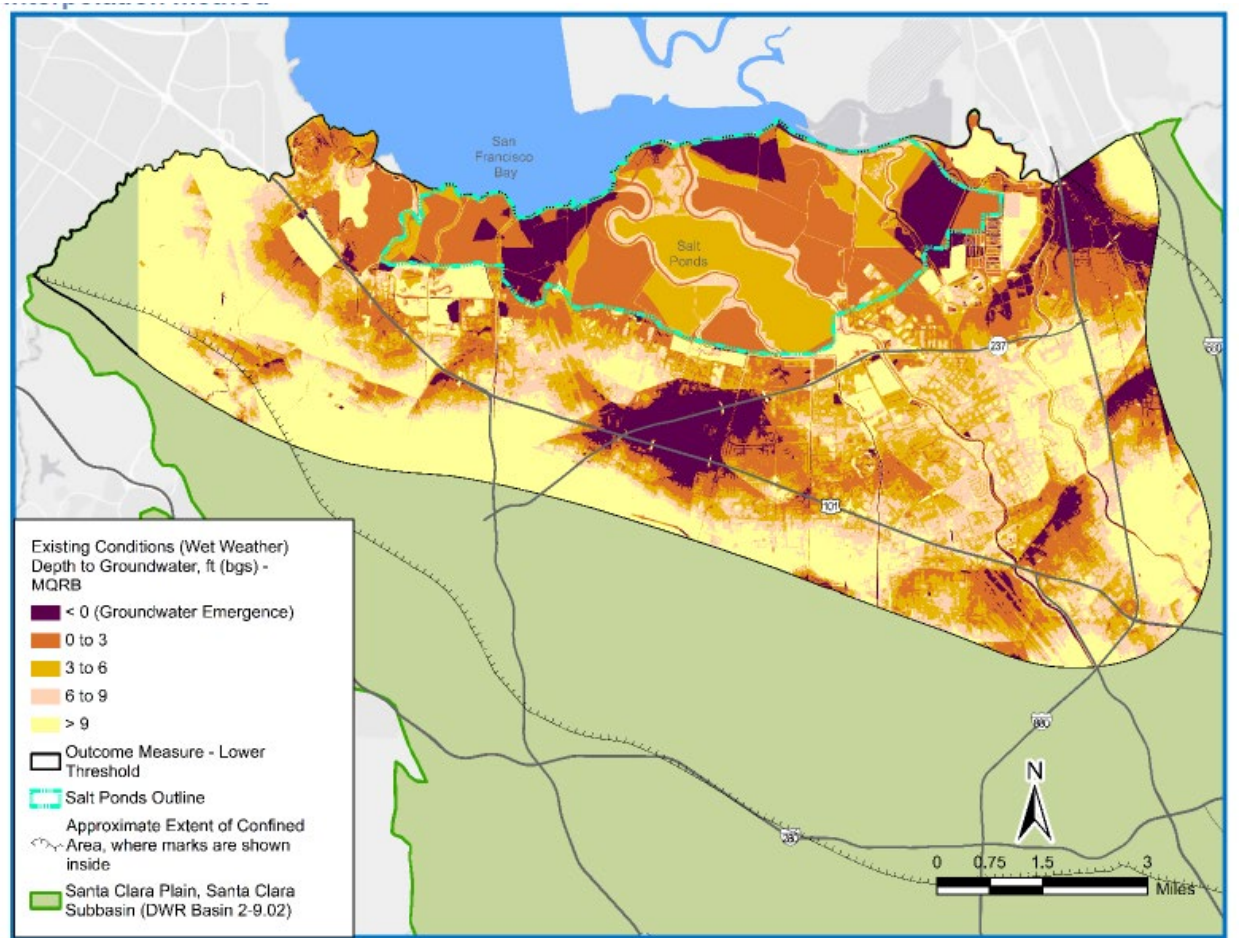
Recommend spline interpolation as best practice.

Interpolated groundwater emergent area (outside salt ponds):

Spline: 1.7 square miles



MQRB: 5.3 square miles

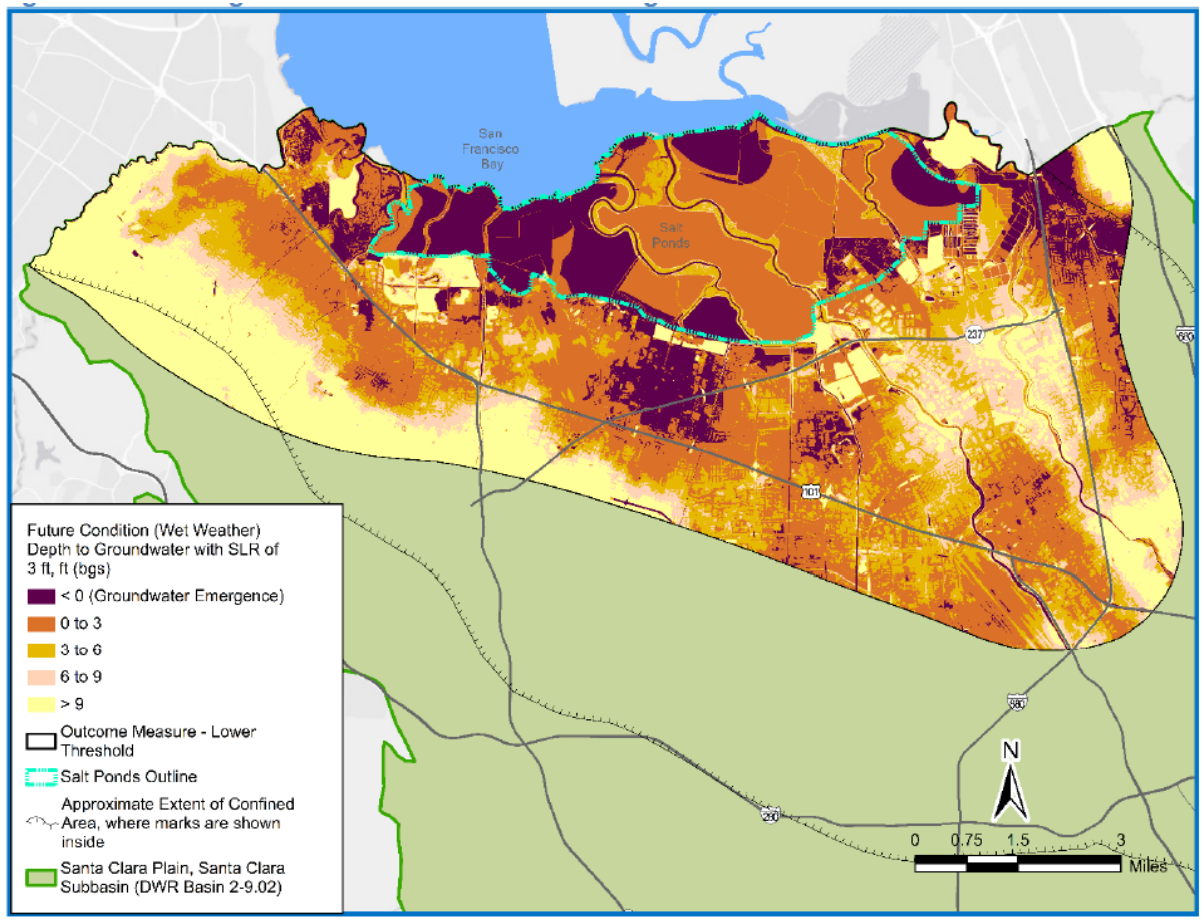


Future Conditions from Sea-Level Rise

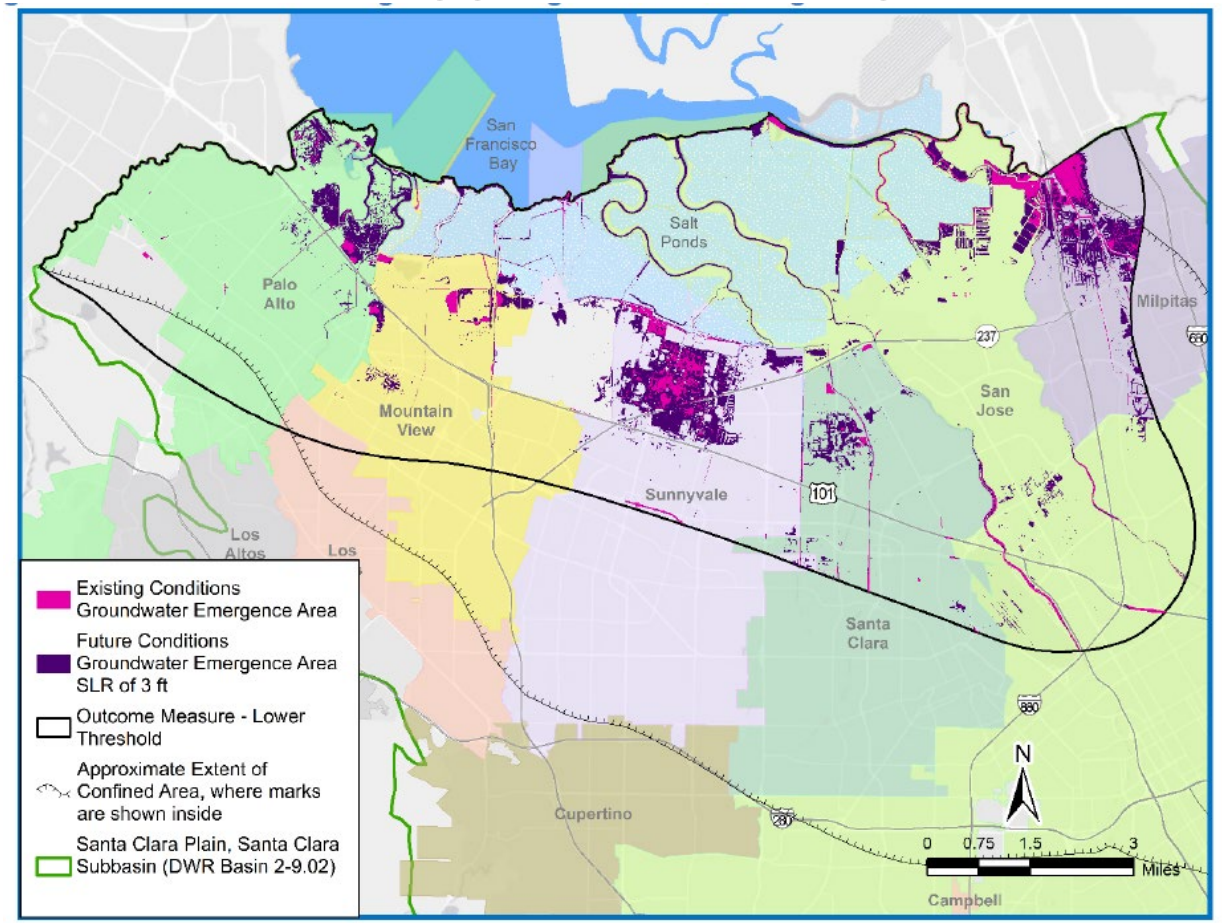
Assume 1:1 response between sea-level rise scenarios (0.5 to 6.5 ft) and groundwater rise.

- Reality - local hydrogeology restricts this response

3.0 feet of sea-level rise



Expansion of areas mapped (interpolated) as existing groundwater emergence

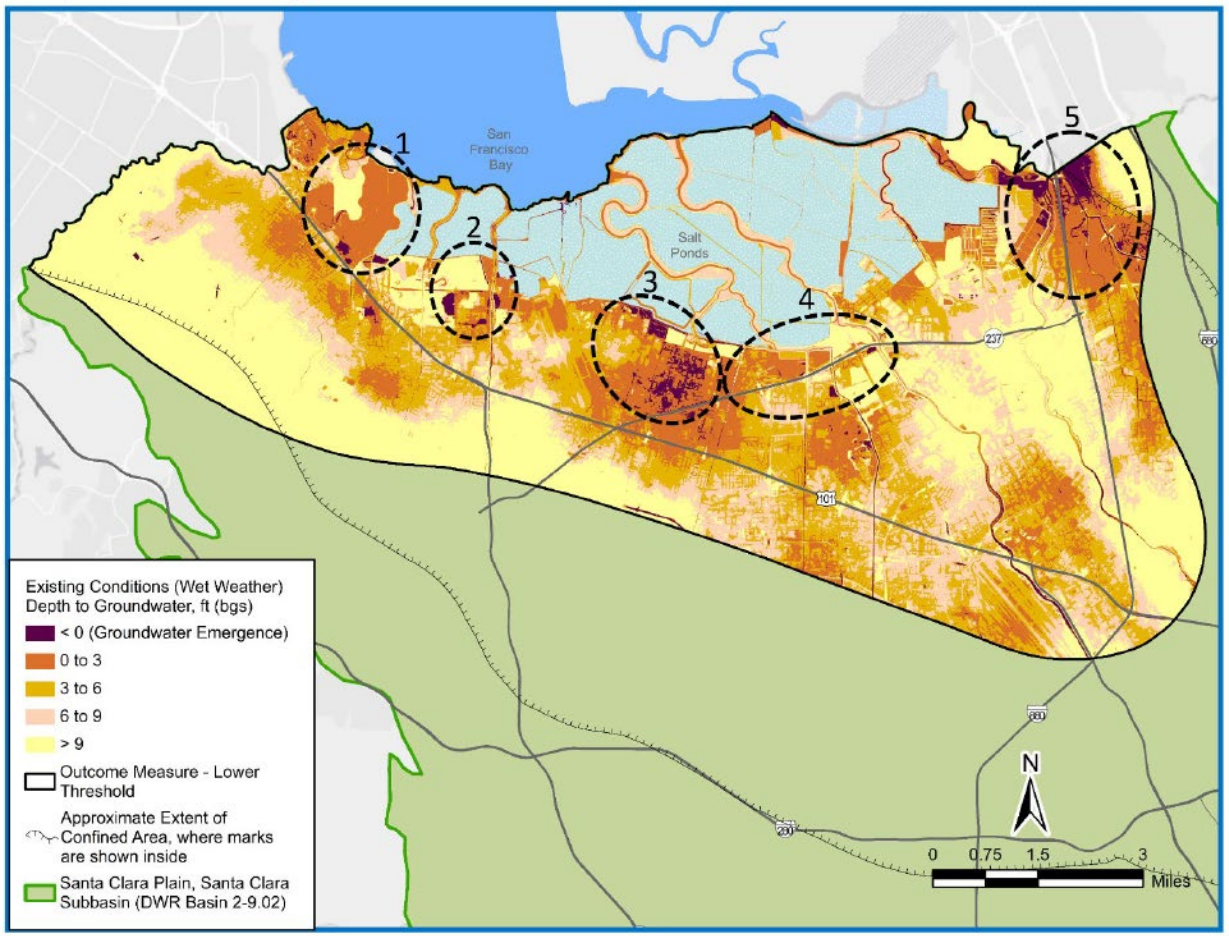


Field Validation: King Tide Observations

Maps overestimate groundwater rise and emergence:

- Only 33% (14 of 42) of sites (**<0.2 mi²**) had emergence during Jan and Feb 2024 king tides
- Only 2% (1 of 42) had emergence during Nov 2024 king tides

5 areas observed during 3 king tides in 2024:



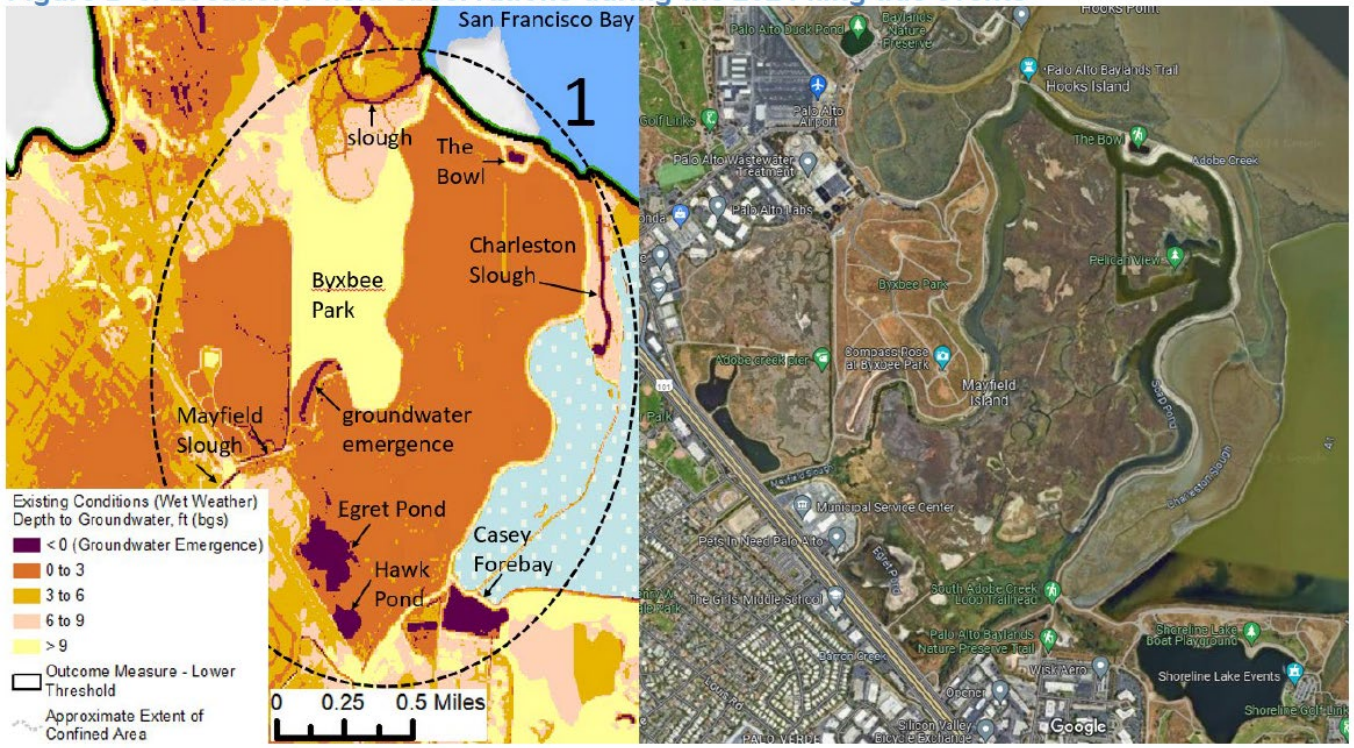
Summary of field observations at 42 locations within 5 areas (Jan and Feb 2024 king tides):

Results of Field Observations	All 42 Areas Mapped as having Groundwater Emergence						
	Location 1	Location 2	Location 3	Location 4	Location 5	Total	
Confirmed groundwater emergence	1	0	0	2	0	3 (7%)	14 (33%)
Suspected groundwater emergence	3	3	1	2	2	11 (26%)	
Direct connection to surface water or Bay	4	1	1	6	7	19 (45%)	28 (67%)
No evidence of groundwater emergence	0	4	1	0	4	9 (22%)	
Total	8	8	3	10	13	42 (100%)	

Example: Location 1 - King Tide Observations

Appendix D in study report

Figure D-6. Location 1 field observations during the 2024 king tide events



Area Name	Existing Highest Groundwater Condition Map (from Figure 4-9)	Field Observations of Groundwater Emergence During King Tides	Area of Field Confirmed or Suspected Groundwater Emergence (square miles)	Land Surface Elevation (feet above mean sea level)
Location 1				
south of Byxbee Park	groundwater emergence	confirmed	0.004	below sea level
Egret Pond		suspected	0.030	
Hawk Pond			0.007	
The Bowl			0.002	
Mayfield Slough		surface water connection	--	
Casey Forebay				
Charleston Slough				
slough				

Valley Water

Valley Water's New Monitoring Network

Monitor and evaluate the tidally driven groundwater emergence areas

- Monitoring current emergence: a window into future conditions

Conclusions for Santa Clara County

Current conditions:

- SWI and groundwater rise & emergence are not substantial or widespread concerns
- Groundwater rise follows seasonal and annual patterns in rainfall and tides
- Groundwater emergence is localized near the Bay, where:
  - Land elevation below sea level, in undeveloped lands, open spaces, wildlife preserves

Future conditions with sea-level rise:

- Expect more permanent groundwater emergence and expansion at current locations
- Groundwater emergence: years to decades before marine inundation & shoreline overtopping

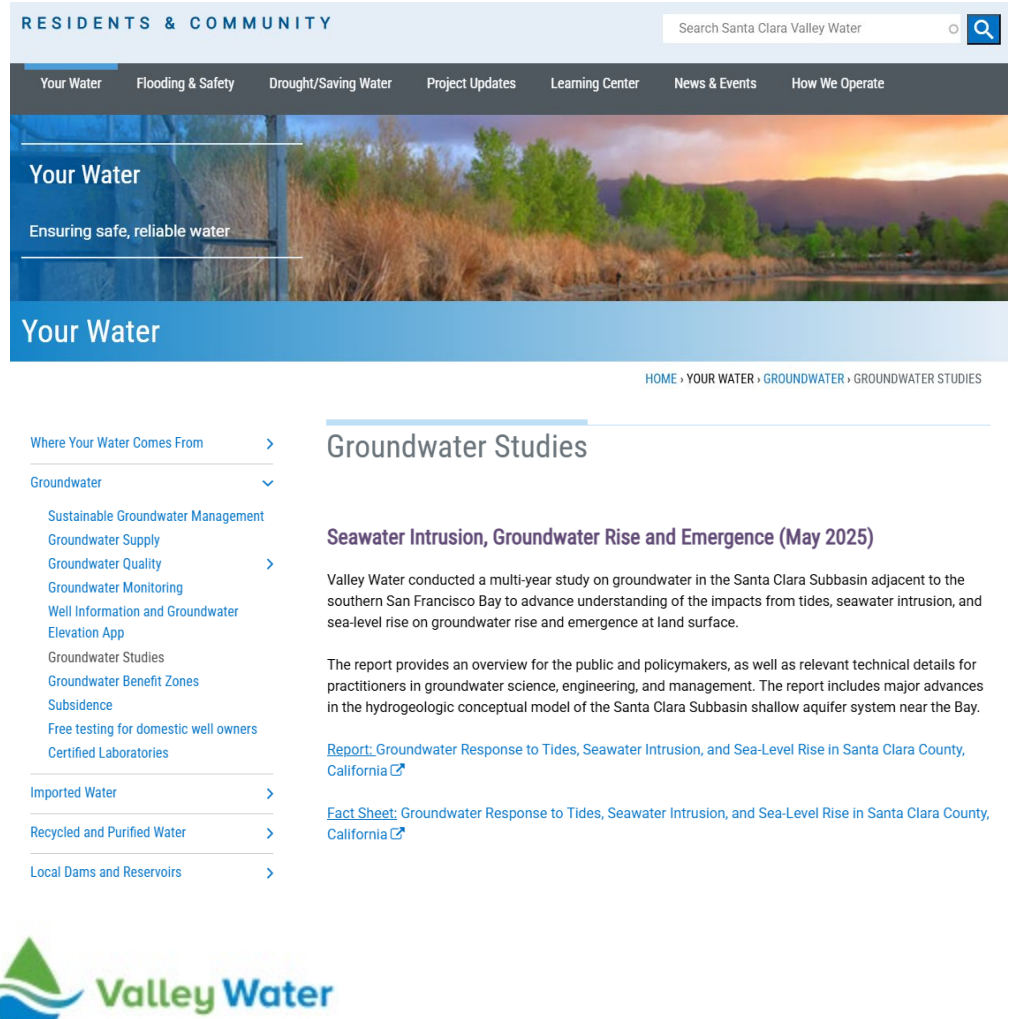
Recommendations for planning:

- Groundwater emergence maps tend to overestimate current and future conditions
- Do not rely solely on these maps for important planning decisions
  - Use Valley Water's map as a starting point (see Appendix D for specific locations)
  - And conduct site specific hydrogeologic investigations and/or emergence monitoring

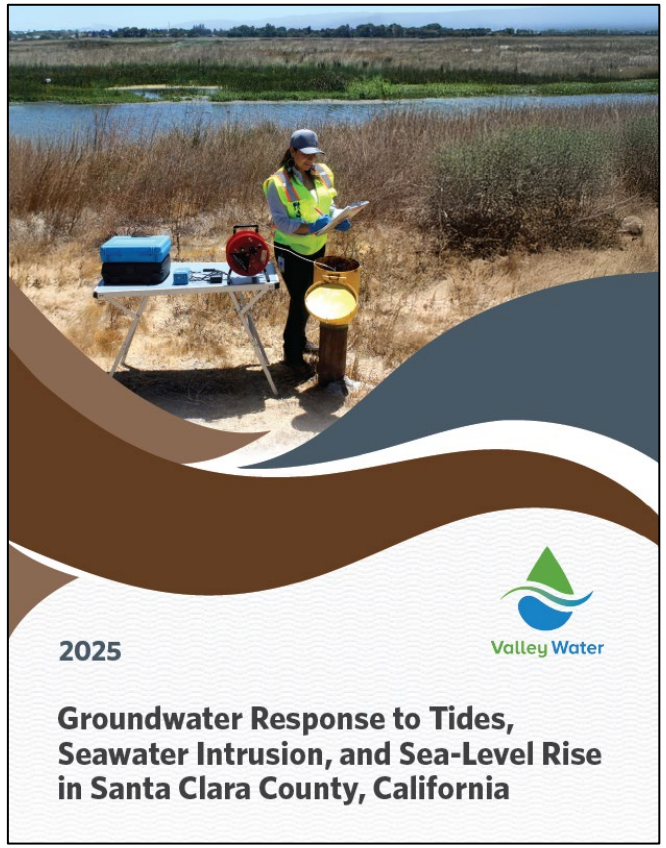
More Information

https://www.valleywater.org/your-water/groundwater/groundwater-studies

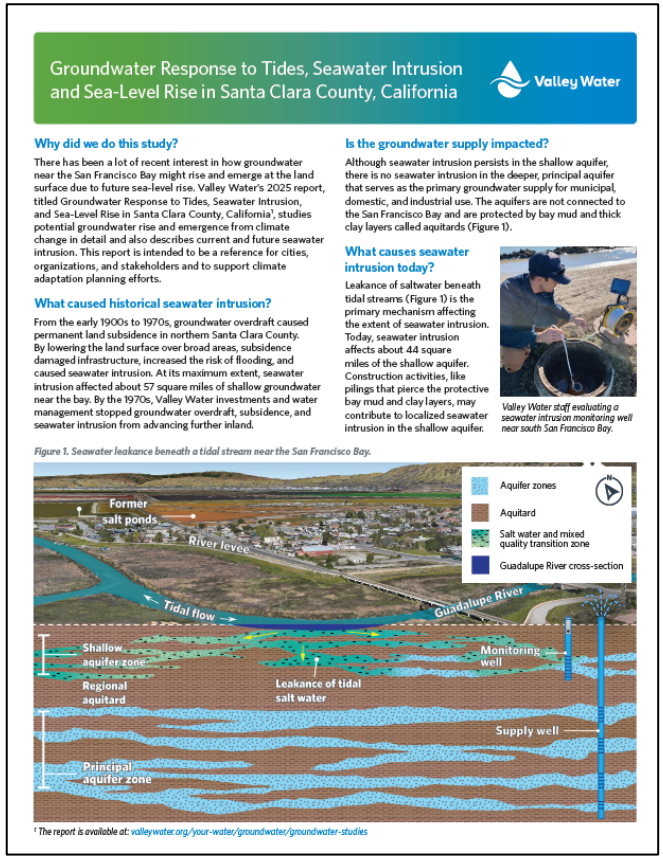
Jason Gurdak: jgurdak@valleywater.org



Report



Fact Sheet



Valley Water

QUESTIONS

Valley Water

Nature-Based Solutions Training Development

ReScape

Nature Based Solutions (NbS) Training

Flooding and Sea Level Rise Work Group Meeting

3 February 2026

Welcome - Introductions

Nature based Solutions (NbS) - *approaches that work with and enhance nature to address societal challenges while providing human well-being and biodiversity benefits.*

Welcome - Introductions

Nature based Solutions (NbS) practices create cycles of mutually reinforcing benefits. They restore ecosystems, revitalize communities, re-center economic activity on life-serving projects and enterprises. They value nature and culture. They develop projects and ventures that create multiple regenerative value streams.

Our Vision

Diverse Workforce Training

Climate Equity

Advocacy & Policy

Our work, education, policy and thinking/activities are based on a **nature-based and whole systems** foundation of one input effecting the whole.

Meeting Objectives

1. Introduce the NbS Training Project
   - *Assessment Survey* of Jurisdictions & Community
   - Create Curriculum
   - Offer Training in April 2026

2. Review Assessment Survey

3. Get Your Feedback

NbS Training: Project Goals

- Demystify NbS and green infrastructure for diverse audiences
- Build comfort and capacity for implementing and maintaining nature-based projects
- Support cross-jurisdictional NbS projects for climate resilience
- Address flooding and extreme heat hazards through practical solutions - Engage both public agencies and community-based organizations

NbS Training: Core Curriculum Modules Overview

Module 1: NbS Fundamentals Through Regenerative Lens - *Watershed dynamics, NbS role in climate adaptation through the 8 Regenerative Principles, California policy context, and interactive watershed mapping exercises.*

Module 2: Community-Centered Regenerative Implementation - *Environmental justice, equitable resilience planning, community engagement using ReScape's equity framework, and role-playing exercises for community-led NbS planning.*

Module 3: Regenerative Green Infrastructure Solutions - *Bioretention systems, permeable pavements, urban forests, living shorelines, carbon sequestration through street trees and green roofs, applying 8 Principles locally.*

Module 4: Policy and Planning using NbS Practices - *Regenerative land use policies, Green Stormwater Infrastructure requirements, multi-benefit funding strategies, cross-jurisdictional collaboration, and policy development exercises.*

Module 5: Design, Implementation, Monitoring & Regenerative Maintenance - *Project planning, installation best practices, regenerative monitoring across 8 Principles, long-term maintenance strategies, adaptive management protocols, and implementation exercises.*

Current NbS Experience

"What NbS projects related to sea level rise and flooding are you currently working on or aware of in your jurisdiction?"

Implementation Barriers

"What are your biggest obstacles to implementing NbS projects?" (Technical knowledge, funding, maintenance, coordination, etc.)

Interactive Discussion: Your Needs & Priorities

Community Engagement & Environmental Justice

"How does your organization currently approach engagement and what would strengthen your efforts?"

Maintenance & Long-Term Stewardship

"What are your biggest concerns/needs or questions about maintaining NbS over time?"

Next Steps:
Complete Survey

Contact: Milena Fiore
milena@rescapeca.org

Meeting Wrap Up

Next Steps

- Complete NbS Training Survey
- Next Meeting: April 7
- Slides and agenda available on SC4 website after post meeting email is sent: Work Group Resources