SANTA CRUZ MID-COUNTY GROUNDWATER SUSTAINABILITY PLANNING

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

Advisory Committee Meeting #12

Wednesday, October 24, 2018, 5:00 – 8:30 p.m.
Simpkins Family Swim Center, Santa Cruz

Welcome and Introductions

- Groundwater Sustainability Plan (GSP) Advisory Committee
- Staff
- Public

Meeting Objectives

- Receive update on work of the Groundwater Modeling Technical Advisory Committee.
- Review and discuss groundwater modeling results for sustainability strategies:
  - Understand what we can learn from the results.
  - Evaluate results against Minimum Thresholds and Measurable Objectives.
  - Provide Advisory Committee feedback on Sustainable Management Criteria to inform next modeling iteration.
- Review federal and state statutory and regulatory framework governing potential Groundwater Sustainability Plan (GSP) management actions and projects related to water quality, and discuss staff proposal for groundwater quality sustainable management criteria.

Agenda

5:00	Welcome, Introductions, Objectives, Agenda, GSP Project Timeline, and Project Updates
5:10	Oral Communications
5:20	Update on Groundwater Modeling Technical Advisory Committee efforts
5:50	Groundwater Modeling Results for Sustainability Strategies
6:30	*Break*
6:45	[Continued] Groundwater Modeling Results for Sustainability Strategies
7:20	Public Comment
7:30	Groundwater Quality
8:10	Public Comment
8:20	Confirm September 26, 2018 Advisory Committee Meeting Summary
8:25	Recap and Next Steps
8:30	*Adjourn*

GSP Project Timeline and Iterative Process

GSP Project Timeline – Phase 2

Santa Cruz Mid-County Basin
Groundwater Sustainability Plan Process Overview — July–December 2018

2018 — PHASE 2: GSP ADVISORY COMMITTEE POLICY DEVELOPMENT

7/18 8/18 9/18 10/18 11/18 12/18

Phase 2b. July – December 2018: Projects, Management Actions and Groundwater Modeling

July 19, 2018 *(Joint Advisory Committee/MGA Board Meeting)*
- Discuss projects and management actions and how they relate to GSP.

August 22, 2018
- Describe groundwater model and what goes into the model, including discussion of assumptions for historic and predictive simulations.
- Discuss groundwater modeling results for sample projects and management actions; evaluate project impacts against minimum thresholds.

September 26, 2018
- Discuss model results – pumping impacts by use type and location.
- Review proposed minimum thresholds for chronic lowering of groundwater levels.
- Discuss proposal for developing measurable objectives.

October 24, 2018
- Present groundwater modeling results for sustainability strategies; evaluate results against minimum thresholds and measurable objectives.
- Review of federal and state statutory and regulatory framework governing potential GSP management actions and projects related to water quality.

November 15, 2018
- MGA Board meeting only (no Advisory Committee meeting).

December 12, 2018
- Discuss next iteration of groundwater modeling results.
- Discuss projects and management actions, and measurable objectives for analysis (e.g., cost allocation, legal issues) in 2019.
- Revisit sustainability goal.
- Discuss management areas.

7/18 8/18 9/18 10/18 11/18 12/18

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

Share

Project Updates

Oral Communications

Item 3. Model TAC Efforts

Recommendation to Use Catalog Climate for Climate Change Scenario

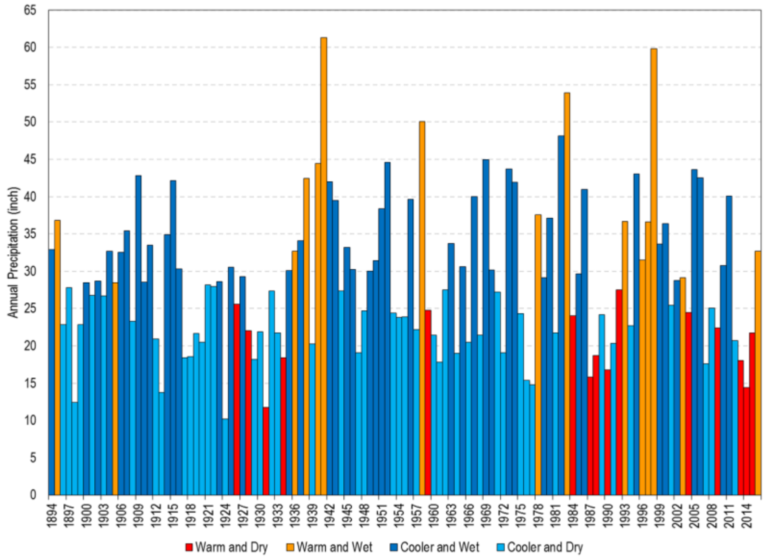
Recommendation to Update Sea Level Rise Projection

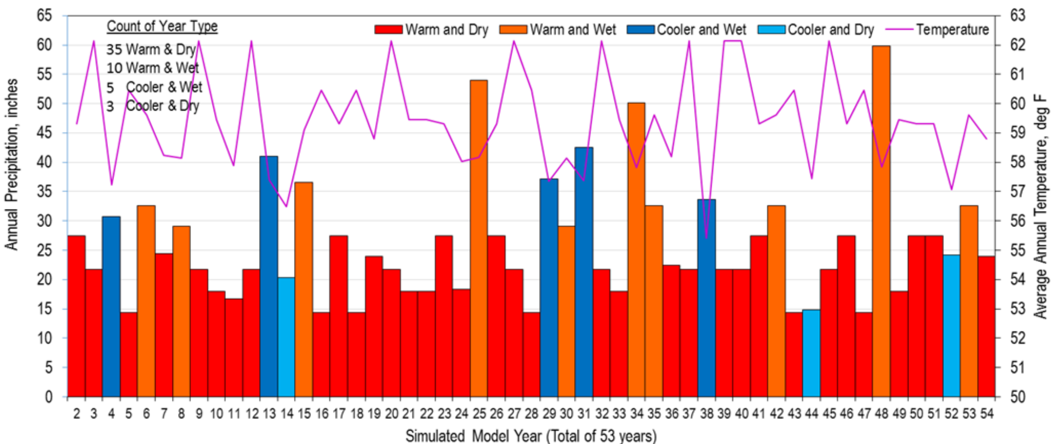
Model Technical Advisory Committee

- Bruce Daniels, Soquel Creek WD
  - Ph. D. in hydroclimatology
  - Board President
- Andy Fisher, UC Santa Cruz
  - Professor, hydrogeology
- Barry Hecht, Balance Hydrologics
  - Surface water-groundwater interactions
  - Certified hydrogeologist
- Brian Lockwood, Pajaro Valley WMA
  - Certified hydrogeologist
  - General Manager
- Robert Marks, Pueblo Water Resources
  - Certified hydrogeologist
  - Consultant to City of Santa Cruz

Climate Based on Historical Catalog

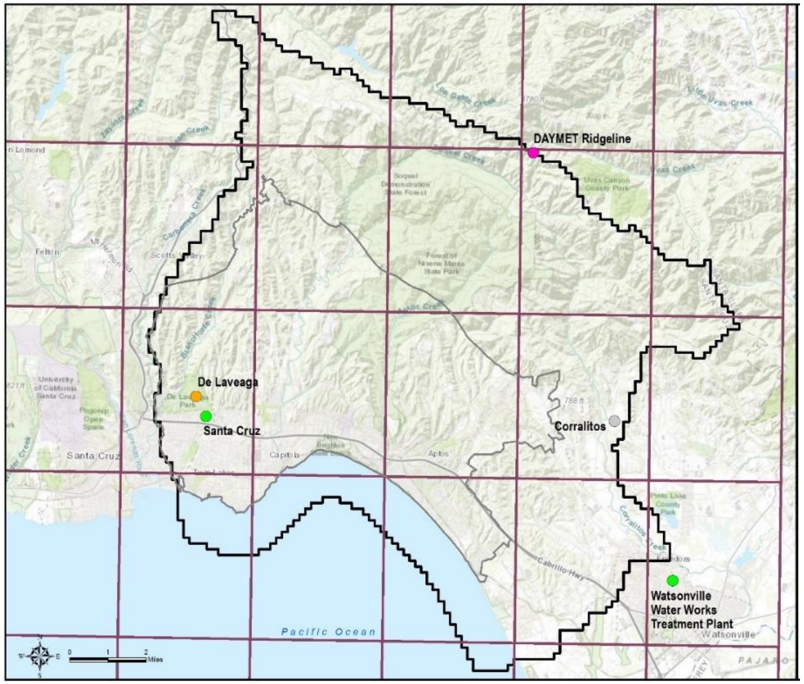
- Select mostly warm years from 1909-2016
  - +1.5 degree F
  - -10% Rainfall
- Approach recommended by Dr. Andy Fisher and used by Metropolitan WD
- Used for reduced pumping runs





Downscaled Global Circulation Model (GCM)

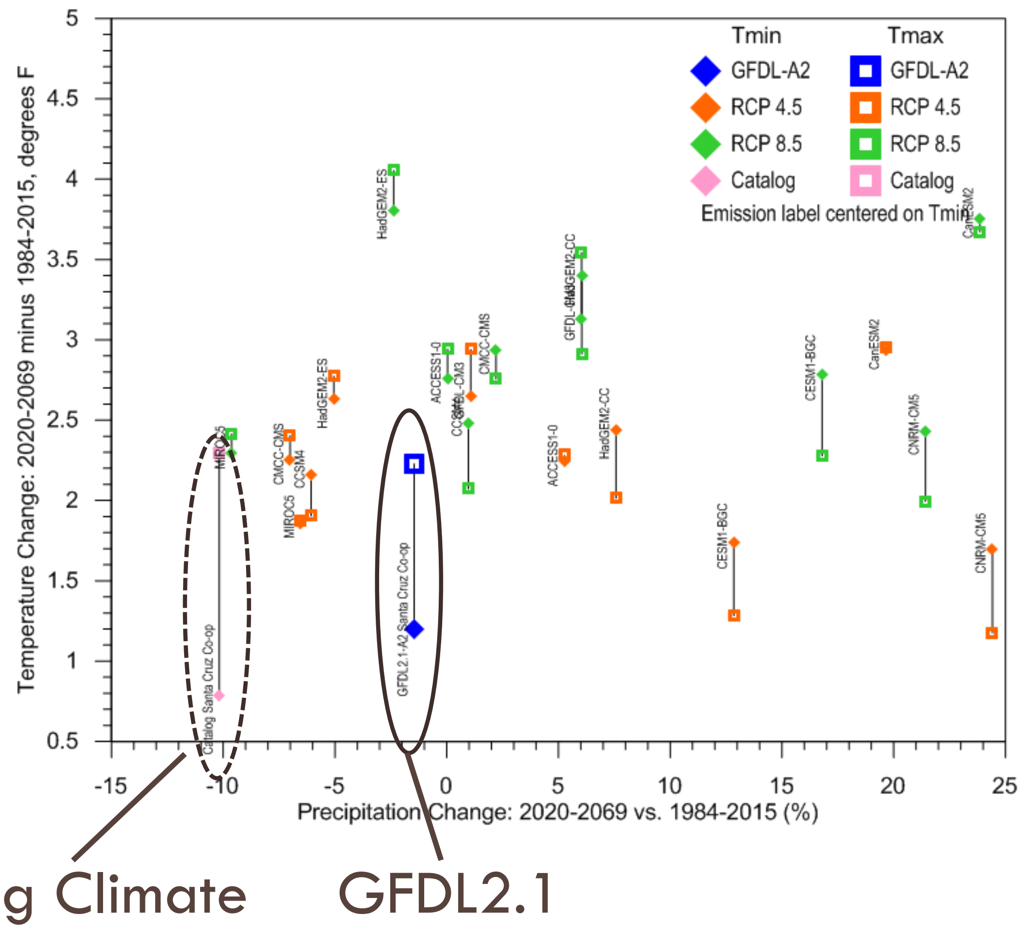
- GFDL2.1-A2 used for City of Santa Cruz Water Supply Advisory Committee (WSAC) planning
  - CMIP3 released in 2010
- Used to evaluate technical feasibility of Aquifer Storage and Recovery (ASR) strategy
  - Based on San Lorenzo River streamflow projections for GFDL2.1
- Downscaled to stations for GSFLOW model input



SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

Comparison to CMIP5

- Compared Catalog Climate and GFDL2.1 to 2013 ensemble used by state
- Drier than most CMIP 5 models for Santa Cruz
- Not as hot as most CMIP 5 models for Santa Cruz



Climate Period Analysis Approach (Optional DWR Guidance)

- Shift every month of historical period by climate change factors
  - 2030 & 2070 provided
- Removes effect of future inter-annual variability
- Multiple simulations required to evaluate changes over time

DWR, 2018

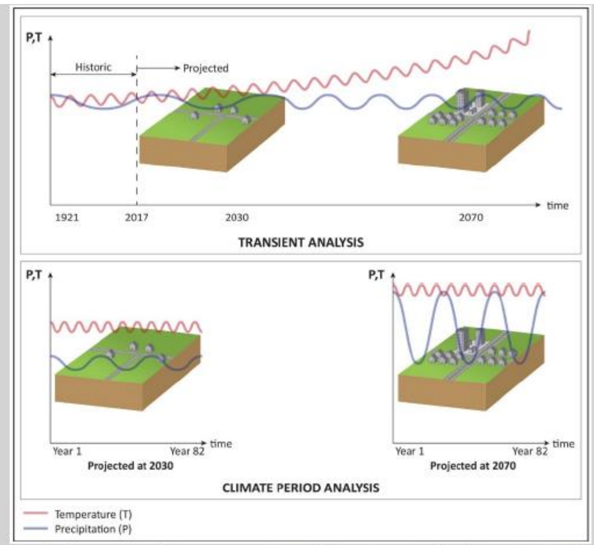


Figure A-10. Conceptual Representation of Transient and Climate Period Analysis

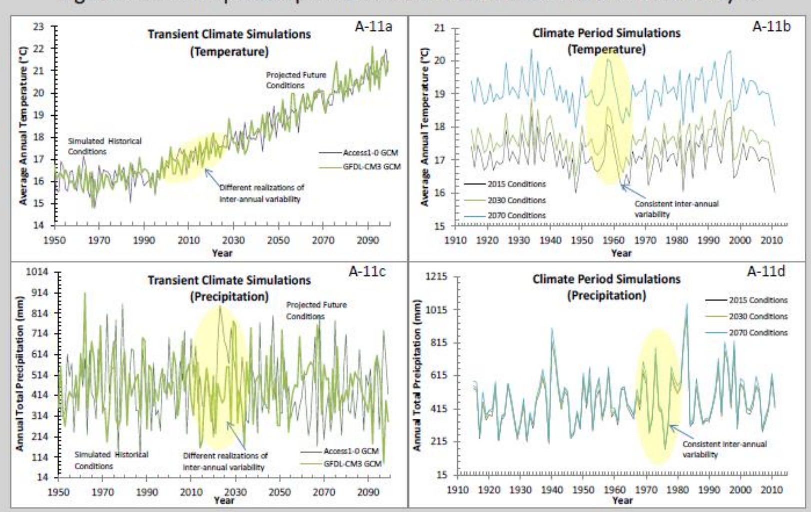


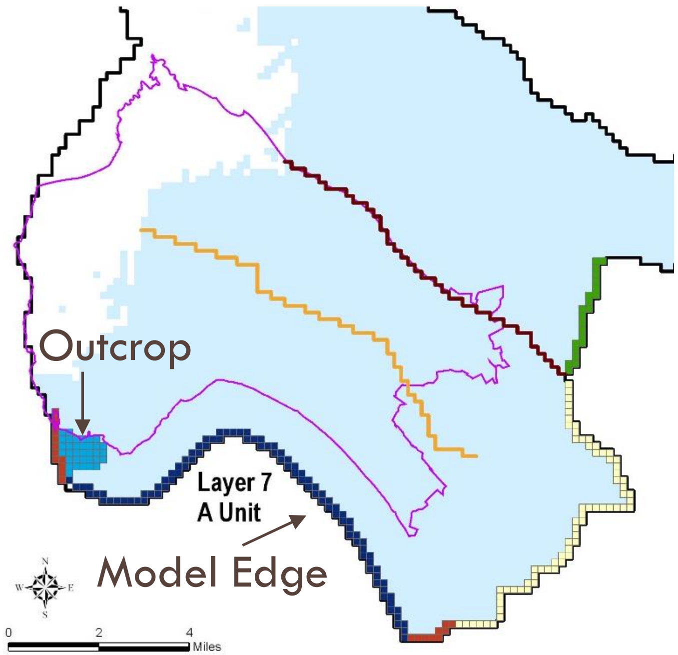
Figure A-11. Transient and Climate Period Simulations of Temperature and Precipitation

Model TAC Recommendations

- No Scenario Represents Accurate Prediction of Future
  - Use to plan for variety of conditions
- Recommend Catalog Climate for GSP
  - Consecutive warm, dry years tests system
  - Should consult with DWR
- Do not use individual GCM
  - Combination of GCMs may be appropriate
- Climate Period Analysis may be appropriate
  - Some issues identified for streamflow datasets

Sea Level Rise

- Based on mean projections from National Research Council 2012 report: 2070 vs 2000: +1.5 feet
- Applied at offshore General Head Boundary
- Also add 1.5 feet to groundwater level proxies as Sustainable Management Criteria for seawater intrusion
  - Protective elevation is relative to sea level



2018 Update of Projections

- California Ocean Protection Council 2018 Update
  - Provides projections for Monterey
- Use 5% Probability Projection Based on TAC Guidance
- 2.3 feet in 2070 for High Emissions Scenario

		Probabilistic Projections (in feet) (based on Kopp et al. 2014)					H++ scenario (Sweet et al. 2017) *Single scenario
		MEDIAN	LIKELY RANGE		1-IN-20 CHANCE	1-IN-200 CHANCE	
		50% probability sea-level rise meets or exceeds...	66% probability sea-level rise is between...		5% probability sea-level rise meets or exceeds...	0.5% probability sea-level rise meets or exceeds...	
				Low Risk Aversion		Medium - High Risk Aversion	Extreme Risk Aversion
High emissions	2030	0.4	0.3 -	0.5	0.6	0.8	1.0
	2040	0.6	0.4 -	0.8	0.9	1.2	1.7
	2050	0.8	0.5 -	1.1	1.3	1.9	2.7
Low emissions	2060	0.9	0.5 -	1.2	1.5	2.3	
High emissions	2060	1.0	0.7 -	1.4	1.8	2.6	3.8
Low emissions	2070	1.0	0.6 -	1.4	1.9	3.0	
High emissions	2070	1.3	0.9 -	1.8	2.3	3.4	5.1

Share

Questions

Item 4. Groundwater Modeling Results for Sustainability Strategies

1. Pumping Impacts on Key Sustainability Indicators
   - Review sensitivity tests
   - Modeled changes in municipal pumping
2. Effects of Stable Water Demand
3. Pumping Redistribution of Reduced Pumping
4. Example of Modeling Impacts of a Project: City of Santa Cruz ASR

Item 4. Pumping Impacts on Key Sustainability Indicators

Review sensitivity tests

Modeled changes in Municipal Pumping

Sustainability Indicators Relying on Groundwater Levels

Sustainability Indictors	Groundwater Level Minimum Threshold or Proxy	Non-Groundwater Level Minimum Threshold	Significant & Unreasonable Conditions Currently Exist
Seawater Intrusion	Proxy Seawater Intrusion		✓
Surface Water Depletion	Proxy Surface Water Depletion		?
Lowering GW Levels	Lowering GW Levels		✗
Reduction of Storage	Proxy Reduction of Storage		✗
Degraded Quality		Degraded Quality	✗
Land Subsidence	Proxy Land Subsidence	Land Subsidence	**Not applicable**

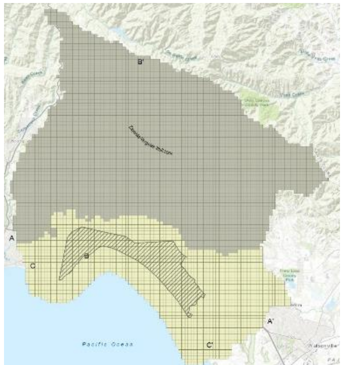
Projects/Management Actions Needed

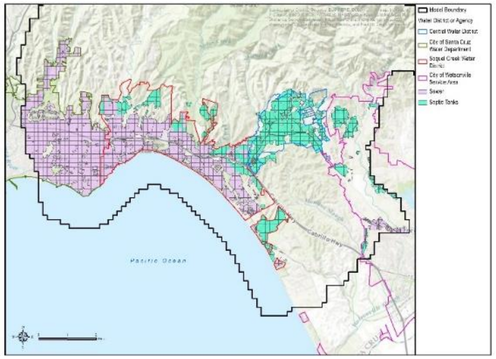
What does it take to get groundwater levels above protective elevations?

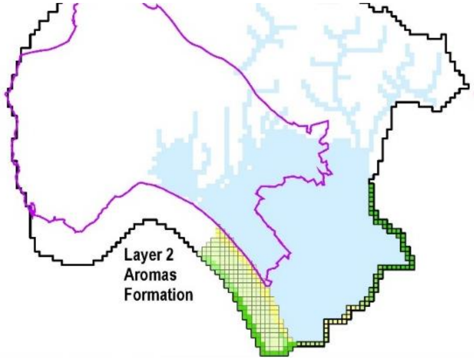
- Move pumping inland
- River water for in-lieu or managed recharge
- Recharge of treated water
- Managed aquifer recharge of stormwater
- Conservation/curtailment

Review Sensitivity Tests

- Inland pumping
  - Small effect on coastal groundwater levels
  - Need to test effect on surface water
- Septic return flow assumptions
  - Small effect on coastal groundwater levels
- Pajaro Valley Boundary Condition
  - Affects groundwater levels in Aromas area







Review Municipal Pumping Effect

- Tested effect of surface water transfer
  - Helps recover Purisima A unit groundwater levels
  - Helps raise Tu unit groundwater levels but not enough
- Tested reducing from ~5,000 AFY groundwater demand to 3,450-3,750 AFY municipal pumping
  - Baseline demand reductions may be underestimated
- Further redistribution is required to achieve Sustainable Management Criteria for seawater intrusion
  - Shifting pumping from Tu Unit and Aromas to Purisima A/BC appears promising
- Effect of non-municipal pumping in Aromas should be evaluated

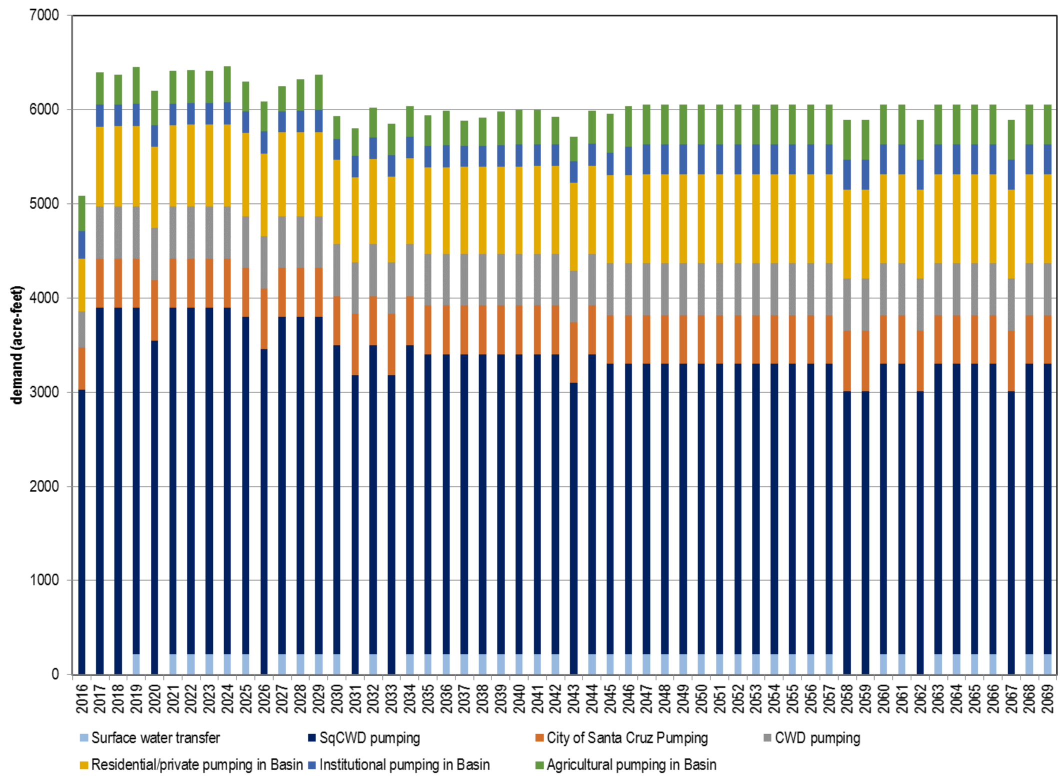
Effects of Stable Demand

Simulated groundwater levels do not recover without reduction in net extraction

Groundwater Demand Assumptions

- CWD pre-drought average 2008-2011
- SqCWD 2015 Urban Water Management Plan projections
  - 3,900 afy → 3,300 afy
- City of Santa Cruz cooperative agreement
- Pre-drought estimates for non-municipal pumping
- Demand projections may be underestimated →

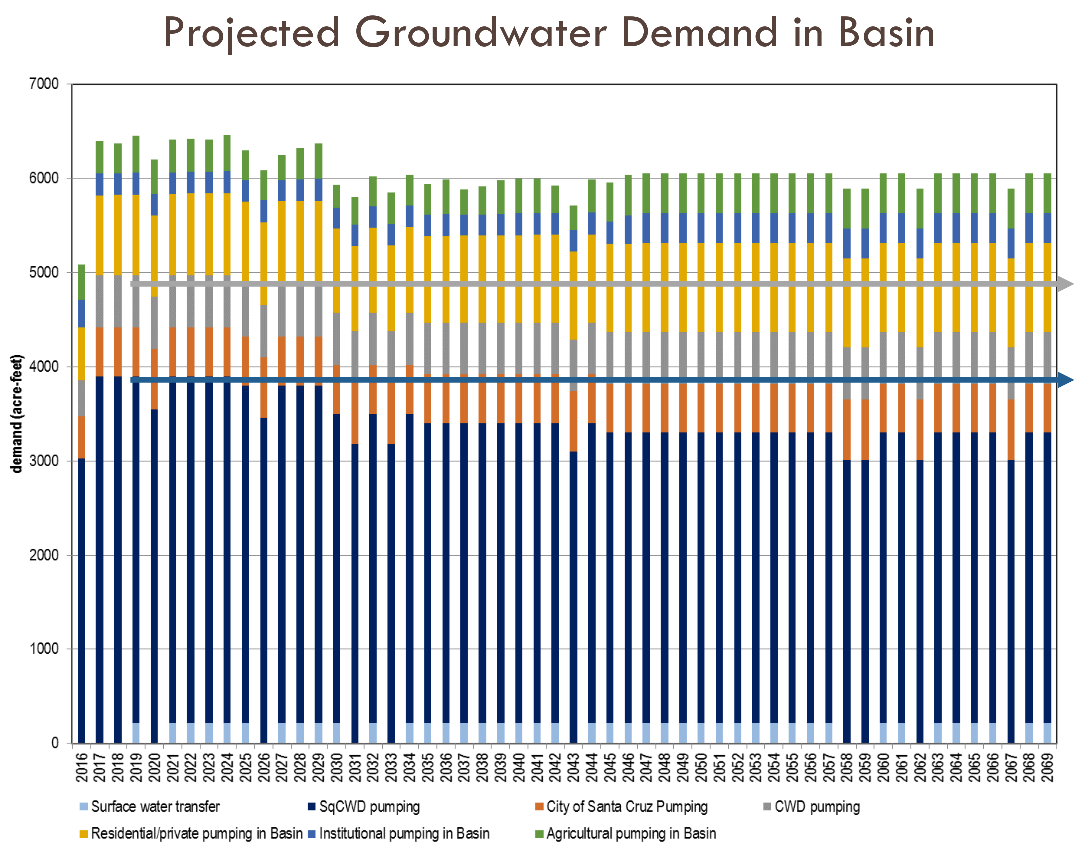
Projected Groundwater Demand in Basin



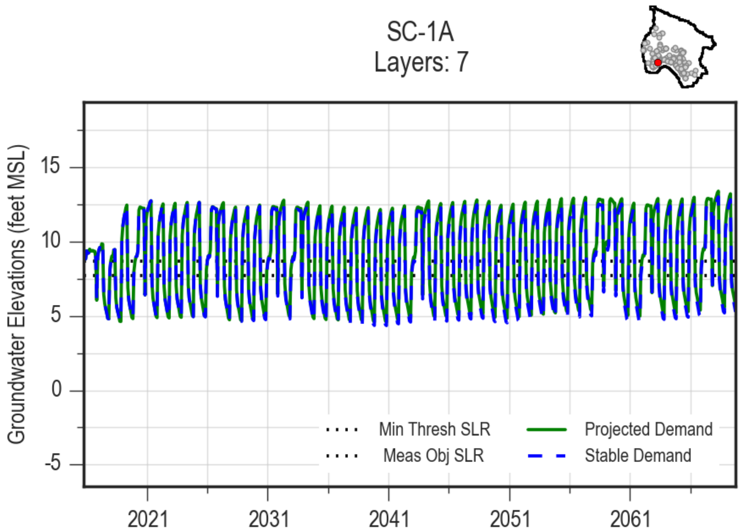
New laws facilitating Accessory Dwelling Units
Land use changes, such as cannabis cultivation
Higher demand would increase size of project/action needed to achieve sustainability

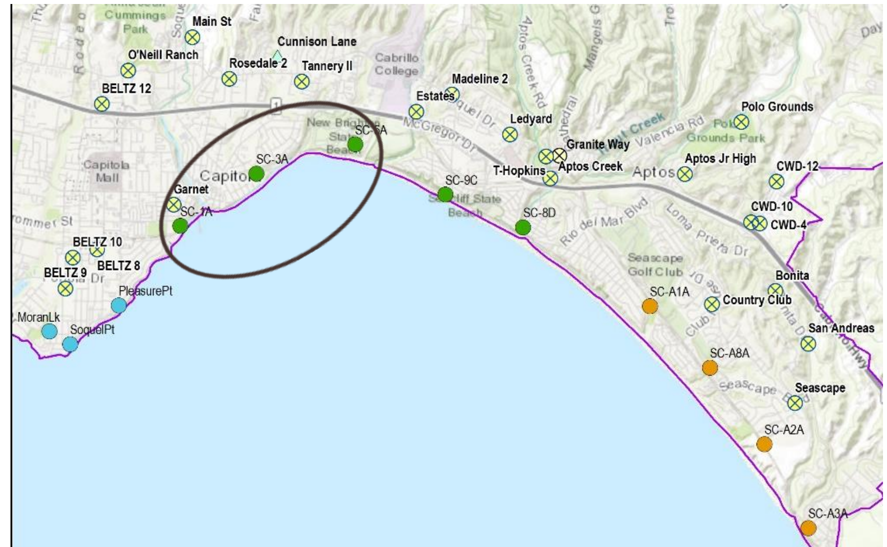
Stable Demand Runs

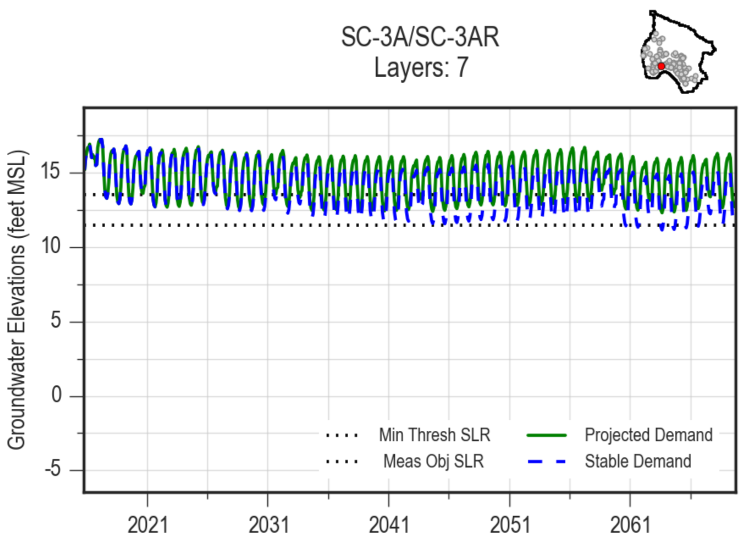
- SqCWD groundwater demand stable at 3,900 afy
- UWMP projection for 2020-2025
- No reduction to 3,300 afy by 2045
- Include surface water transfer of 215 AFY in non-critically dry years
  - Municipal pumping of ~4,750 AFY

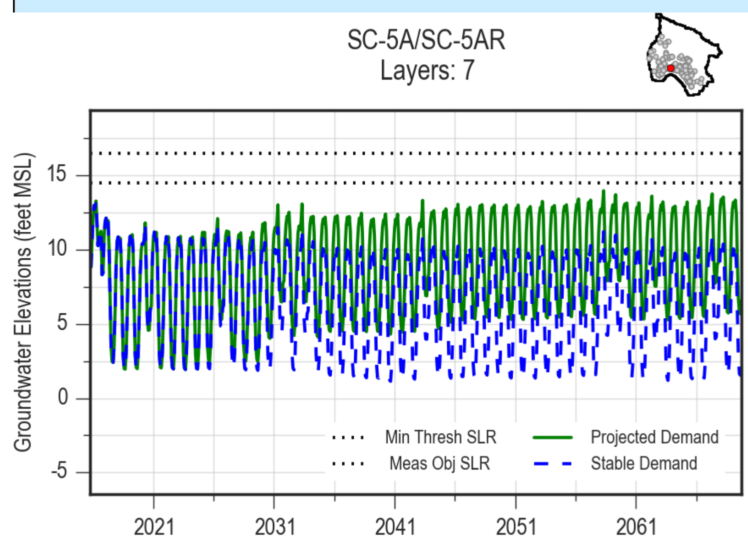


Coastal Groundwater Levels
Purisima A Unit





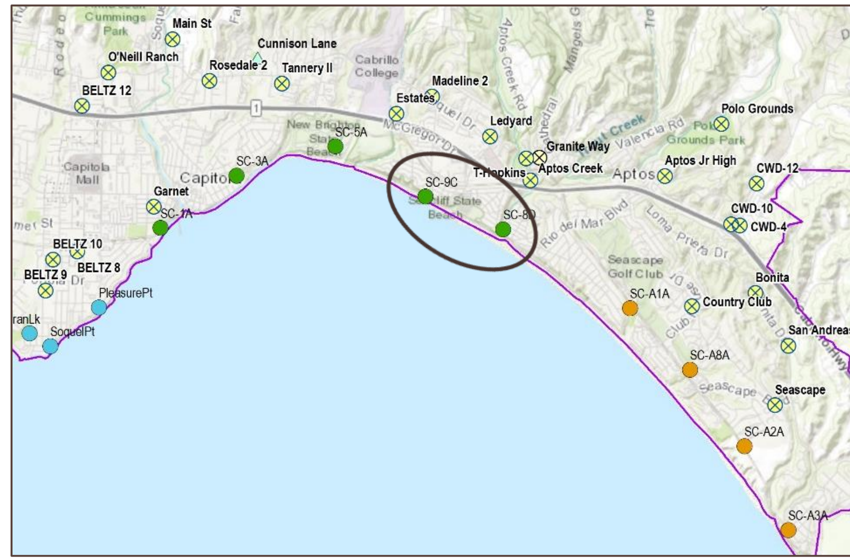


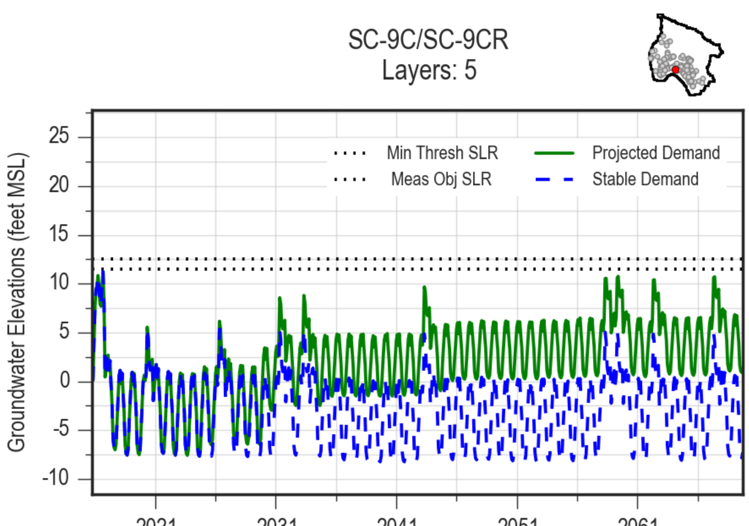


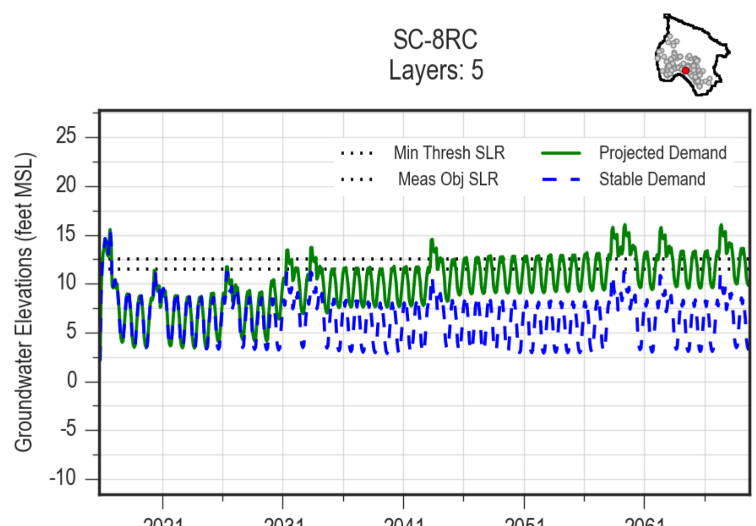
Projected

Stable

Coastal Groundwater Levels Purisima BC Unit



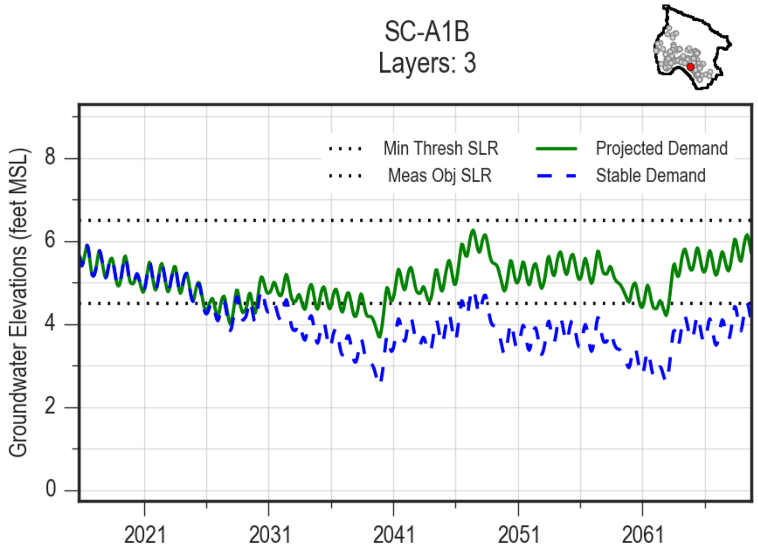


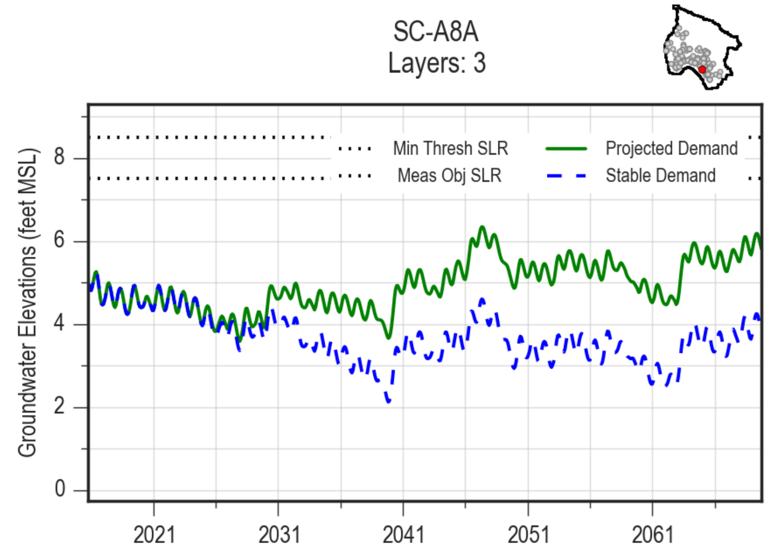


Projected

Stable

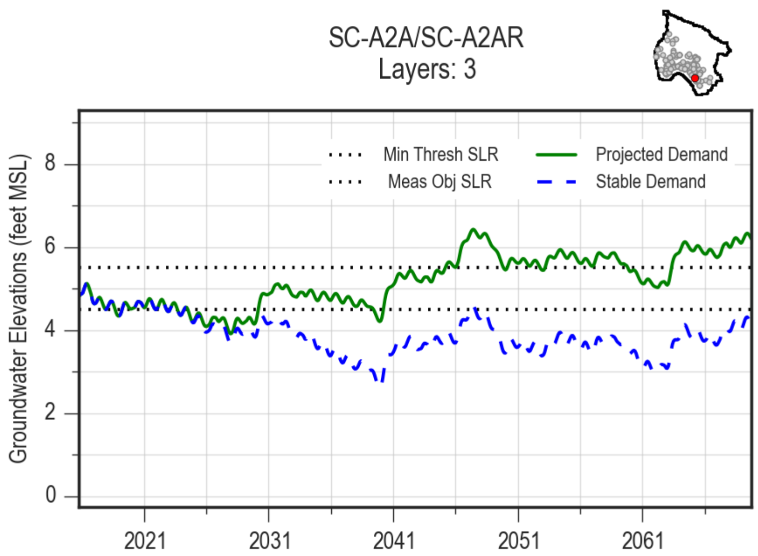
Coastal Groundwater Levels
Aromas Area (Purisima F Unit)

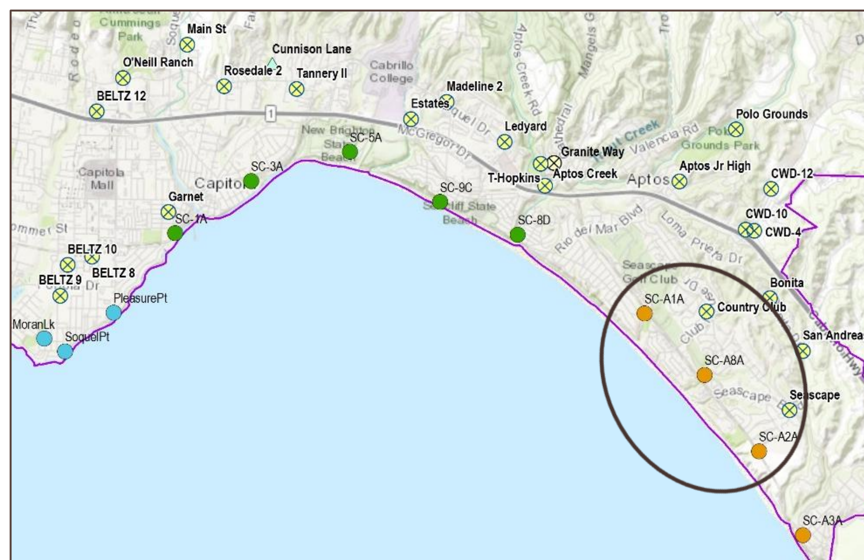




Projected

Stable





Stable Demand Run Conclusions

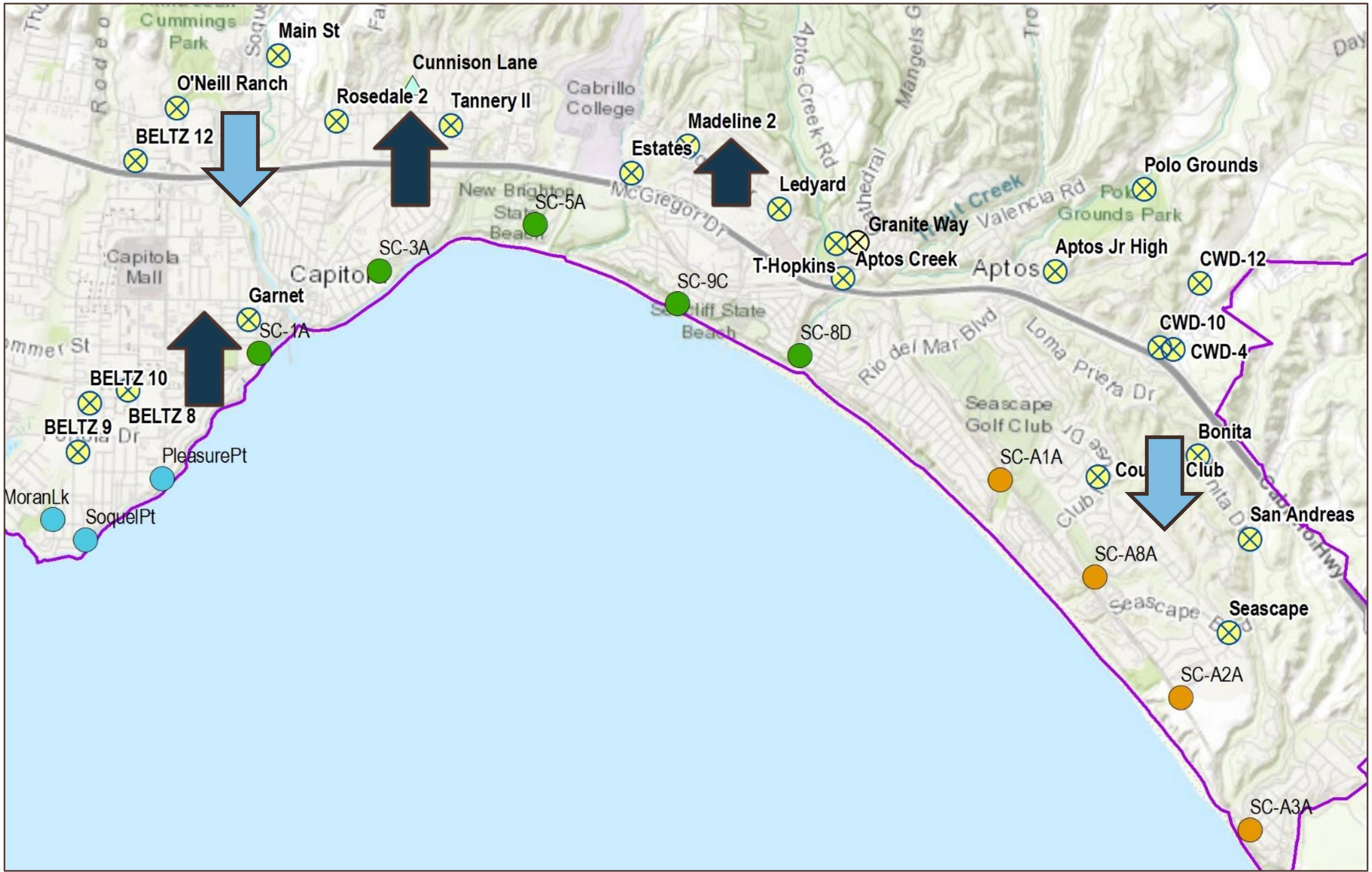
- Municipal pumping of ~4,750 afy for 2020-2069 simulated based on maximum projected demand
- Simulated groundwater levels in Purisima do not recover
- Simulated groundwater levels in Aromas area decline slightly over time
- Simulated groundwater levels for Purisima A Unit and Tu Unit lower without surface water transfer

Pumping Redistribution of Reduced Pumping

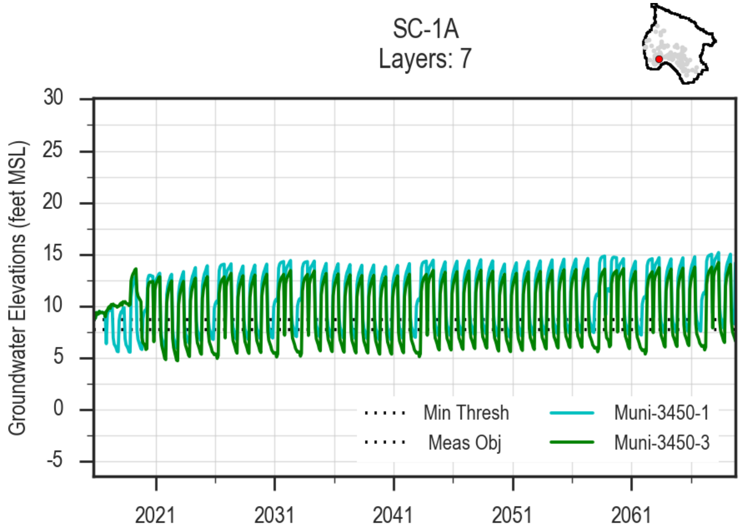
May need additional reduction in pumping below 3,450 AFY even with pumping redistribution from Tu and Aromas to Purisima

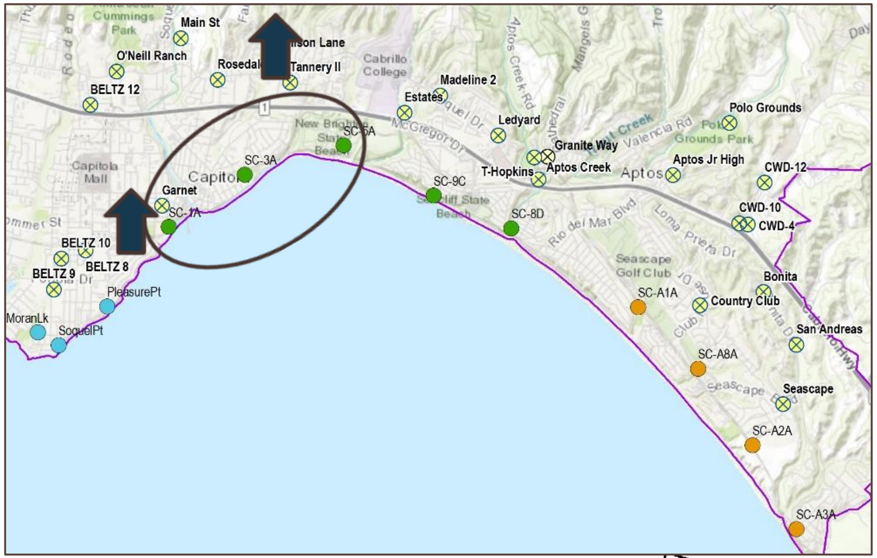
Additional Pumping Redistribution

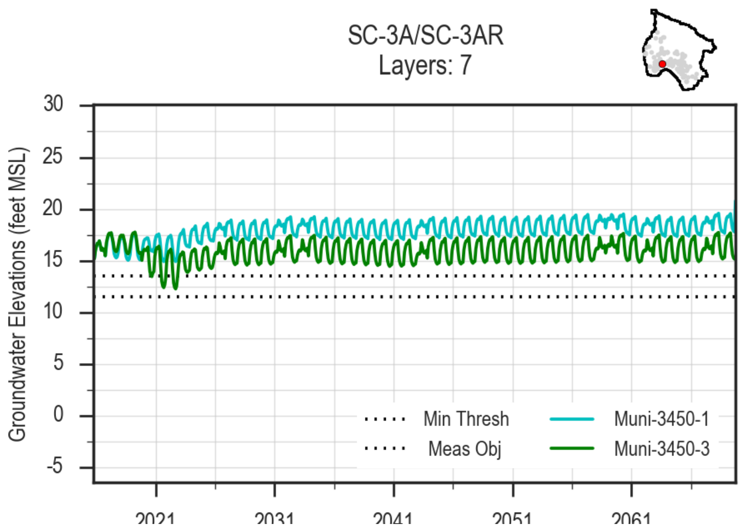
- Reduce Pumping in Tu and Aromas; Increase in Purisima

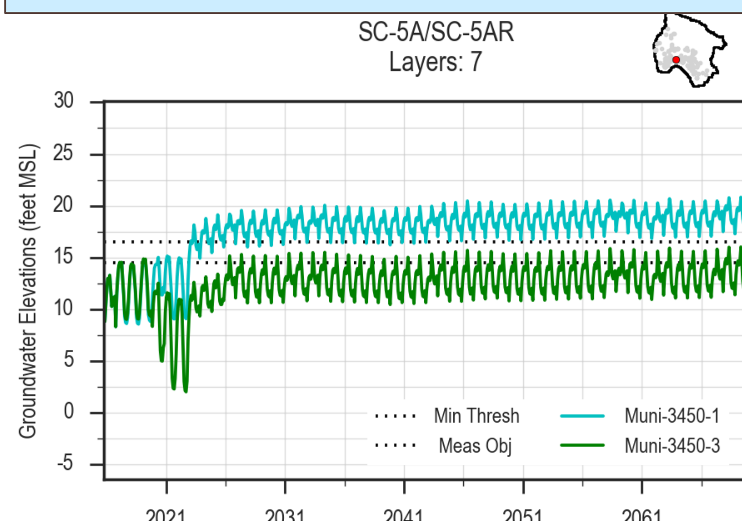


Coastal Groundwater Levels
Purisima A Unit



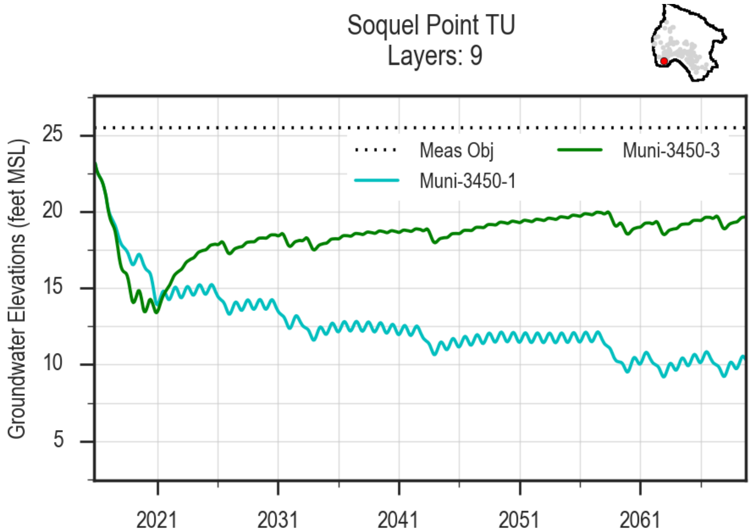


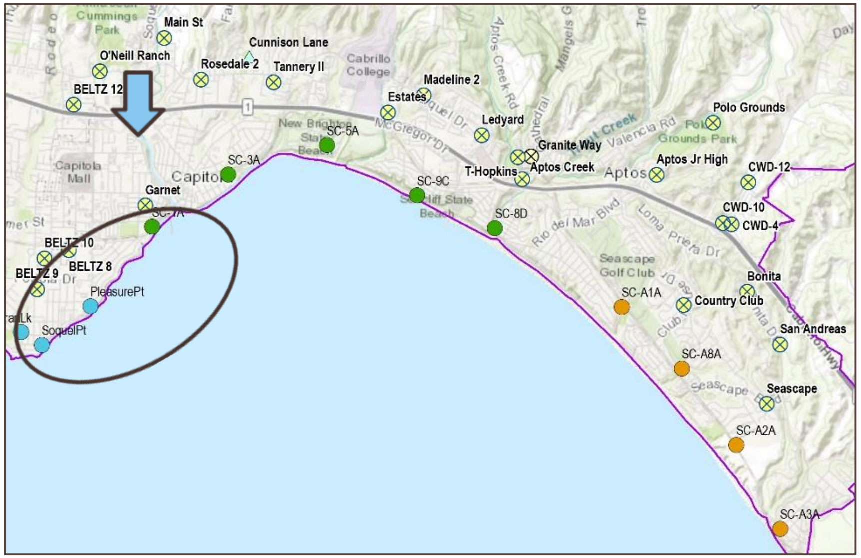


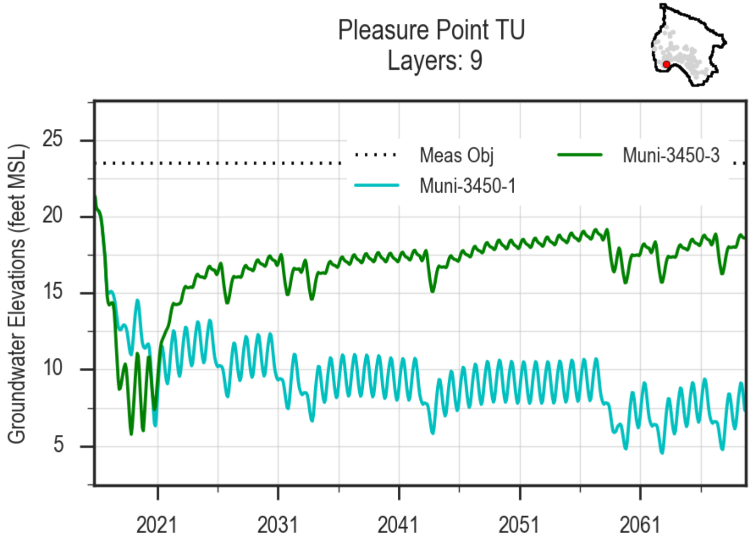


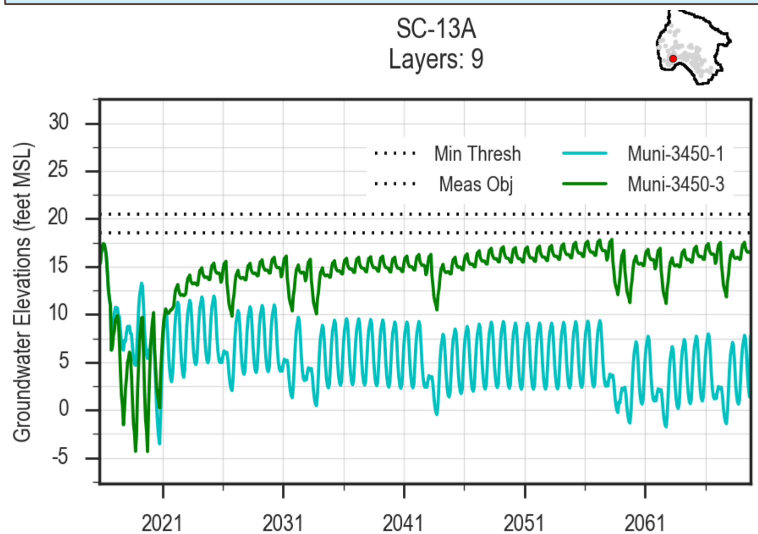
3450 AFY
Redistribute

Coastal Groundwater Levels
Tu Unit





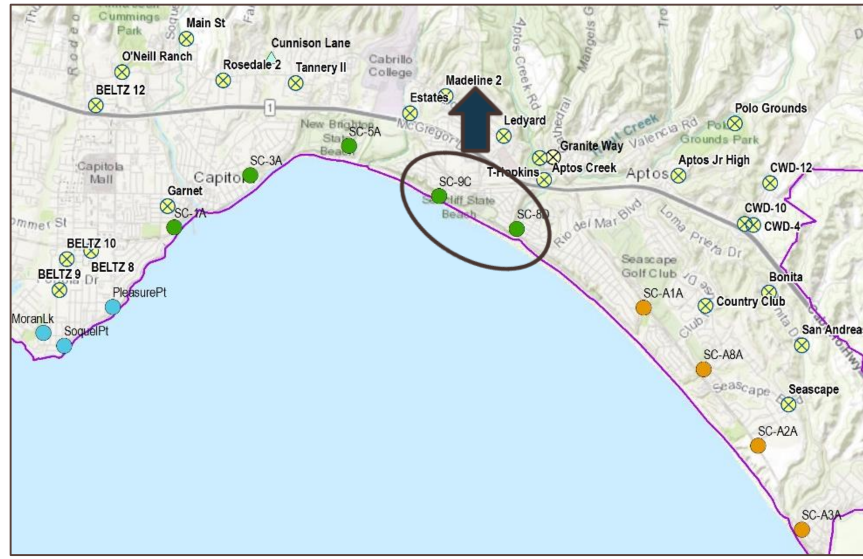


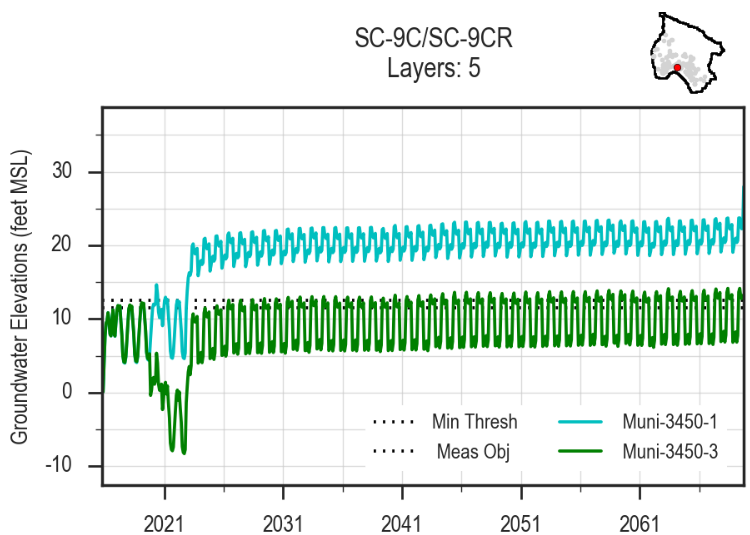


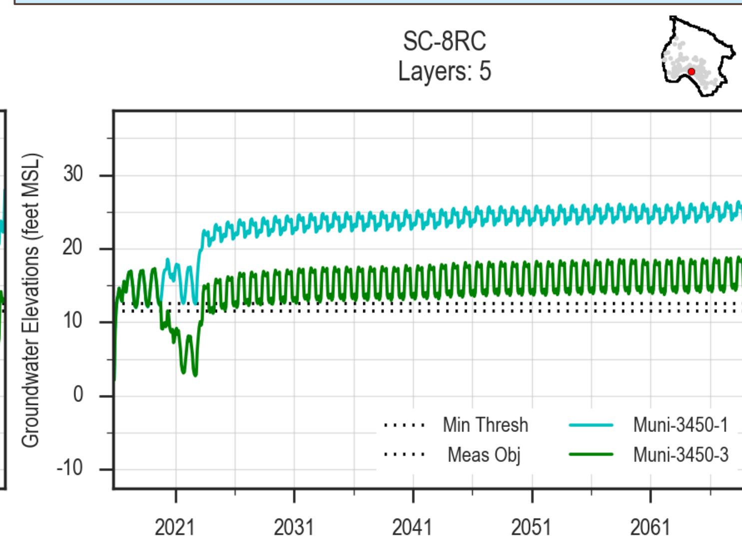
Redistribute

3,450 AFY

Coastal Groundwater Levels
Purisima BC Unit



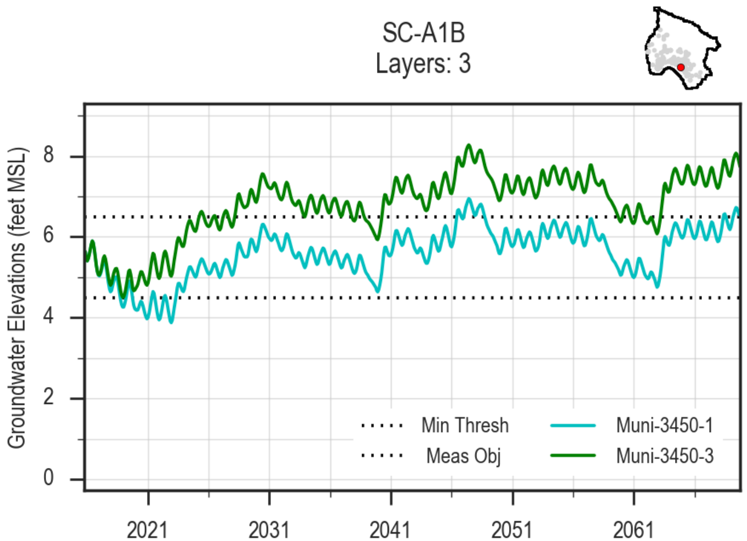


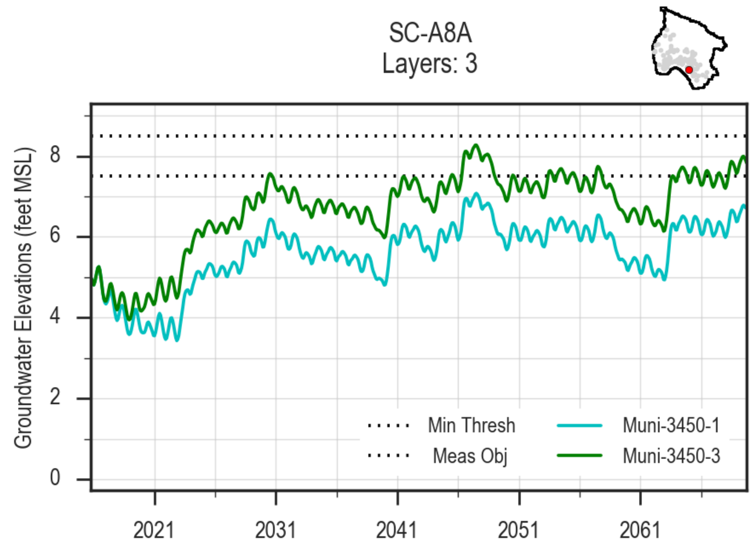


3,450 AFY

Redistribute

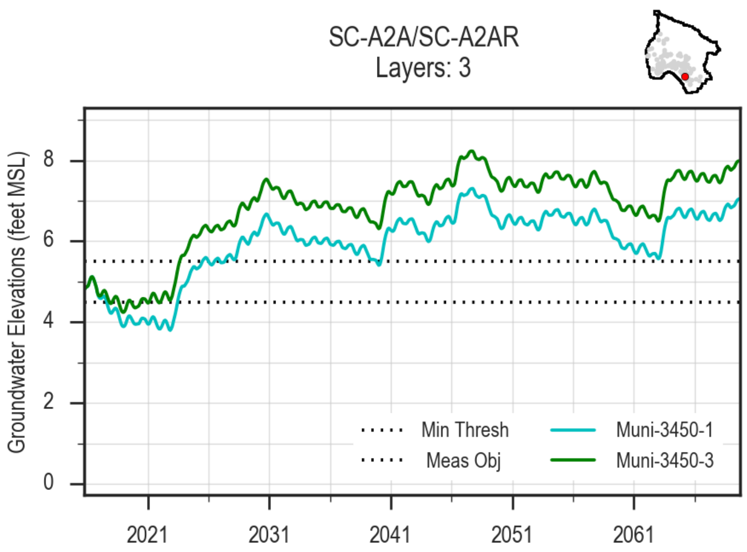
Coastal Groundwater Levels Aromas Area (Purisima F Unit)

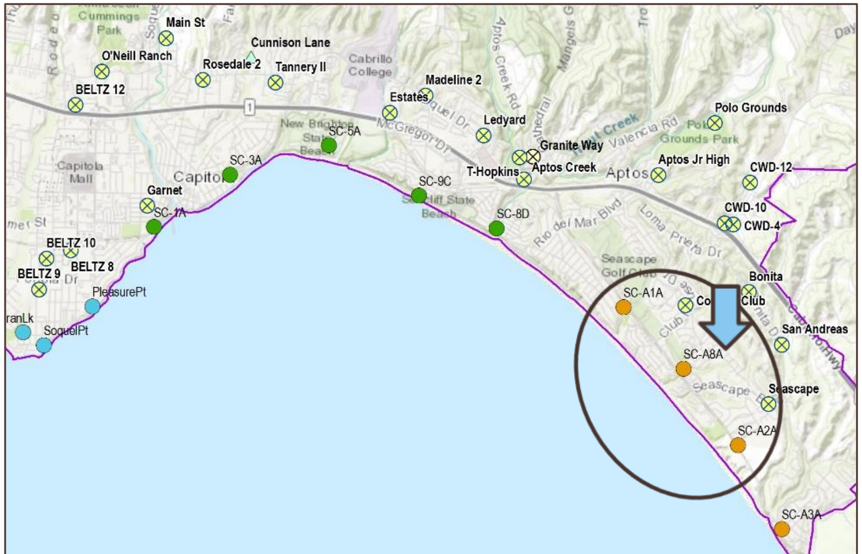




Redistribute

3,450 AFY





Pumping Redistribution Conclusions

- Simulated Purisima A Unit groundwater levels drop below sustainable management criteria
- Simulated Tu Unit groundwater levels stabilize
- Simulated Aromas area groundwater levels do not achieve sustainable management criteria at all wells
- Additional reduction of pumping below 3,450 AFY appears necessary

Break

Example of Modeling Effects of a Project

City of Santa Cruz Aquifer Storage and Recovery:

Not Designed to Achieve Basin Sustainability but Shows Benefit

City of Santa Cruz ASR

- Preferred option from City of Santa Cruz Water Supply Advisory Committee
- Designed to meet City water shortage only
- Includes both injection and in-lieu options
- Phase I Technical Feasibility Investigation includes groundwater modeling

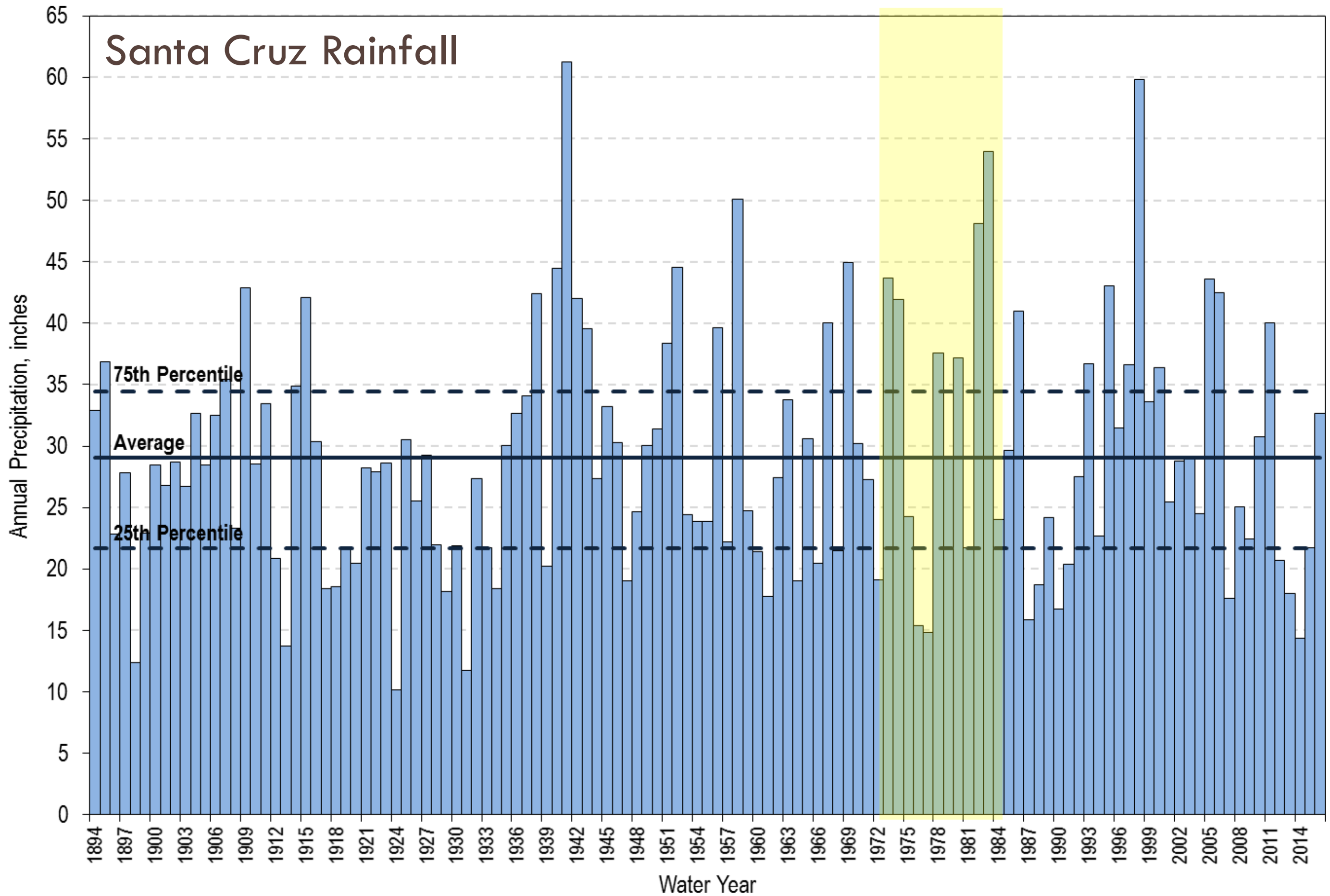
Groundwater Modeling

- Primary Purpose for Phase I Feasibility Study
  - Evaluate Storage Capacities
  - Evaluate Storage Losses
  - Evaluate Per-Well Injection Rates
- Consider Groundwater Level Effects
  - Relative to Baseline
  - Compared to Sustainable Management Criteria
- Inputs Based on Confluence Model of San Lorenzo River Flows (Fiske)
  - Incorporates projected demand and shortage

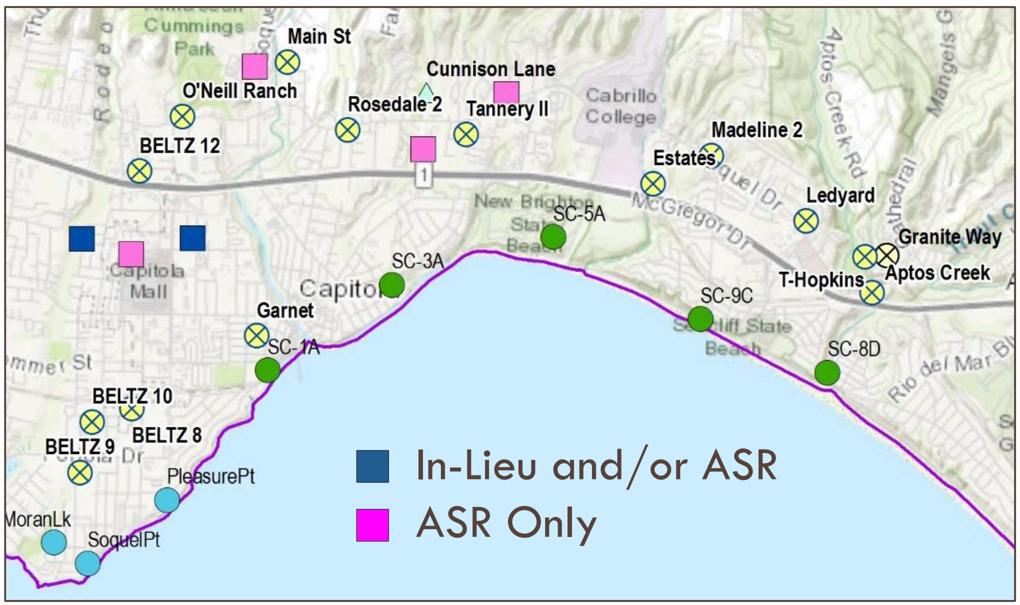
Climate Scenarios

1. 1985-2015
2. 1973-1984
3. 2020-2069
   - GFDL2.1-A2

1973-1984 includes Design Drought of 1976-1977



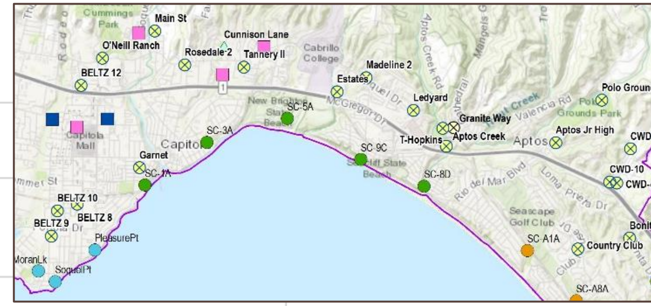
Pumping/Injection Scenarios

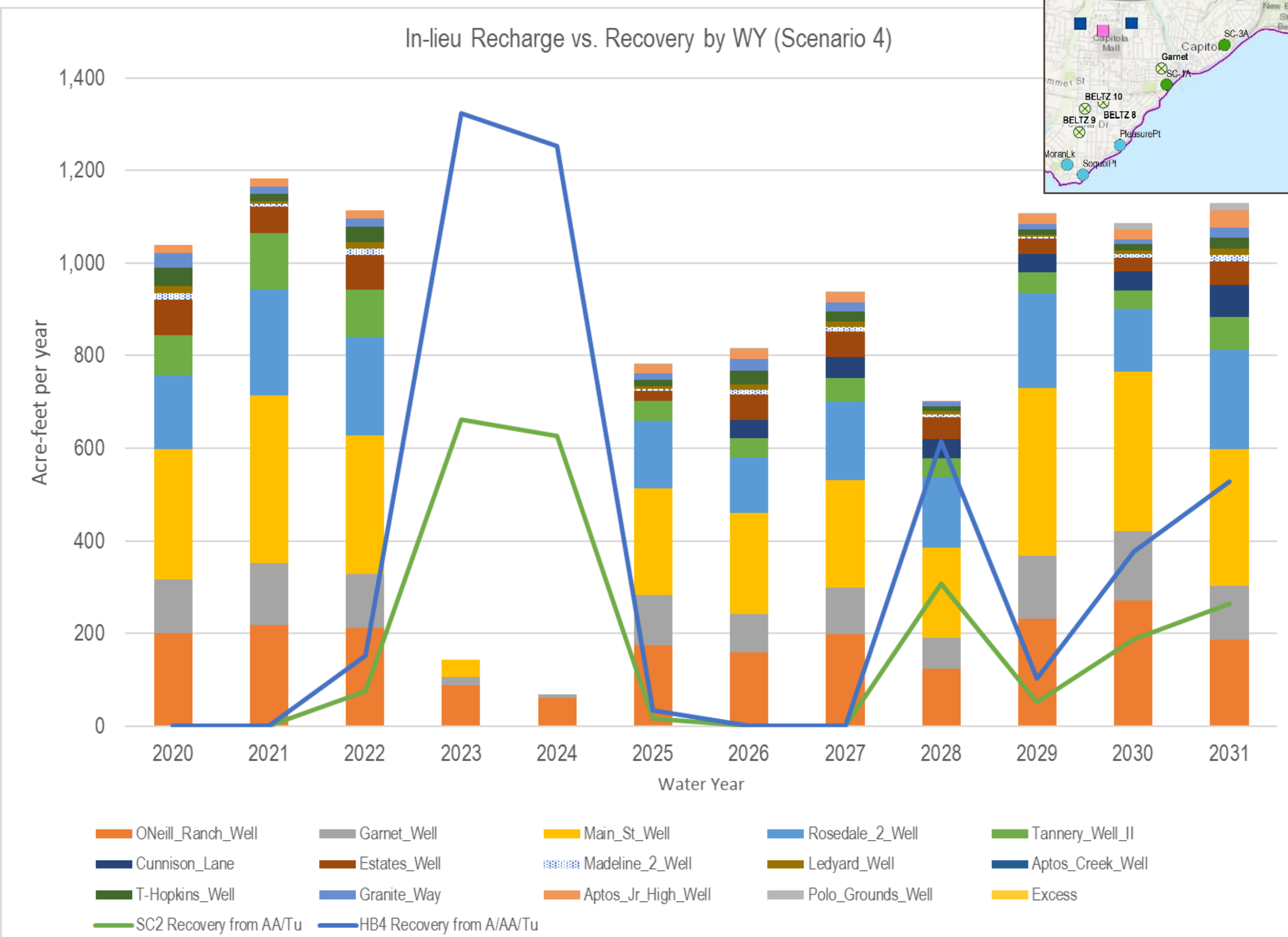


Scenarios developed by Pueblo Water Resources for Phase I feasibility study

- In-lieu only
  - Reduced pumping at SqCWD Purisima wells
  - Recovery pumping at new City wells
- ASR only
  - Injection at new City wells
  - Recovery pumping at same wells as injection
- In-lieu + ASR
- Baseline (No Projects)

In-Lieu Recharge Only vs. Recovery

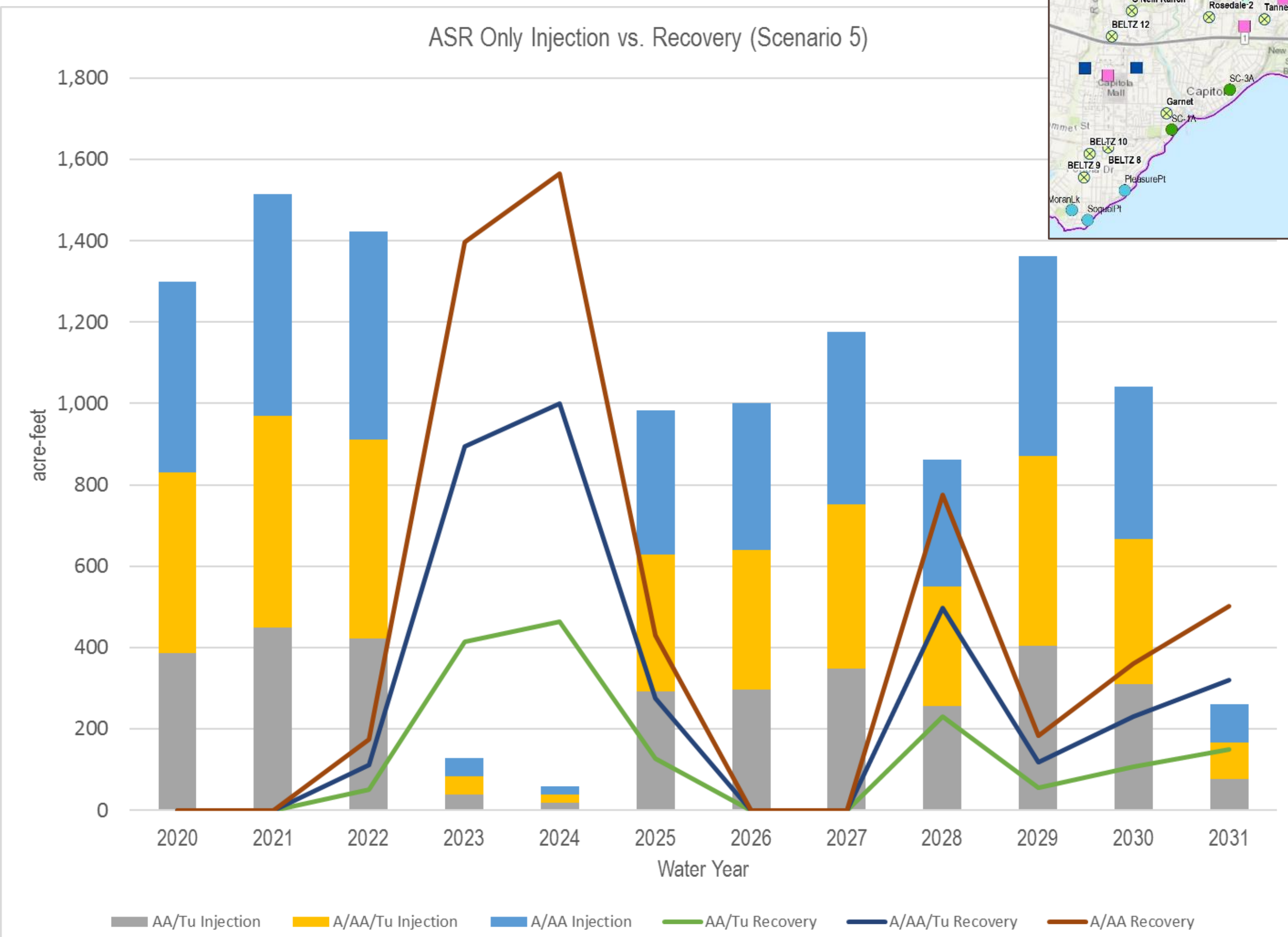


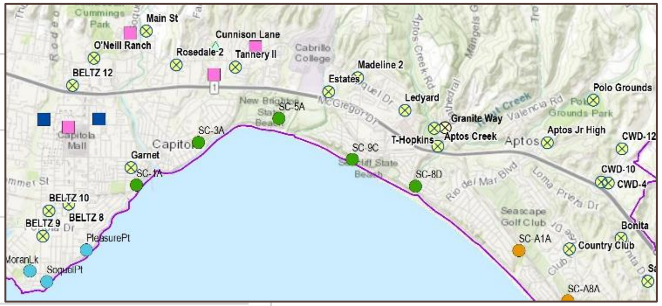


In-lieu recharge across SqCWD Purisima Wells

Recovery from 2 wells in City of Santa Cruz

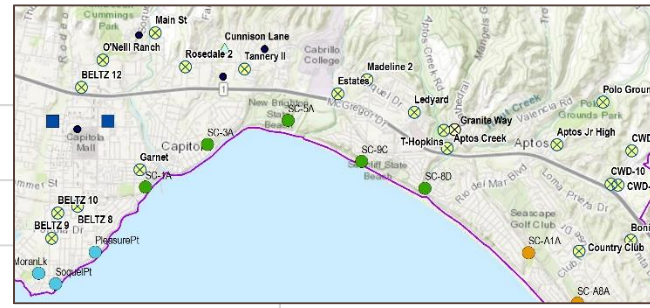
ASR Injection Only vs. Recovery

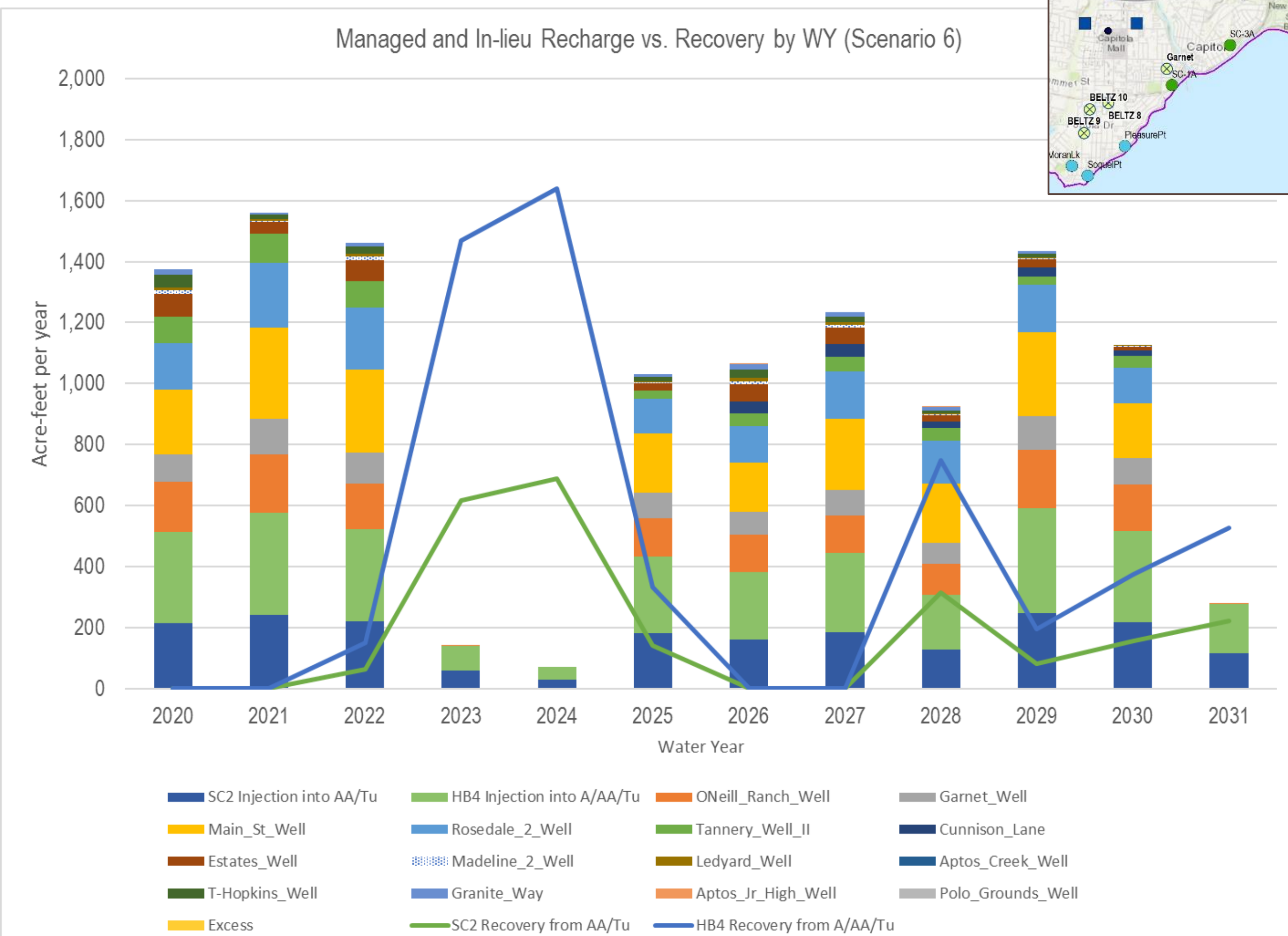




Injection and Recovery at 6 new wells

In-Lieu + Injection vs. Recovery

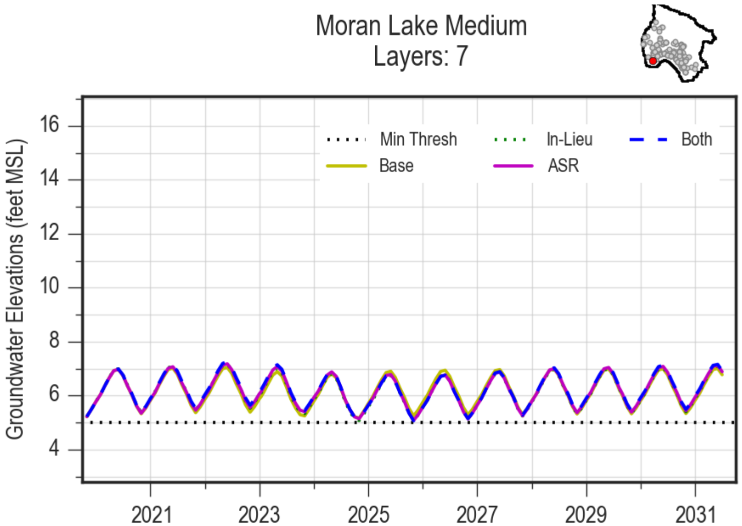


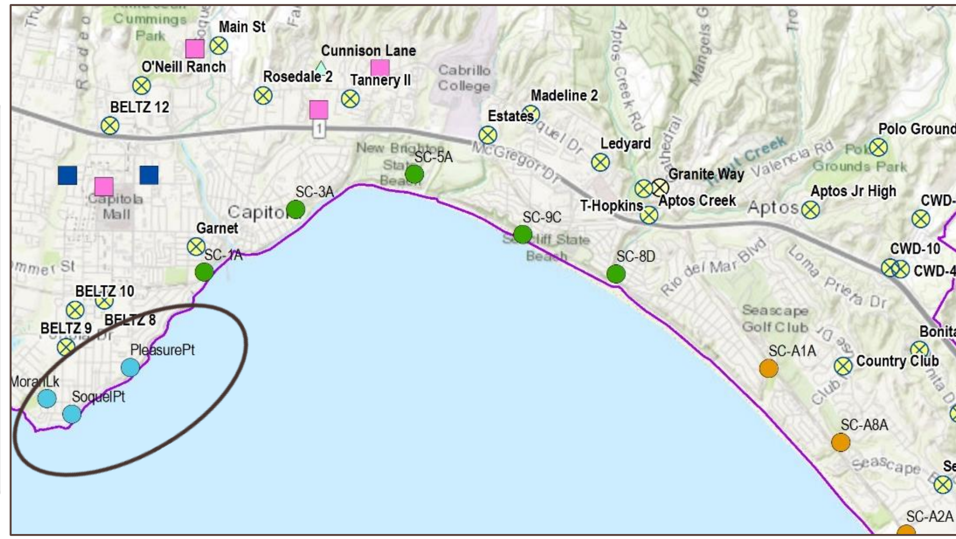


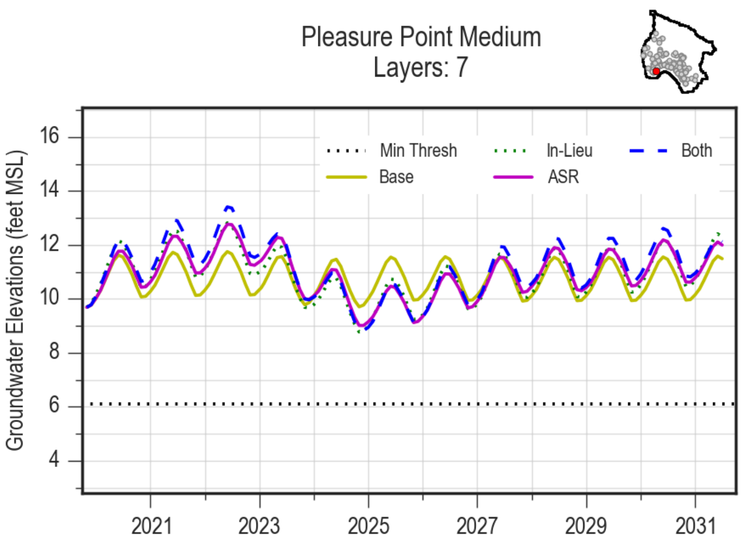
In-lieu recharge Across SqCWD Purisima Wells

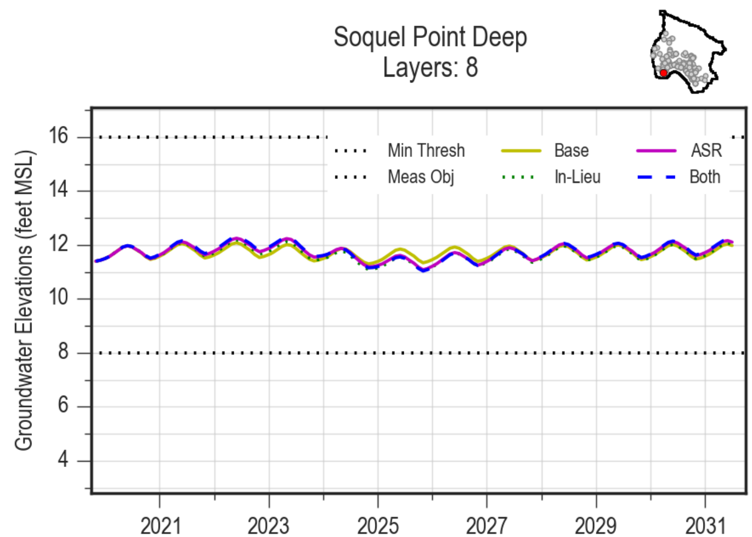
Injection and Recovery from 2 wells in City of Santa Cruz

Coastal Groundwater Levels Purisima A Unit (City Wells)





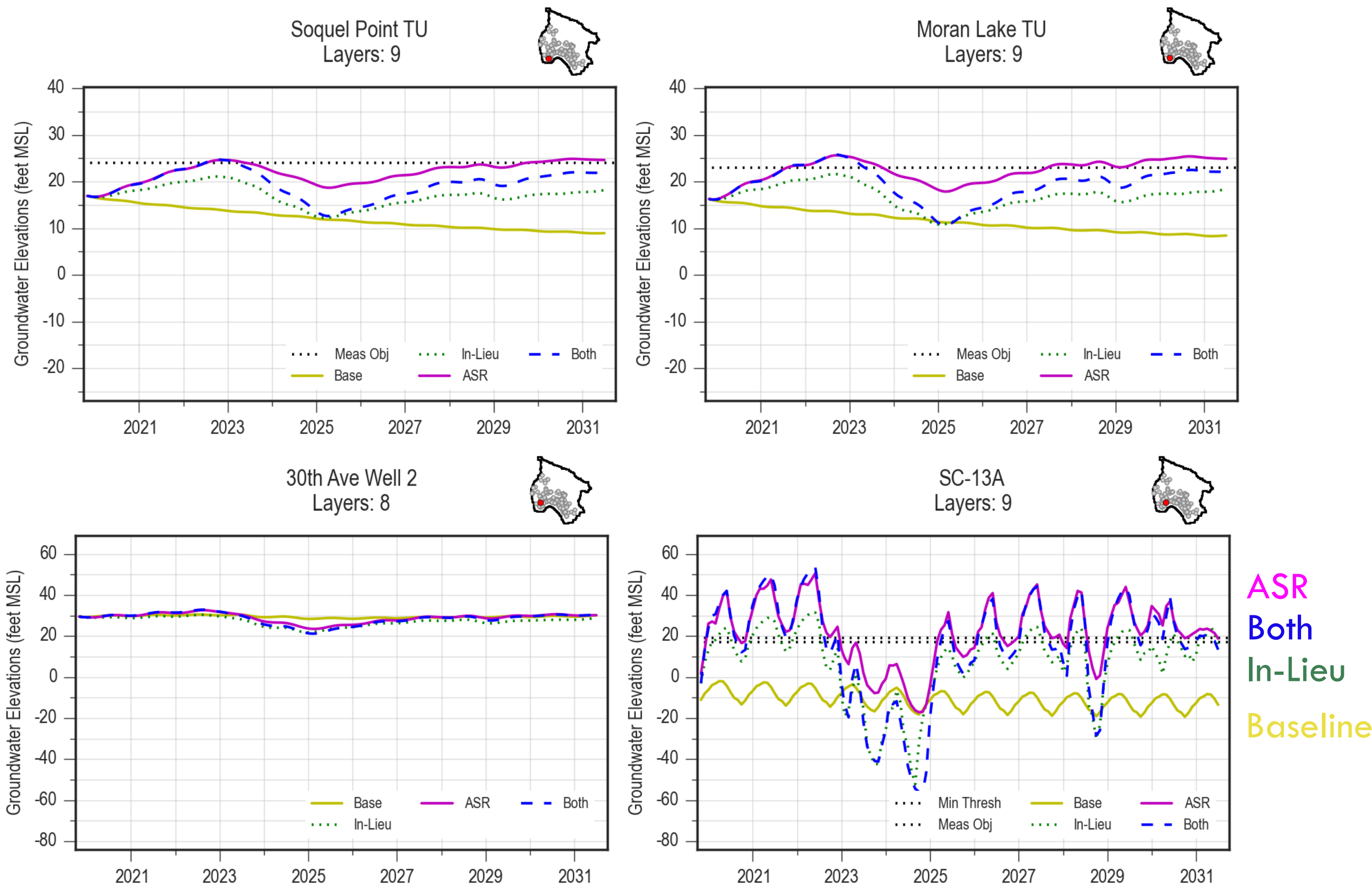




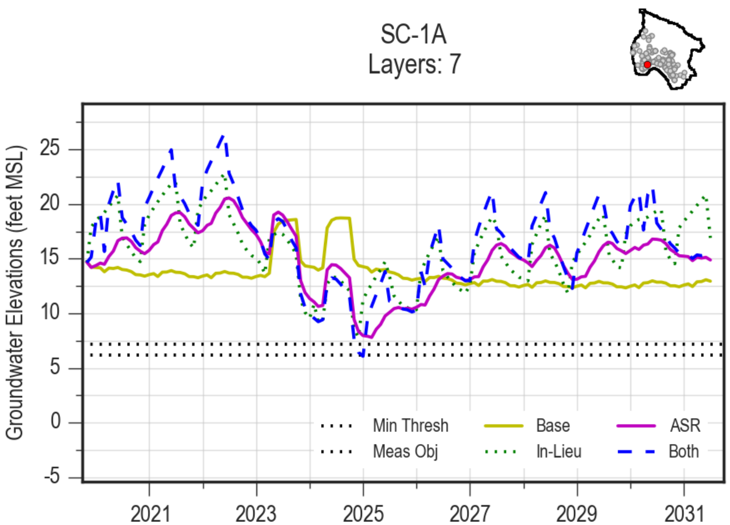
Baseline
In-Lieu
ASR
Both

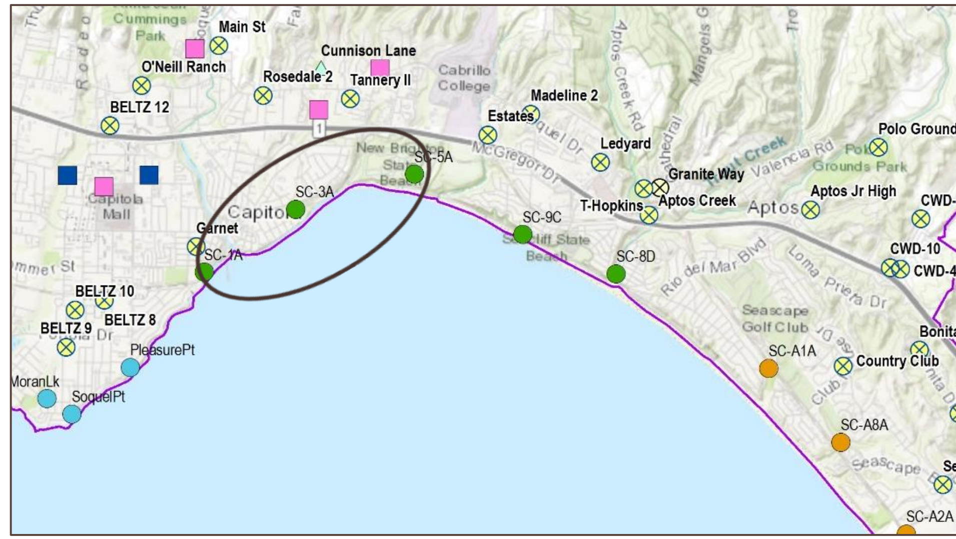
Coastal Groundwater Levels

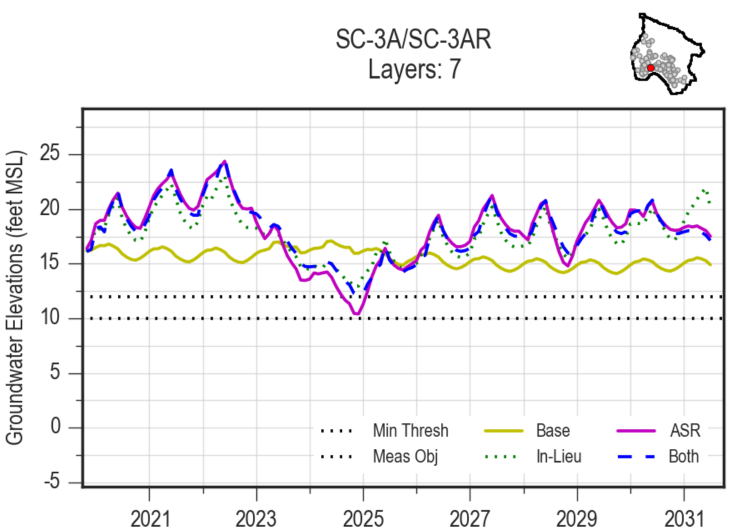
Tu Unit

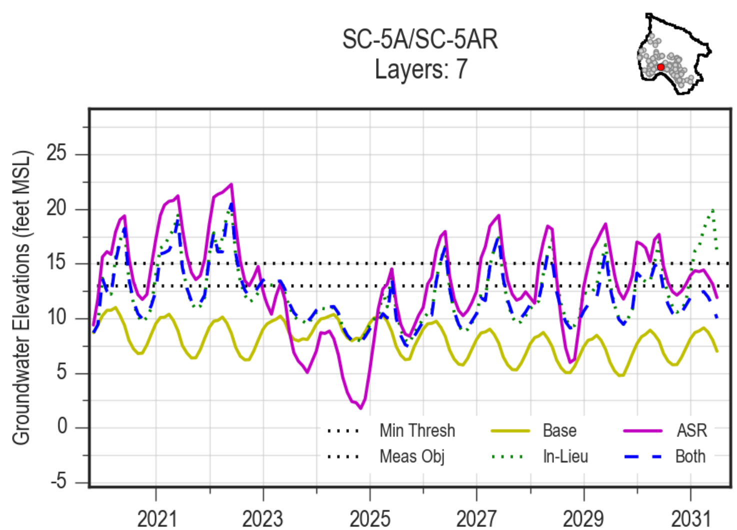


Coastal Groundwater Levels Purisima A Unit (SqCWD Wells)





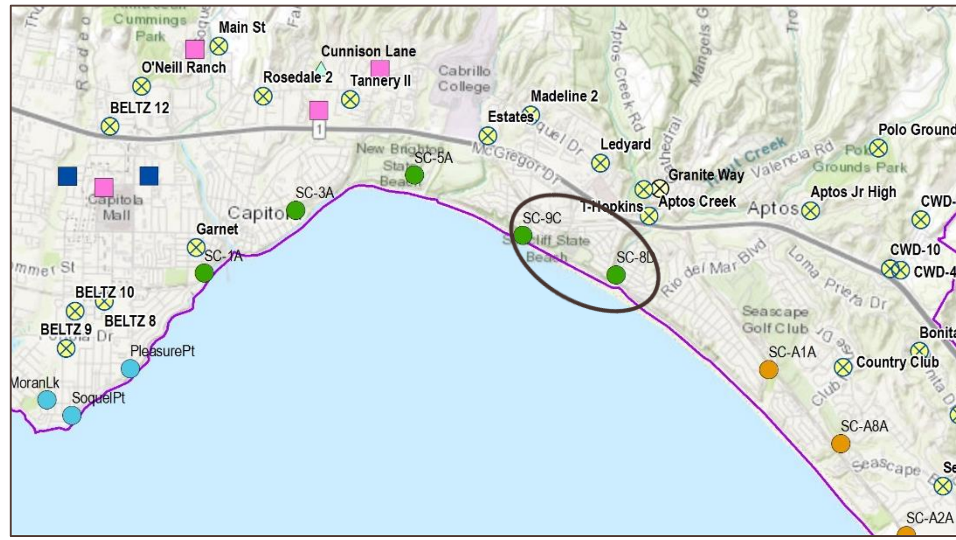


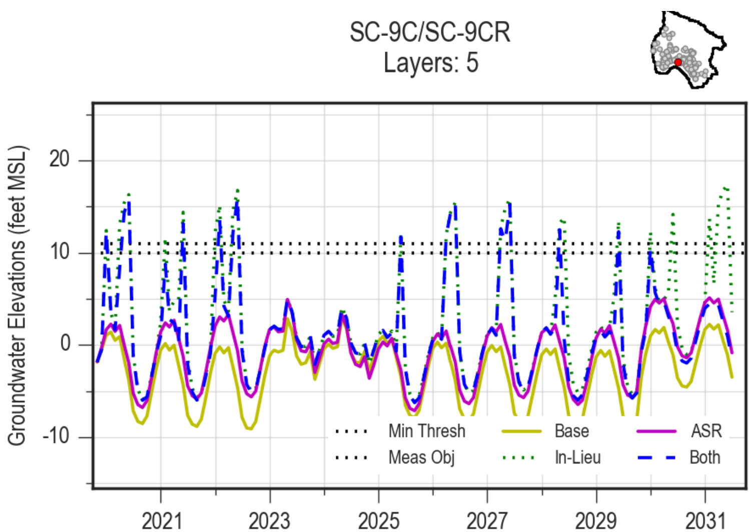


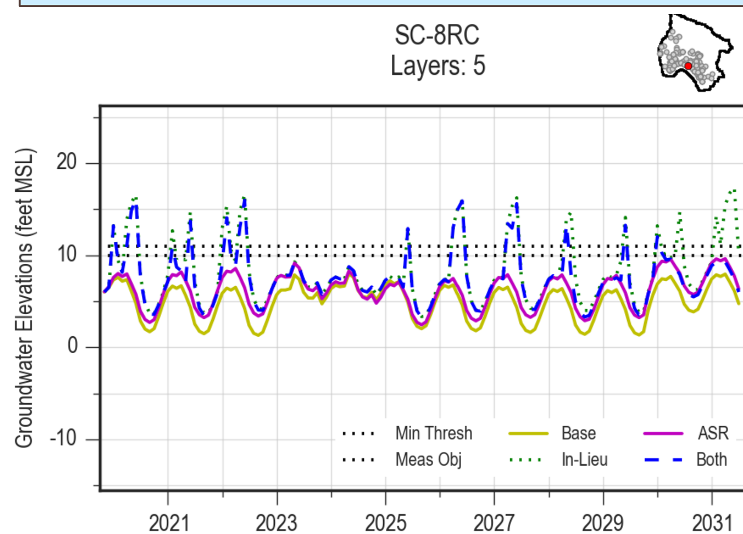
In-Lieu
ASR
Both
Baseline

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

Coastal Groundwater Levels
Purisima BC Unit

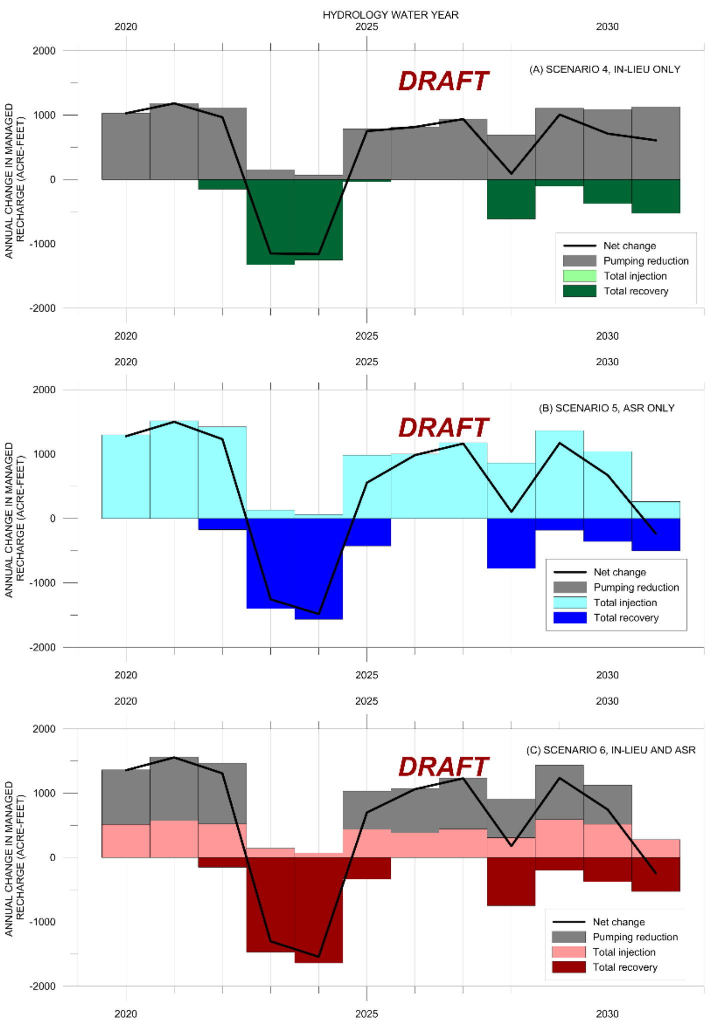


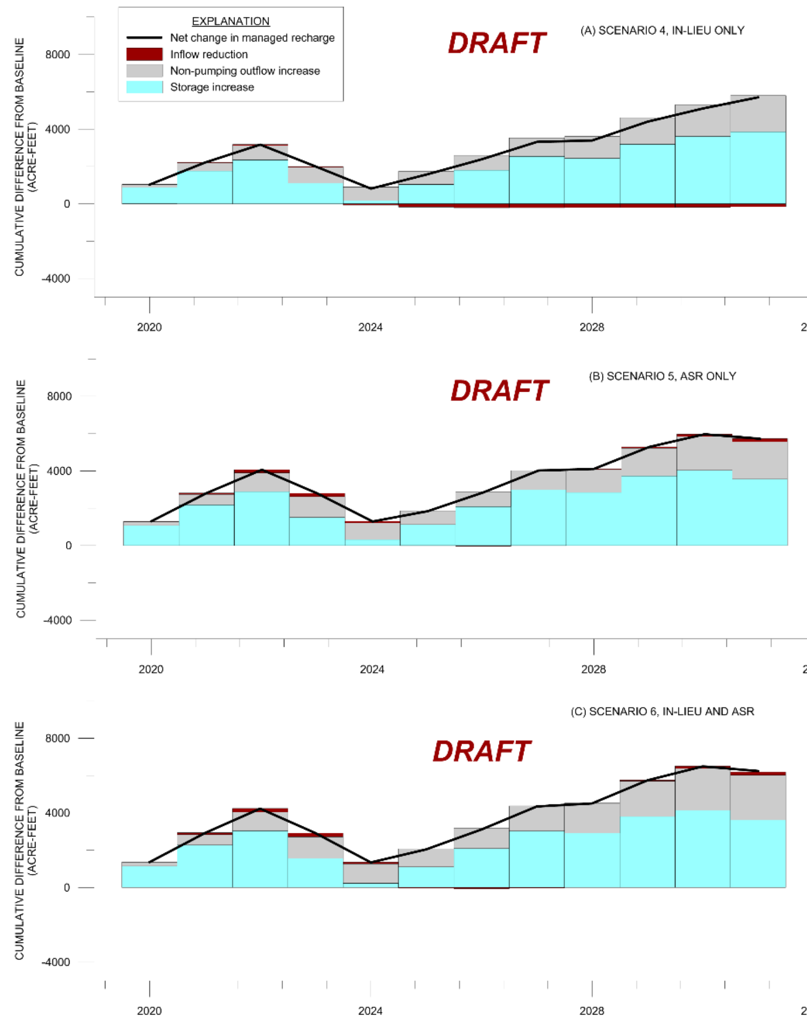




In-Lieu
ASR
Both
Baseline

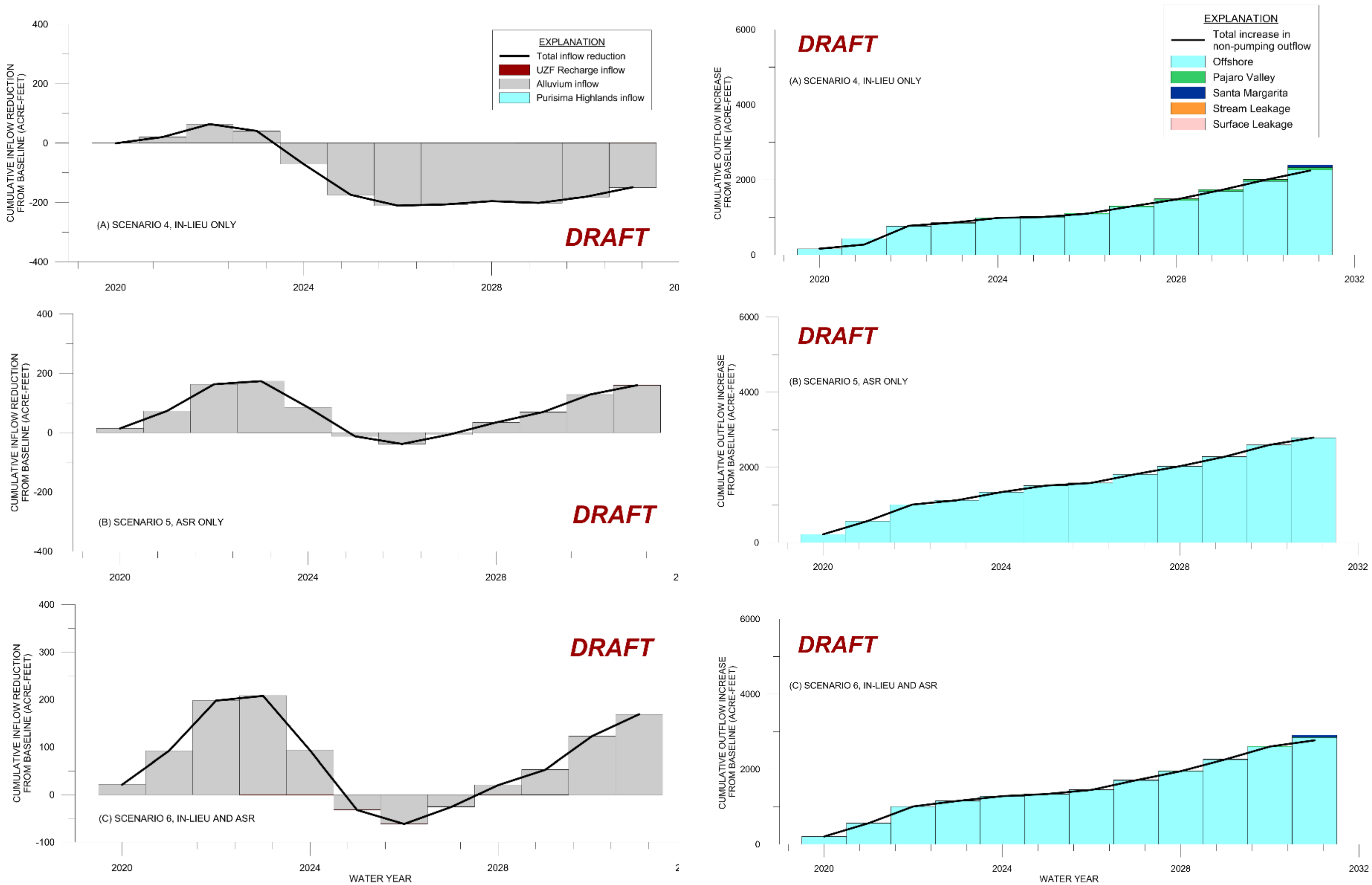
Changes in Groundwater Budget



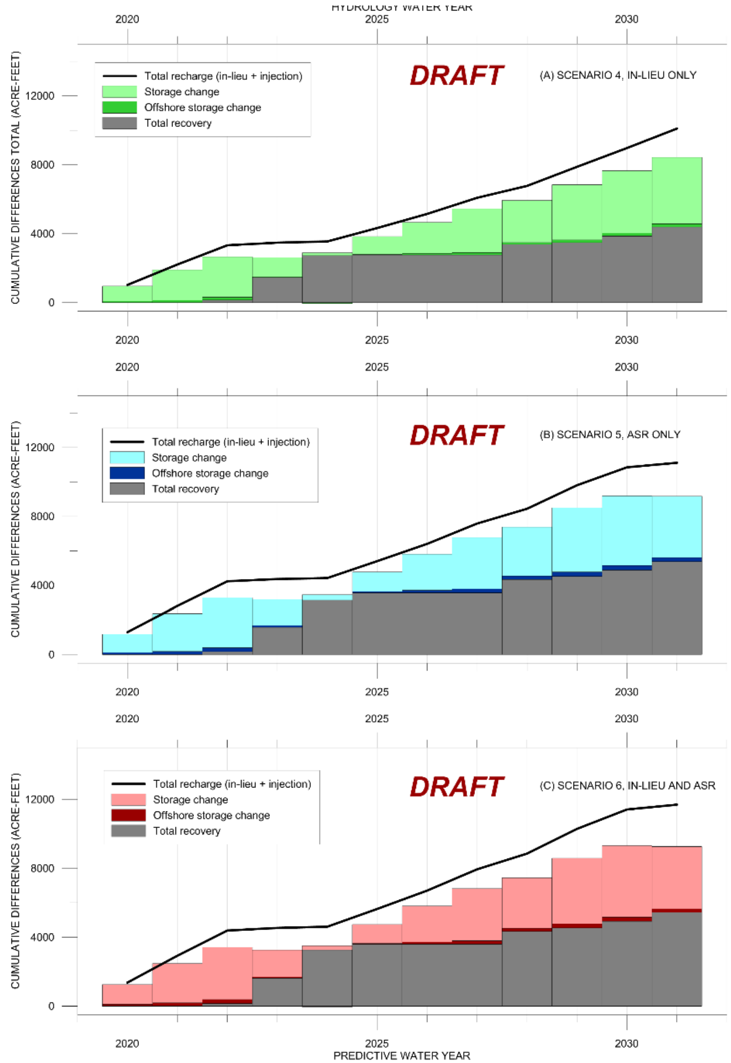


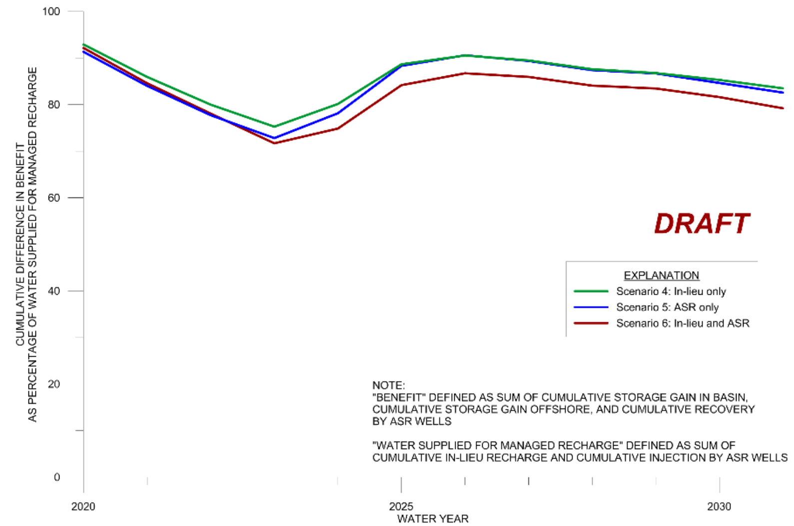
SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

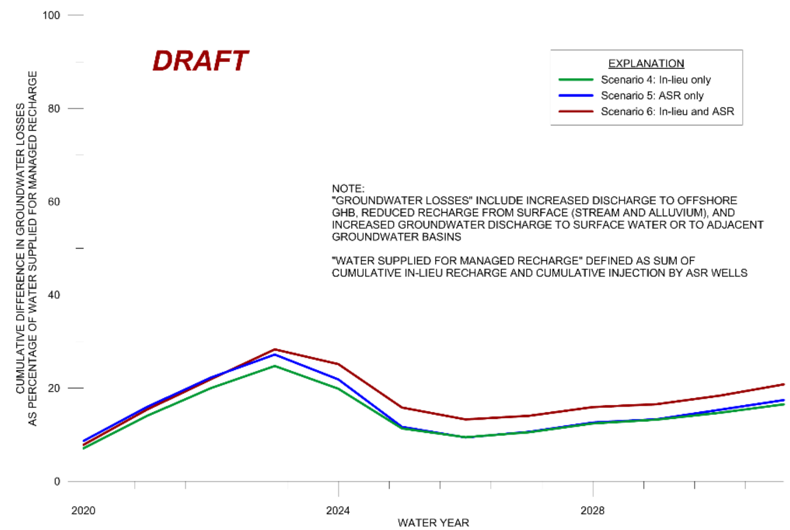
Components of Groundwater Loss



Benefit and Loss Percentage

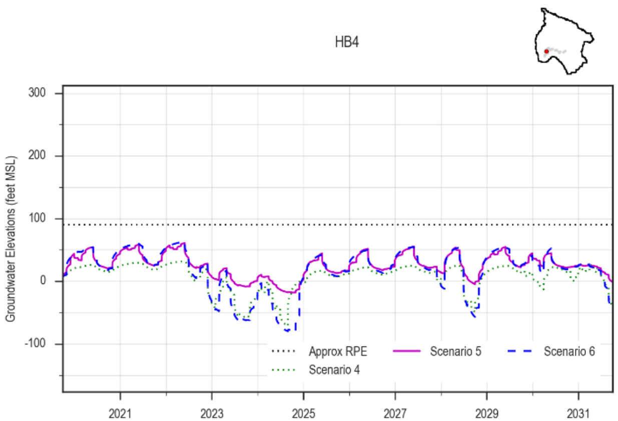


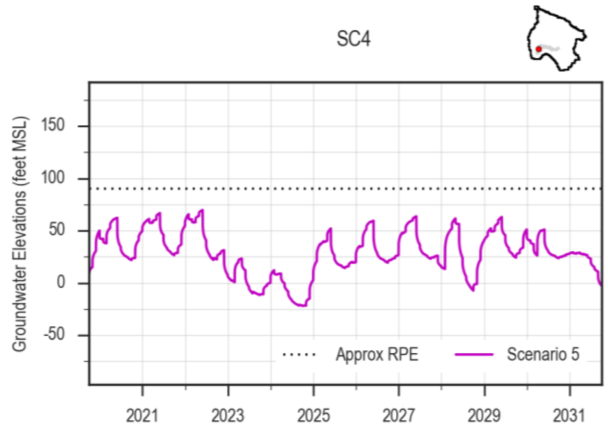


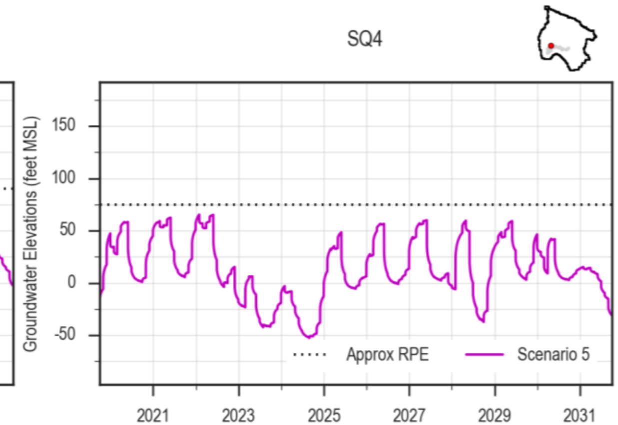


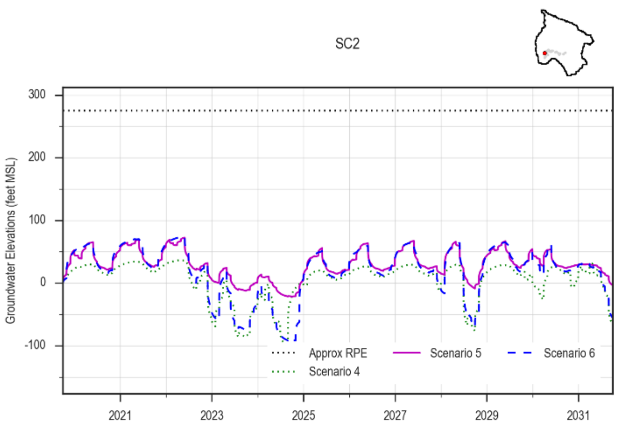
SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

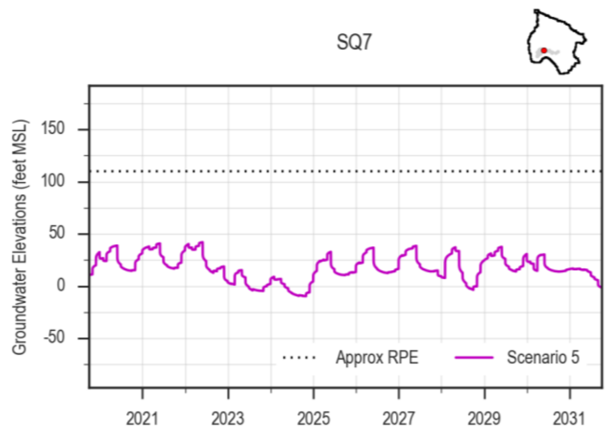
Recovery/ASR Wells

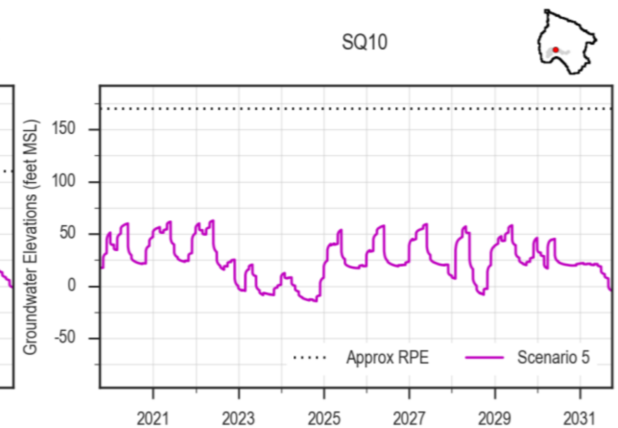












SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

City of Santa Cruz ASR Run Conclusions

- Not designed to achieve basin sustainability
  - Does not achieve basin sustainability
  - Potential for benefits to basin demonstrated
  - Results in some exceedances of sustainable management criteria
- City feasibility study
  - Slightly higher hydraulic losses than estimated for WSAC
  - Storage capacities support project
  - Assumed well injection capacities consistent with project
  - Location of recovery wells relative to recharge (in-lieu or injection) important

Questions and Discussion on Modeling Results

- What do the modeling results say about preferred management actions or projects to achieve sustainability?

Item 4.1. Summary of Groundwater Modeling **Assumptions** and Scenarios

Model Assumptions with Water Supply Augmentation Options as Superscript	**Assumptions**	**Follow up work**
Pumping demand [1]	CWD: pre-drought average 2008-2011 SqCWD: 2015 Urban Water Management Plan projections that reduce over time City of Santa Cruz: cooperative agreement with SqCWD Pre-drought estimates for non-municipal pumping	SqCWD projected demand may be too low; test SqCWD demand that is stable over time
Return Flow	Municipal system losses from sewer and water pipes	
Santa Margarita/Pajaro Valley boundaries	No annual changes in heads	
Stream-aquifer interaction	Streamflow calculated by model and calibrated to gauge flow data	Calibration of stream alluvium to gradient between shallow groundwater level and stream level
Climate change	Catalog Climate: 10% less rainfall, 1.5 degree F increase in temps	Model TAC approved use of Catalog Climate as opposed to individual global circulation models; will need to check approach with DWR
Sea level rise	+1.5 ft	Model TAC advised updating to 2018 Ocean Protection Council updated guidance +2.3 feet in 2070 based on 5% probability
Surface water transfer [2]	2015 AFY pilot transfer to SqCWD continues indefinitely	

Item 4.1. Summary of Groundwater Modeling Assumptions and **Scenarios**

Model Scenario with Water Supply Augmentation Options as Superscript	Type	General Effect on Groundwater Levels	Follow up work
Eliminate inland pumping in areas where simulated groundwater levels are > 50 ft above sea level	Sensitivity	small effect in coastal groundwater levels (< 1 ft increase)	Test effect of non-municipal pumping in Aromas area (Purisima F and Aromas)
Reduce septic tanks return flow from 90% to 50%	Sensitivity	small effect in coastal groundwater levels (~1 ft decrease)	
Pajaro Valley Boundary, groundwater increases 3 ft	Sensitivity	benefits groundwater levels in the Aromas area (up to 1.2 ft increase at protective elevation wells)	
Effect of non-municipal pumping in alluvium	Sensitivity	In progress	Move pumping in aquifers below alluvium and Terrace Deposits to alluvium and Terrace Deposits
Effect of non-municipal pumping in Soquel Creek and Bates Creek Valleys	Sensitivity	In progress	Turn off pumping in these areas
Effect of vertical distribution of pumping near Soquel Creek	Sensitivity	In progress	Move municipal pumping in wells screened in AA and Tu to only Tu
Remove surface water transfer to SqCWD	Management action	Lowers groundwater levels in coastal Purisima A unit and Tu unit up to 4 feet.	
Municipal pumping redistribution towards coast	Current operational limits	Lowers groundwater levels 1-4 feet in western coastal Purisima A unit. Increase groundwater levels 10+ feet in coastal Tu unit. Decreases groundwater levels <1 ft in coastal Aromas area.	
Reduce municipal pumping [1, 2a, 4a, 4bii, 4d, 5a, 5b]	Management action	- helps recover Purisima A-unit and BC unit. Purisima A/BC units can have increased pumping and still achieve sustainability - Aromas area/Purisima F unit pumping needs further reduction - Tu unit pumping needs further reduction - coastal elevations La Selva Beach area of Aromas aquifer (SC-A3A) are not impacted by reducing municipal pumping because municipal wells already inactive.	Redistribute municipal pumping further in an attempt to reach Minimum Thresholds and Measurable Objectives at more wells Test effect of non-municipal pumping in Aromas area (Purisima F and Aromas)
Aquifer storage and recovery by City of Santa Cruz [2b]	Project	Greater groundwater level declines near recovery wells for in-lieu scenarios compared to ASR injection scenarios	Continue feasibility evaluation by simulating different project configurations
Pure Water Soquel seawater intrusion prevention by SqCWD [4bi, 4c]	Project	see Draft EIR Project to be discussed at December 2018 GSP Advisory Committeee meeting	

Item 4.2. Summary Overview of Initial Proposed Sustainable Management Criteria

Significant & Unreasonable	Undesirable Results	Minimum Thresholds	Measurable Objectives
Seawater Intrusion			
Significant and unreasonable conditions would occur if seawater moves farther inland than has been observed in the past five years.	<u>Protective Groundwater Elevations</u> Ten-year average groundwater elevations below protective groundwater elevations in Coastal Monitoring Wells for any Coastal Monitoring Well.	Current protective groundwater elevations (protective of 70% of simulations at coastal wells)	Protective groundwater elevations that are protective of >99% of simulations at coastal wells)
	<u>Chloride Concentrations</u> A. Any coastal monitoring well with current intrusion has a chloride concentration above its past five year maximum chloride concentration. This concentration must be exceeded in 2 or more of the last 4 consecutive samples (quarterly sampled wells). B. Any Unintruded Coastal Monitoring Well has a chloride concentration above 250 mg/L. This concentration must be exceeded in 2 or more of the last 4 consecutive samples (quarterly sampled wells). C. Any Unintruded Inland Monitoring Well (which includes municipal production wells closest to the coast and other non-coastal monitoring wells) has a chloride concentration above 150 mg/L. This concentration must be exceeded in 2 or more of the last 4 consecutive quarterly samples.	Chloride 250 mg/L Isocontour	Chloride 100 mg/L Isocontour
Chronic Lowering of Groundwater Levels			
Significant and unreasonable conditions would occur if a significant number of private, agricultural, industrial, and municipal production wells can no longer provide enough groundwater to supply beneficial uses.	The average monthly Representative Monitoring Well groundwater elevation falls below the <minimum threshold>. All Representative Monitoring Wells to be equipped with data loggers.	Elevation set to meet the water demand of overlying users	2013-2017 average groundwater elevations

See Agenda Packet for full table

Public Comment

GROUNDWATER QUALITY

Rosemary Menard and Georgina King

October 24, 2018

SANTA CRUZ MID-COUNTY
GROUNDWATER AGENCY

Summary of Key Points

- There are strong federal and state statutes and regulations governing water quality that will apply to implementation of management actions and/or projects that may become part of the GSP;
- Federal and state anti-degradation policies are particularly important in considering how projects and/or management actions might be used to support basin sustainability;
- Federal and state policy and regulations are not static but are continuously evolving based on new information and experience.

Item 8. Update on Development of Draft Groundwater Quality Sustainable Management Criteria

Summary of Initial Proposed Sustainable Management Criteria

Significant & Unreasonable	Undesirable Results	Minimum Thresholds	Measurable Objectives
Significant and unreasonable conditions would occur when groundwater quality, attributable to groundwater pumping or managed aquifer recharge, fails to meet state drinking water standards.	Undesirable results in the basin occur when as a result of groundwater pumping or managed aquifer recharge any Representative Monitoring Wells exceeds any <minimum threshold> annually.	Drinking water standards	2013-2017 average concentrations Organic Compounds: Maximum Contaminant Level Goal

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

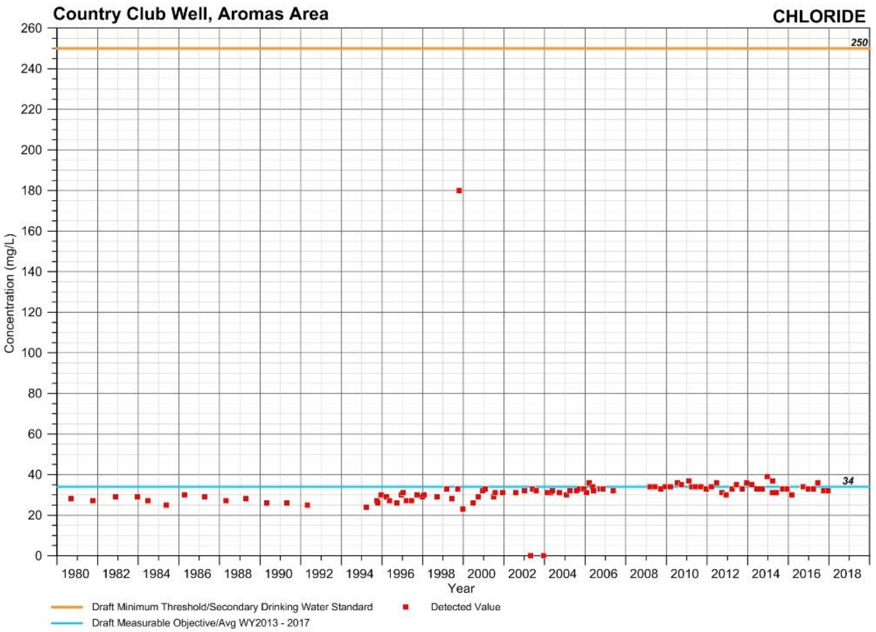
Draft Groundwater Quality Sustainable Management Criteria

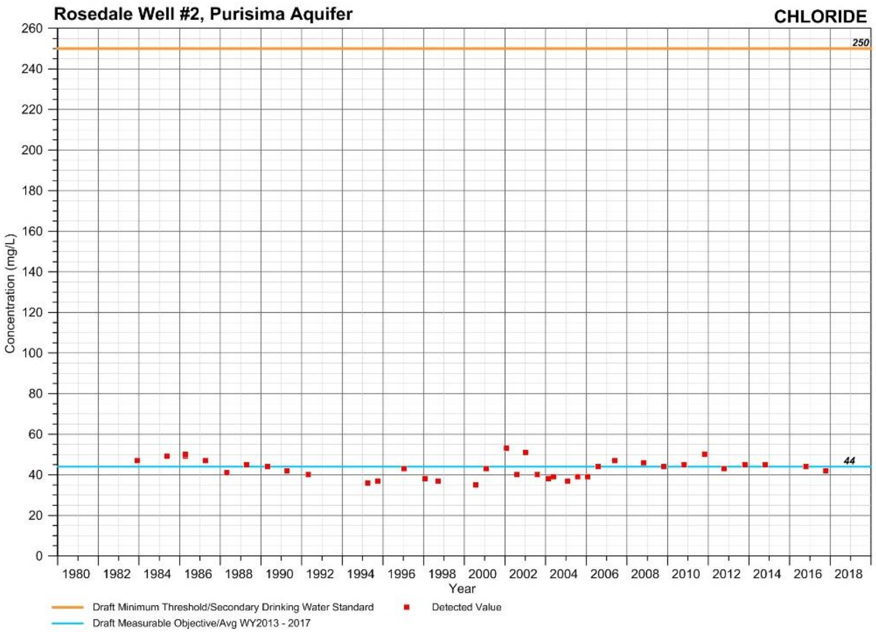
Constituent	Unit	Representative Monitoring Well Minimum Threshold	Range of Representative Monitoring Well Measurable Objectives (2013 – 2017 average)	
			Aromas Area	Purisima Aquifer
chloride	mg/L	250	19 - 60	10 - 150
TDS	mg/L	1,000	209 - 480	209 – 1,198
nitrate as N	mg/L	10	0.1 – 7.1	0 – 1.7
iron	µg/L	300	10.8 – 40.7	15.1 – 1,436
manganese	µg/L	50	4 - 181	9 - 540
arsenic	µg/L	10	0.3 - 0.8	0.1 – 2.5
chromium, total	µg/L	50	0.4 – 26.5	0.2 – 4.1
chromium VI	µg/L	drinking water standard not yet set	0 – 22.0	0 – 0.1
perchlorate	µg/L	6	0.2 – 0.4	0.1 – 2.7
organic compounds		drinking water standards	MCLG	MCLG

Minimum Thresholds & Measurable Objectives may not be able to be set for iron and manganese in the Purisima wells as concentrations fluctuate significantly

Chloride Examples

Constituent	Unit	Representative Monitoring Well Minimum Threshold	Range of Representative Monitoring Well Measurable Objectives (2013 – 2017 average)	
			Aromas Area	Purisima Aquifer
chloride	mg/L	250	19 - 60	10 - 150



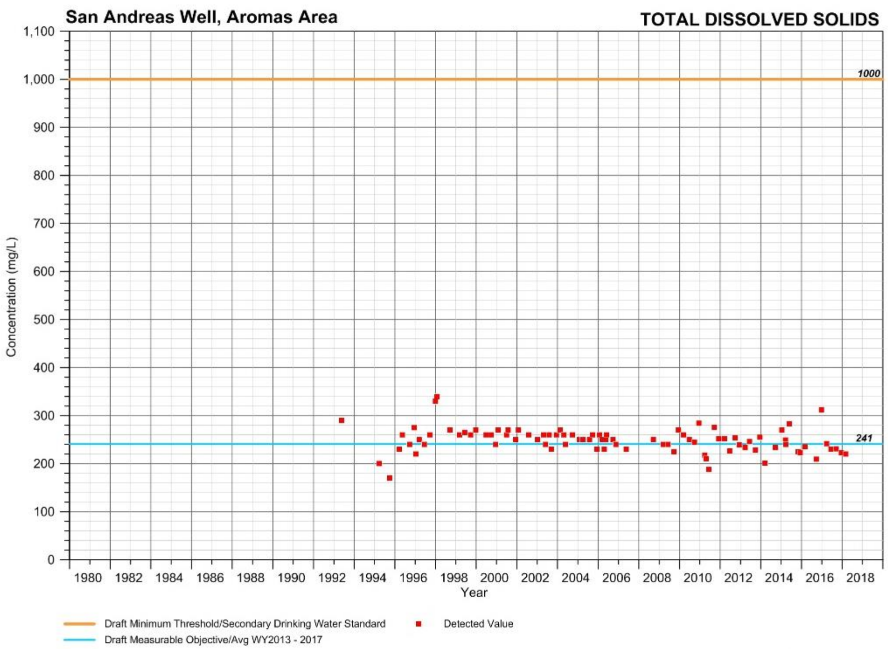


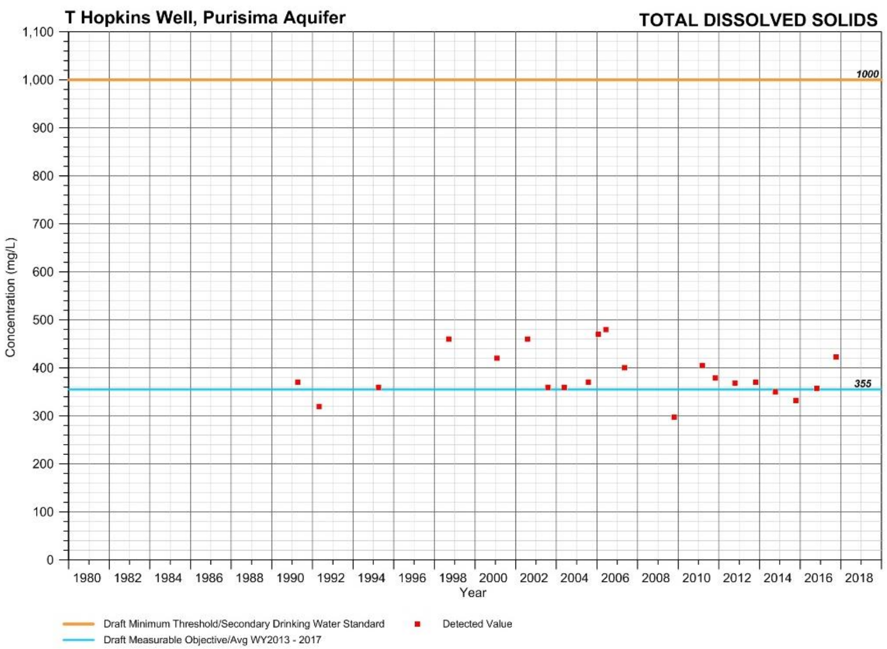
good quality

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

Total Dissolved Solids Examples

Constituent	Unit	Representative Monitoring Well Minimum Threshold	Range of Representative Monitoring Well Measurable Objectives (2013 – 2017 average)	
			Aromas Area	Purisima Aquifer
TDS	mg/L	1,000	209 - 480	209 – 1,198



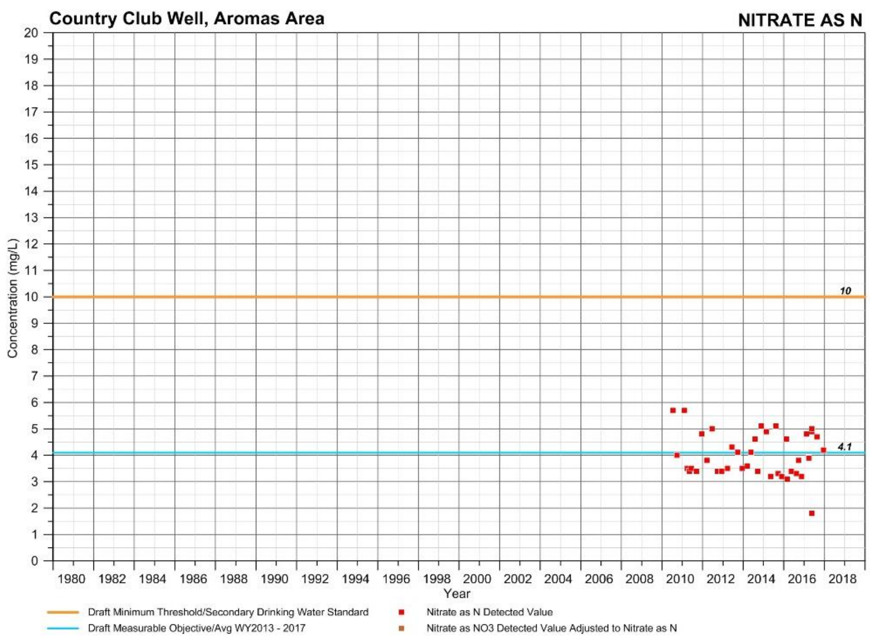


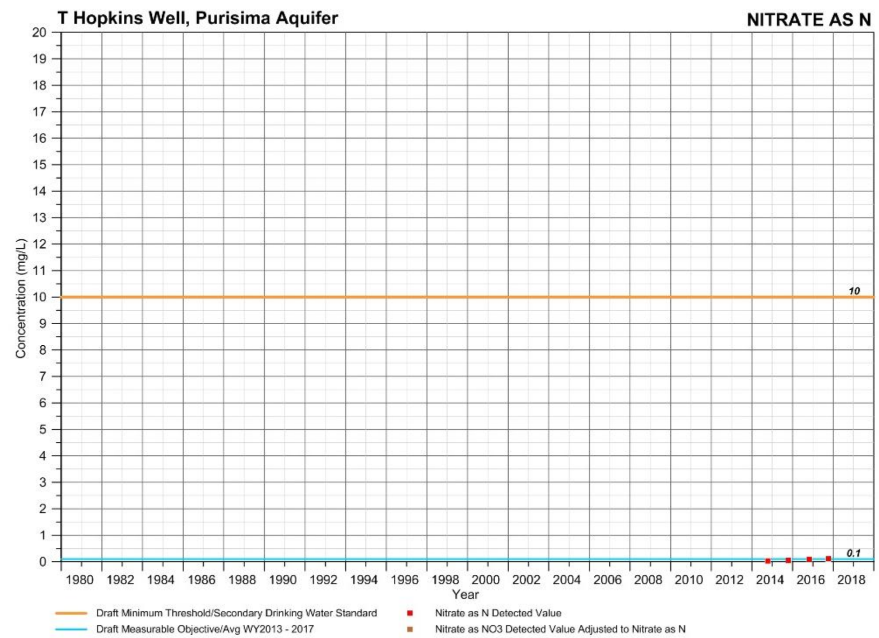
good quality

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

Nitrate as N Examples

Constituent	Unit	Representative Monitoring Well Minimum Threshold	Range of Representative Monitoring Well Measurable Objectives (2013 – 2017 average)	
			Aromas Area	Purisima Aquifer
manganese	µg/L	50	4 - 181	9 - 540



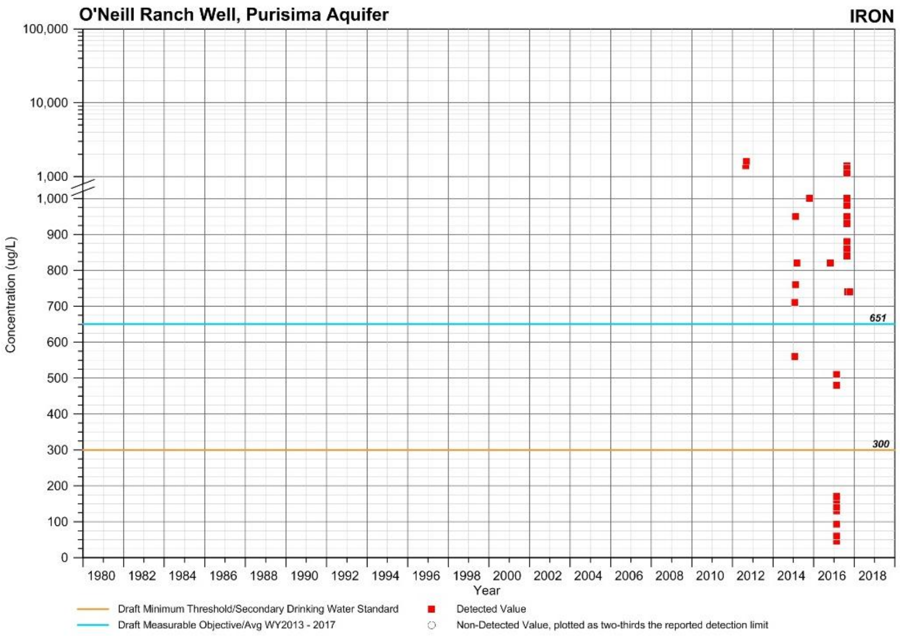


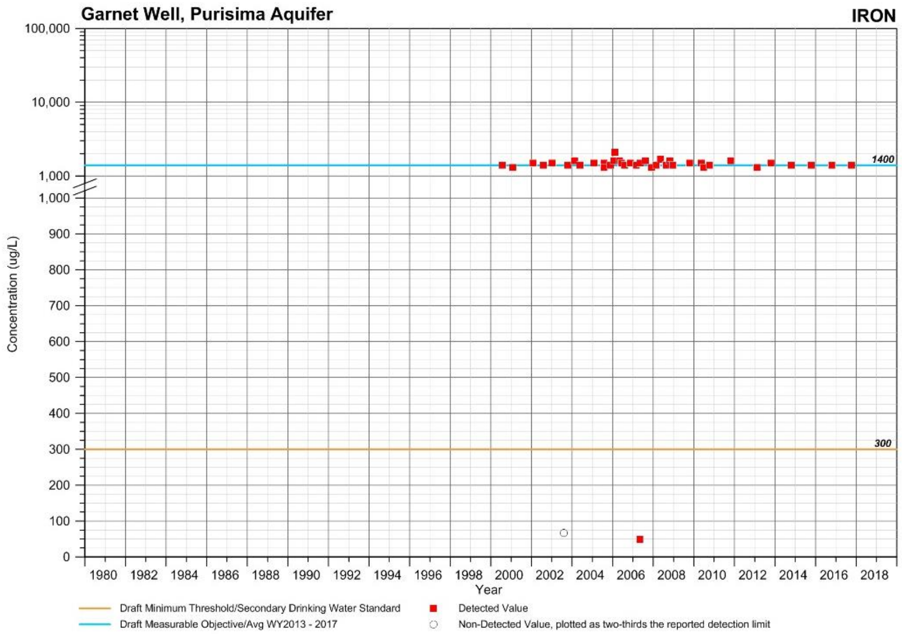
Aromas – slightly elevated but <10 mg/L

Purisima – good quality

Iron Examples

Constituent	Unit	Representative Monitoring Well Minimum Threshold	Range of Representative Monitoring Well Measurable Objectives (2013 – 2017 average)	
			Aromas Area	Purisima Aquifer
iron	μg/L	300	10.8 – 40.7	15.1 – 1,436

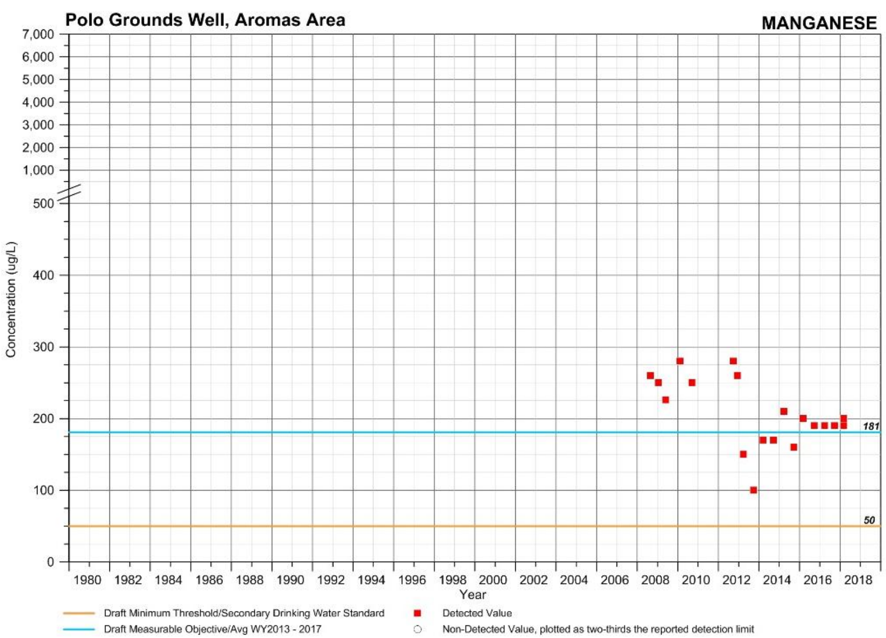


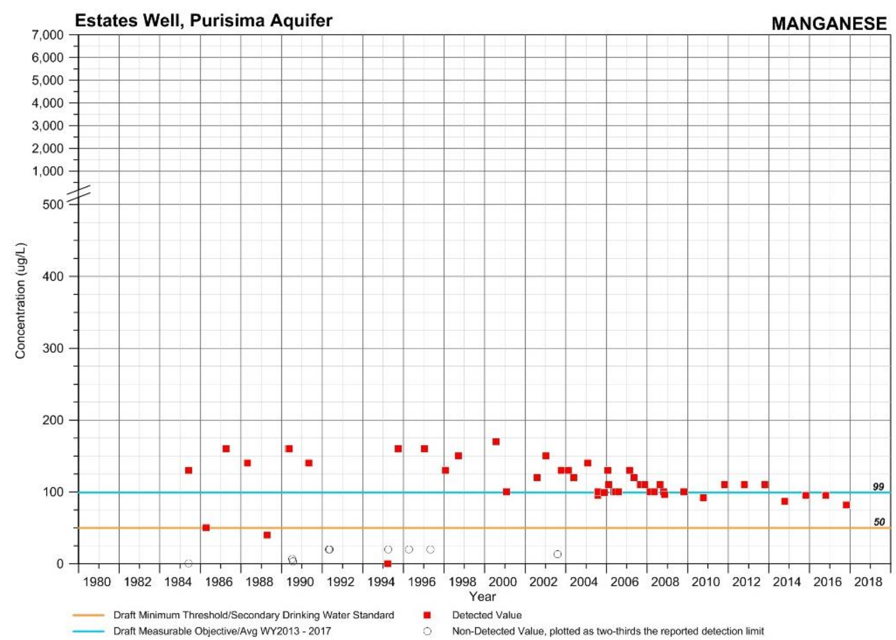


No Undesirable Results because elevated iron is naturally occurring and not caused by use of groundwater

Manganese Examples

Constituent	Unit	Representative Monitoring Well Minimum Threshold	Range of Representative Monitoring Well Measurable Objectives (2013 – 2017 average)	
			Aromas Area	Purisima Aquifer
manganese	µg/L	50	4 - 181	9 - 540

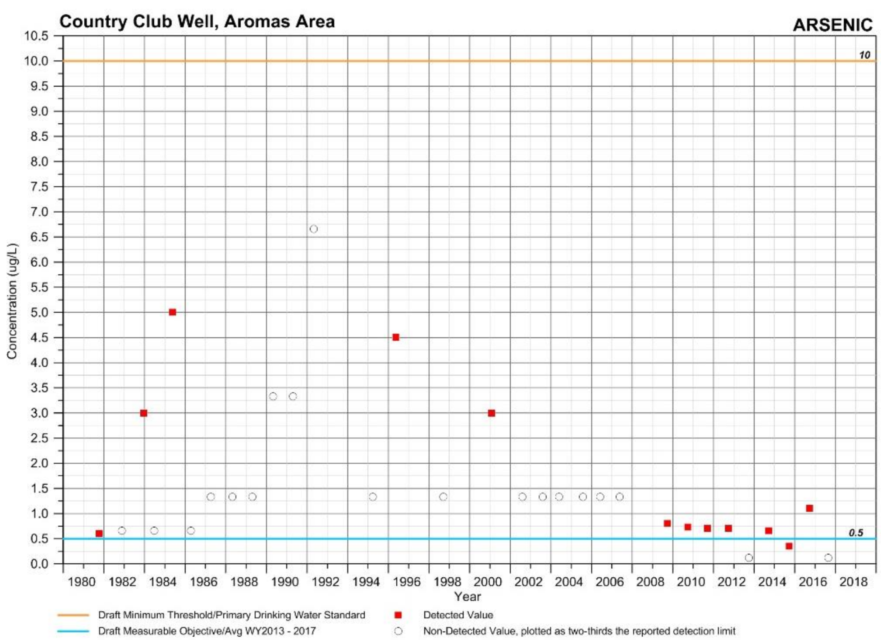


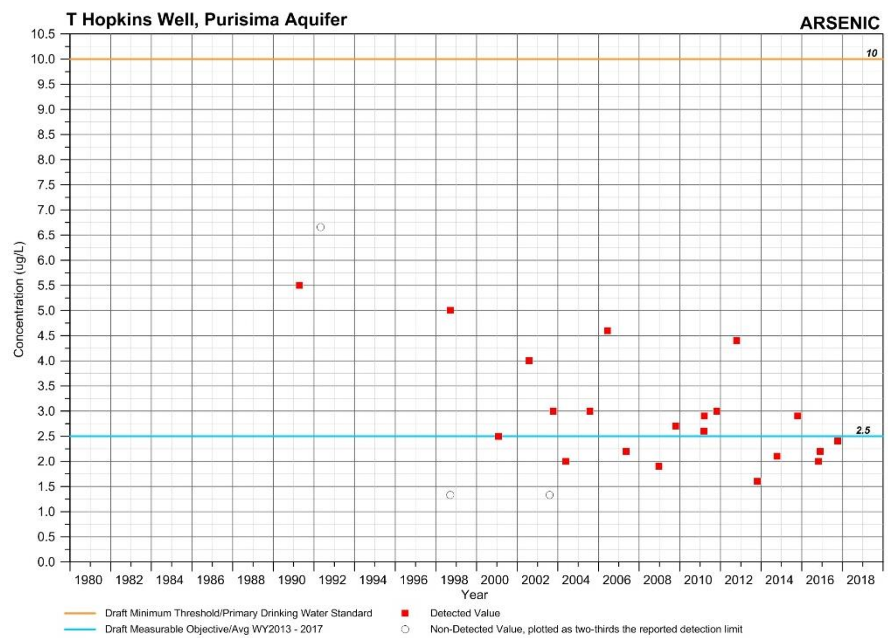


No Undesirable Results because elevated manganese is naturally occurring and not caused by use of groundwater

Arsenic Examples

Constituent	Unit	Representative Monitoring Well Minimum Threshold	Range of Representative Monitoring Well Measurable Objectives (2013 – 2017 average)	
			Aromas Area	Purisima Aquifer
arsenic	µg/L	10	0.3 - 0.8	0.1 – 2.5

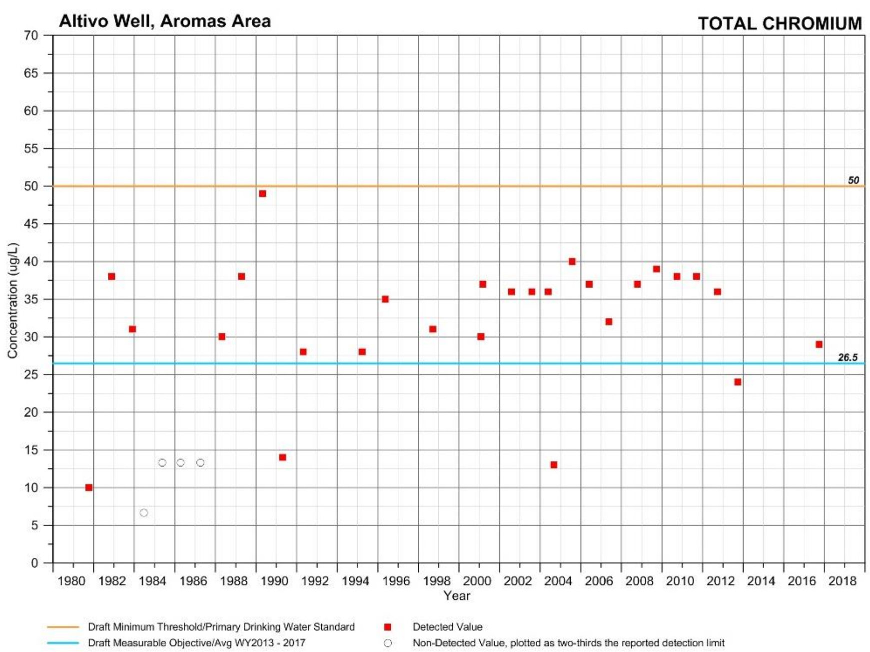


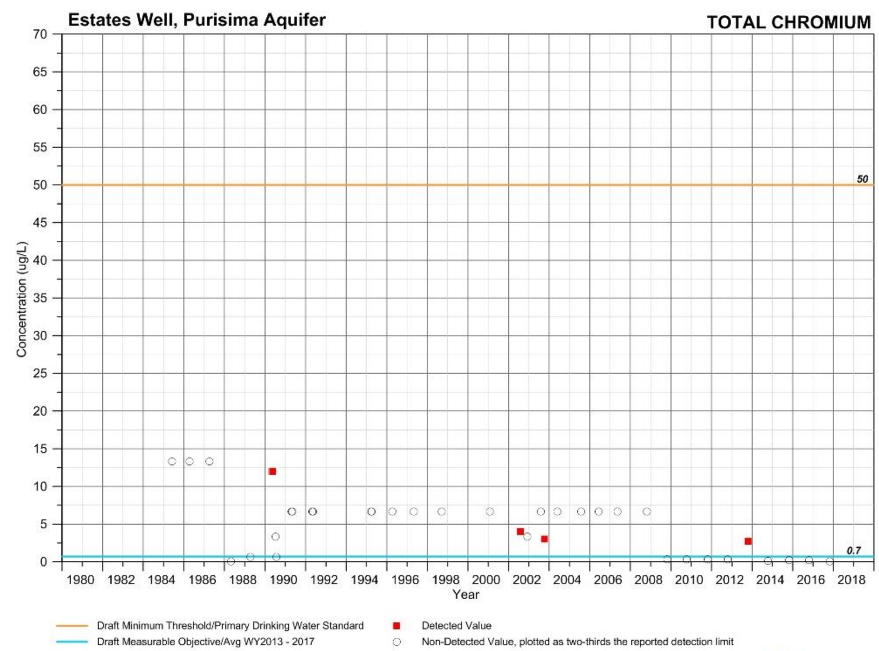


Naturally elevated but generally < 1 µg/L

Total Chromium Examples

Constituent	Unit	Representative Monitoring Well Minimum Threshold	Range of Representative Monitoring Well Measurable Objectives (2013 – 2017 average)	
			Aromas Area	Purisima Aquifer
chromium, total	µg/L	50	0.4 – 26.5	0.2 – 4.1

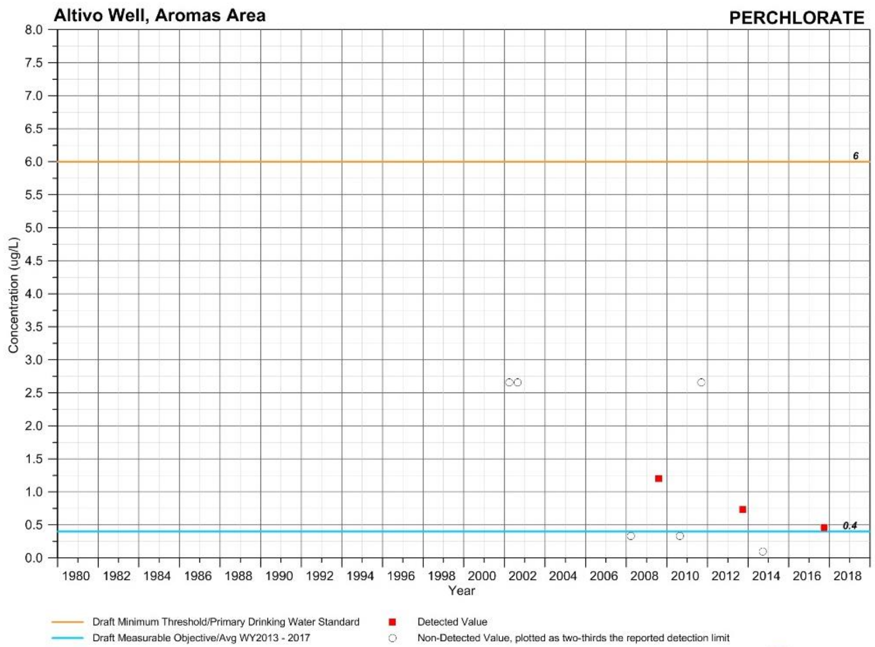


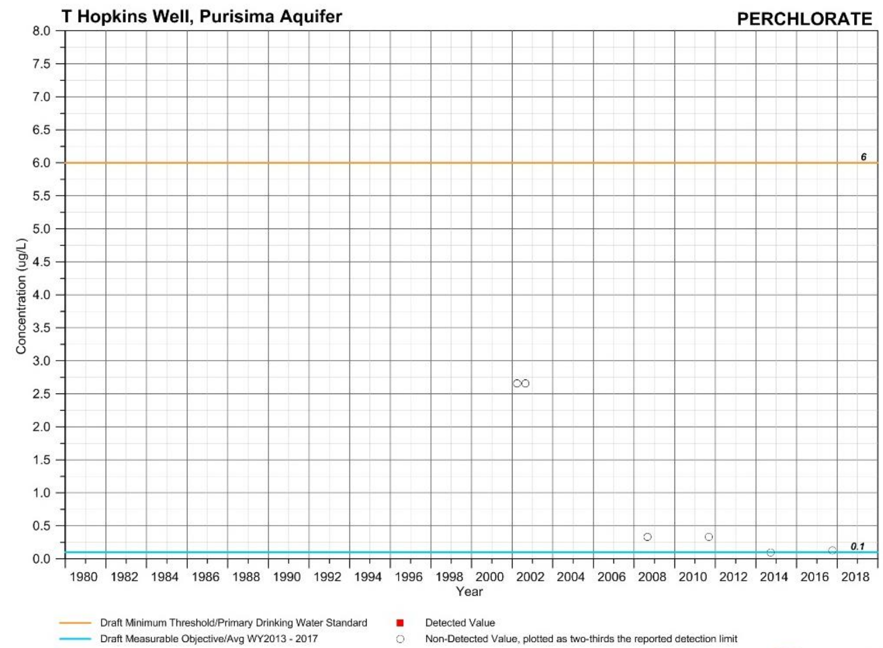


Naturally elevated but < 40 µg/L. If > 50 µg/L this is not an Undesirable Result because chromium in naturally occurring

Perchlorate Examples

Constituent	Unit	Representative Monitoring Well Minimum Threshold	Range of Representative Monitoring Well Measurable Objectives (2013 – 2017 average)	
			Aromas Area	Purisima Aquifer
perchlorate	µg/L	6	0.2 – 0.4	0.1 – 2.7

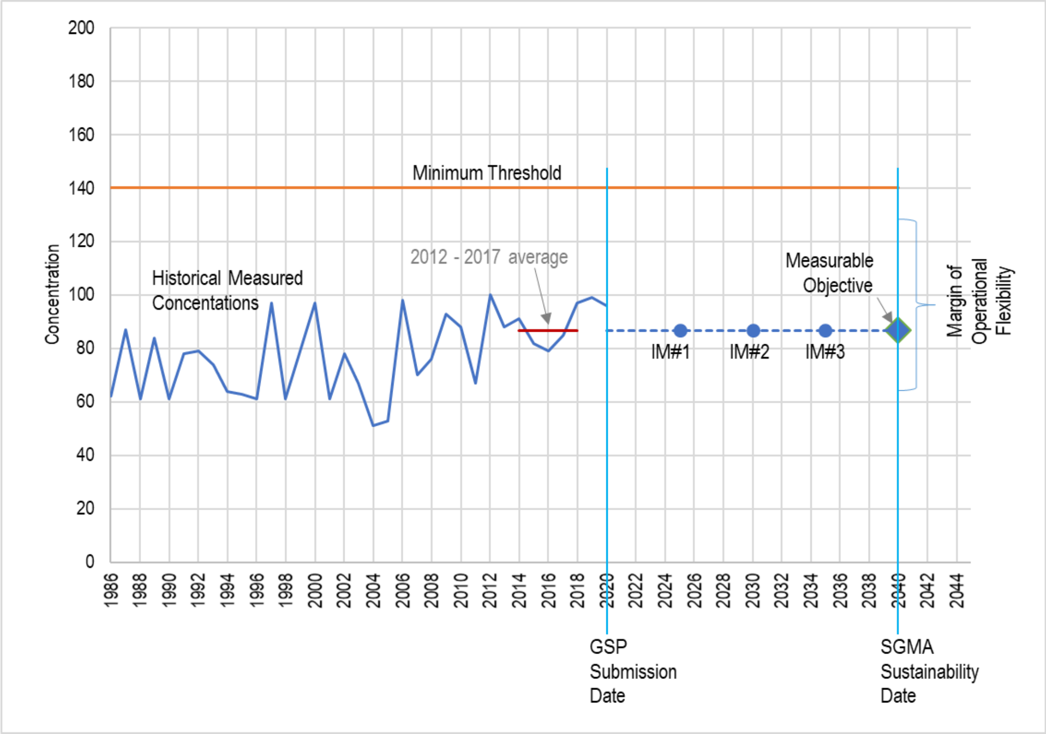




Localized in Aromas but generally <= 1.2 µg/L

Staff Proposal for Interim Milestones for Degraded Groundwater Quality

- Set Interim Milestones at the same concentration as Measurable Objectives to indicate that we don't expect any changes (improvements or degradation) over time



Questions and Discussion

Public Comment

Confirm

September 26, 2018

GSP Advisory Committee Meeting Summary

Recap and Next Steps

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

GSP Project Timeline – Phase 2

Santa Cruz Mid-County Basin
Groundwater Sustainability Plan Process Overview — July–December 2018

2018 — PHASE 2: GSP ADVISORY COMMITTEE POLICY DEVELOPMENT

7/18 8/18 9/18 10/18 11/18 12/18

Phase 2b. July – December 2018: Projects, Management Actions and Groundwater Modeling

July 19, 2018 *(Joint Advisory Committee/MGA Board Meeting)*
- Discuss projects and management actions and how they relate to GSP.

August 22, 2018
- Describe groundwater model and what goes into the model, including discussion of assumptions for historic and predictive simulations.
- Discuss groundwater modeling results for sample projects and management actions; evaluate project impacts against minimum thresholds.

September 26, 2018
- Discuss model results – pumping impacts by use type and location.
- Review proposed minimum thresholds for chronic lowering of groundwater levels.
- Discuss proposal for developing measurable objectives.

October 24, 2018
- Present groundwater modeling results for sustainability strategies; evaluate results against minimum thresholds and measurable objectives.
- Review of federal and state statutory and regulatory framework governing potential GSP management actions and projects related to water quality.

November 15, 2018
- MGA Board meeting only (no Advisory Committee meeting).

December 12, 2018
- Discuss next iteration of groundwater modeling results.
- Discuss projects and management actions, and measurable objectives for analysis (e.g., cost allocation, legal issues) in 2019.
- Revisit sustainability goal.
- Discuss management areas.

7/18 8/18 9/18 10/18 11/18 12/18

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

Next Steps: Meetings13, 14, 15

- **November 15 – No Advisory Committee Meeting**
  - MGA Board meeting only
- **December 12 Meeting (#13)**
  - Discuss next iteration of groundwater modeling results
  - Discuss projects and management actions, and measurable objectives for analysis (e.g., cost allocation, legal issues) in 2019
  - Revisit sustainability goals
  - Discuss management areas
- **January/February 2019 (#14 & 15)**
  - One meeting will be a joint MGA Board and Advisory Committee convening to discuss projects and conditions in Pajaro Valley
  - Other meeting will focus on reviewing elements of GSP Sections 2, 4 and 5, fee schedule, and summary of impact analysis

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

THANK YOU!

FOR ANY QUESTIONS, PLEASE CONTACT:
DARCY PRUITT, Senior Planner
831.662.2052
dpruitt@cfscc.org

www.midcountygroundwater.org