SANTA CRUZ MID-COUNTY GROUNDWATER SUSTAINABILITY PLAN

Advisory Committee Meeting #18

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

Wednesday, April 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

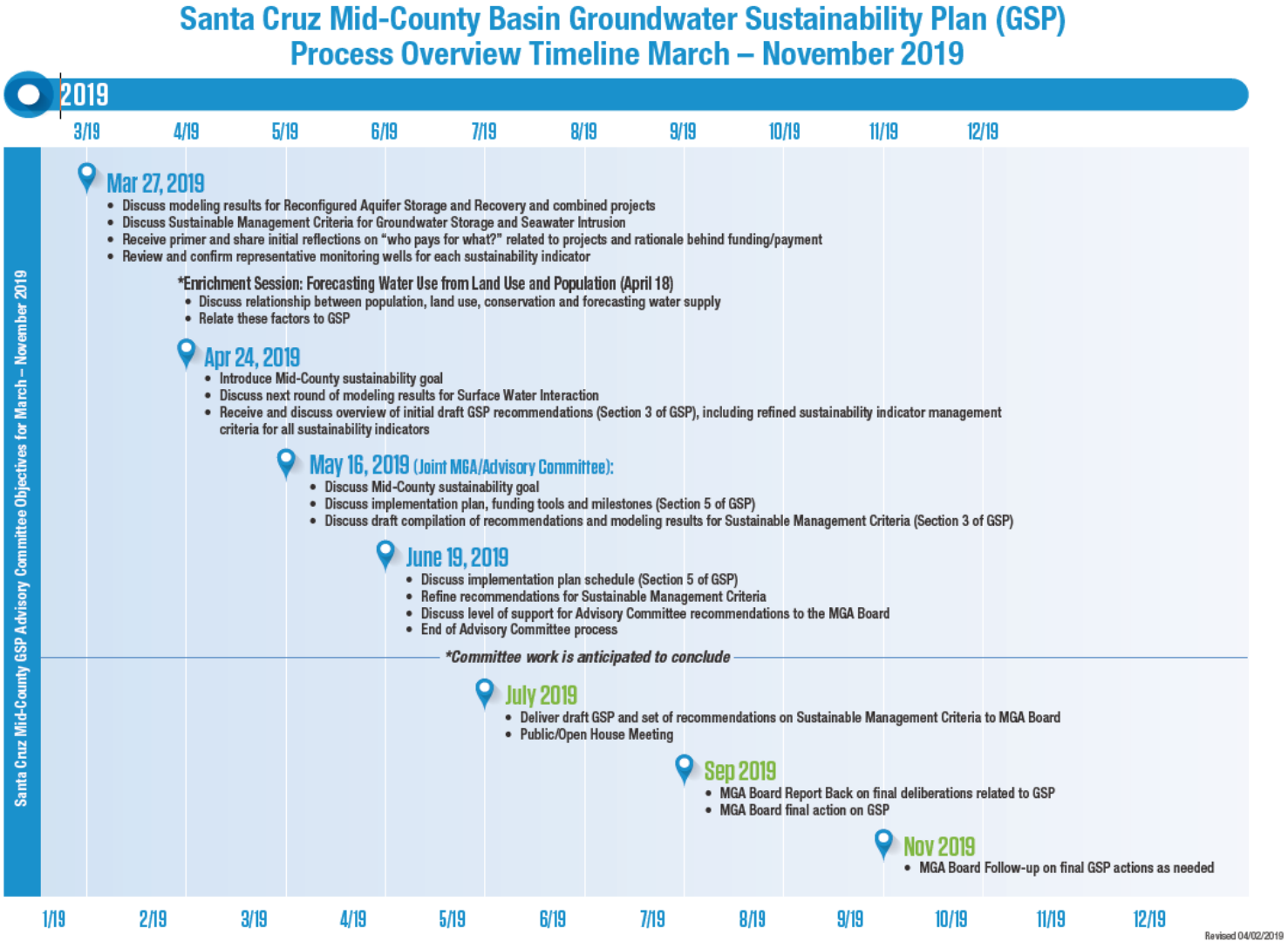
- Receive and discuss next round of modeling results and Sustainable Management Criteria for the Surface Water Interaction Sustainability Indicator.
- Introduce the Mid-County sustainability goal.
- Receive and discuss an overview of initial draft GSP recommendations (Section 3 of GSP), including refined Sustainable Management Criteria for all Sustainability Indicators.
- Discuss how the Advisory Committee will be making its recommendations, including sharing levels of support.

Agenda

5:00	Welcome, Introductions, Objectives, Agenda, and GSP Project Timeline
5:10	Oral Communications
5:20	Project Updates
5:25	Discuss Surface Water Interaction Sustainability Indicator
6:25	Introduce Mid-County Sustainability Goal
6:40	Public Comment
6:50	*Break*
7:05	Receive and discuss overview of initial draft GSP recommendations (Section 3 of GSP)
7:50	Preview of Advisory Committee deliberations and voting on recommendations to MGA Board
8:05	Public Comment
8:15	Confirm February 27, 2019 and March 27, 2019 Advisory Committee Meeting Summaries
8:20	Recap and Next Steps
8:30	*Adjourn*

GSP Project Timeline

GSP 2019 Project Timeline



GSP Rollout: Key Dates

- ***May and June***: Website Updates, Postcard, Survey
- ***June 19th***: GSP Advisory Committee – Vote on recommendations to MGA Board
- ***July 12th***: Draft GSP in Board Packet
- ***July 18th***: Draft GSP Presented to the Board (Board meeting)
- ***July 19th-26th***: Two Open Houses
- ***July 19th – September 19th***: Comment Period Open
- ***September 19th***: Public Hearing, Comment Period Closes
- ***November 21st***: Final GSP presented to Board
- ***Late November***: Submittal to DWR, New 60-Day Comment Period

Oral Communications

Project Updates

- April 18 Water Use Forecasting Enrichment Session

Item 4: Depletion of Interconnected Surface Water Sustainability Indicator

- Background Surface Water Information
- Representative Monitoring Points
- Significant and Unreasonable Conditions
- Groundwater Elevation Proxies
- Minimum Threshold
- Measurable Objectives

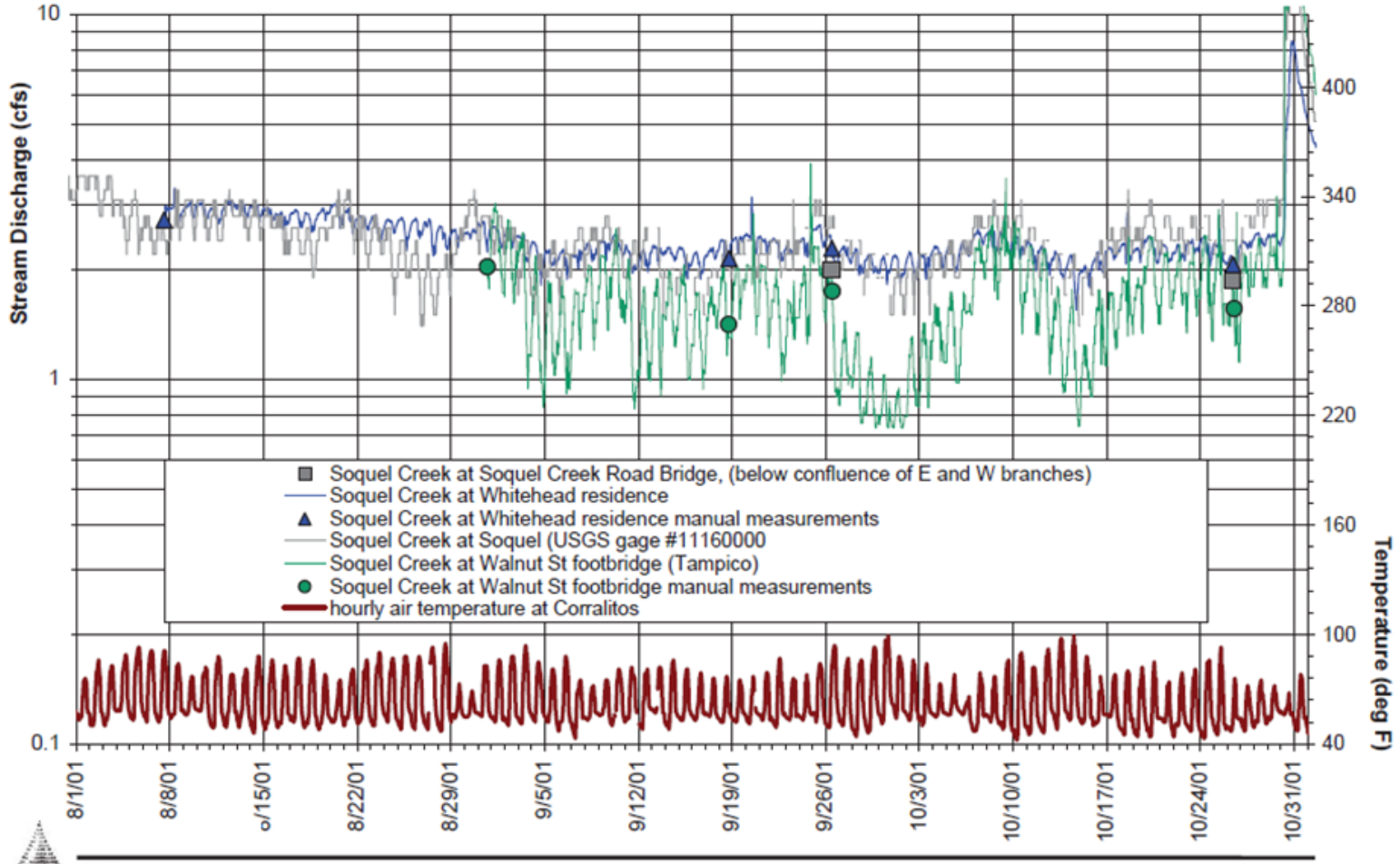
Observed Relationship between Surface Water and Groundwater

Factors Affecting Summer Flow in Mainstem Soquel Creek

Rainfall	+1-5 cfs
Flow from Upper Watershed	+1-4 cfs
Temperature/Evapotranspiration	(0.7-1.4 cfs)
Groundwater Discharge to Mainstem	+0.5-0.7 cfs
Streambed Aggradation (Underflow)	(0.2-0.5 cfs)
Surface Diversions	(0-0.4 cfs)

Median September Flow at USGS Gage = 2.1 cfs	
90% September Flow =5.4 cfs	
10% September Flow = 0.3 cfs	
5% September Flow = 0.2 cfs	

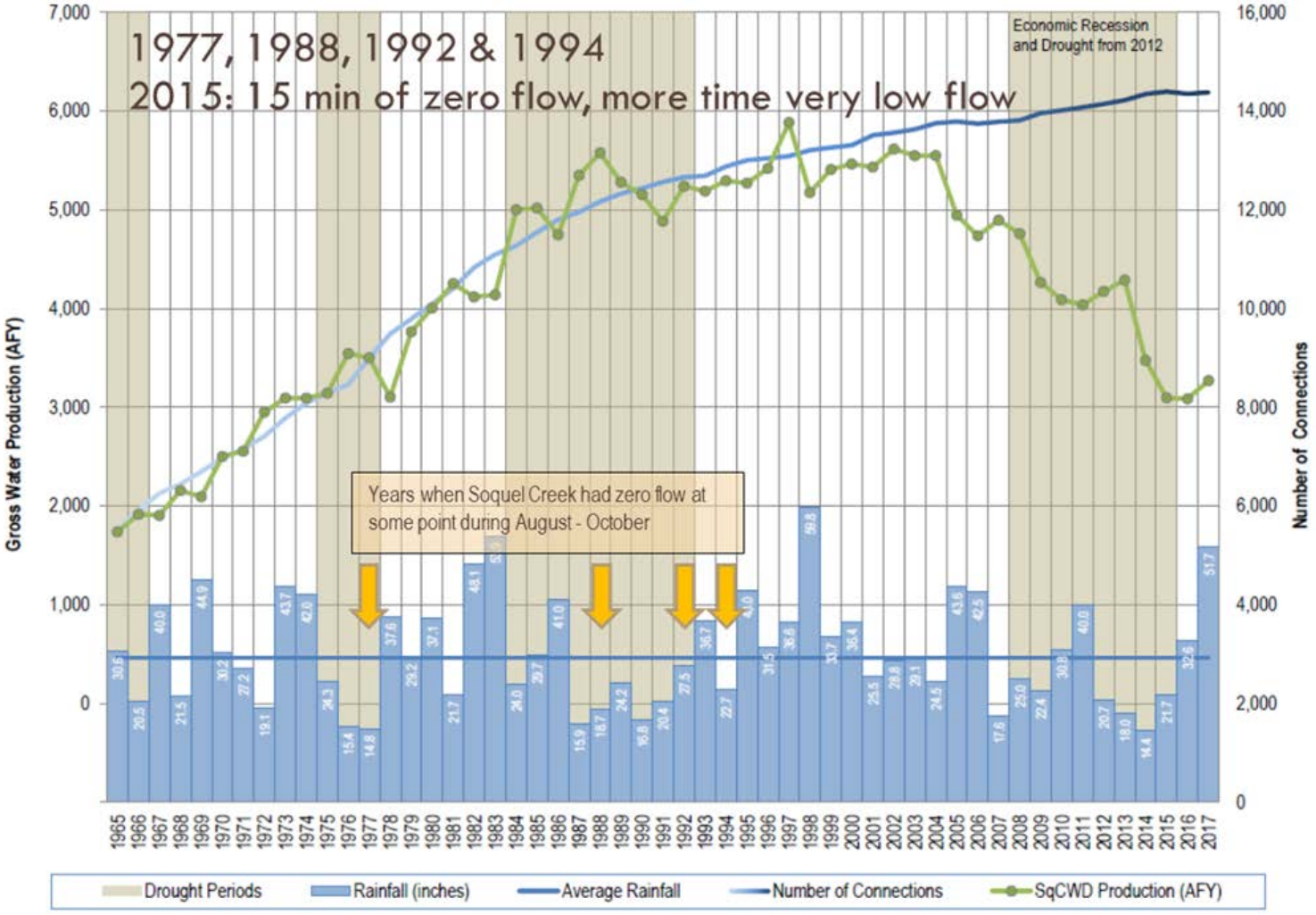
Effect of Temperature and Evapotranspiration



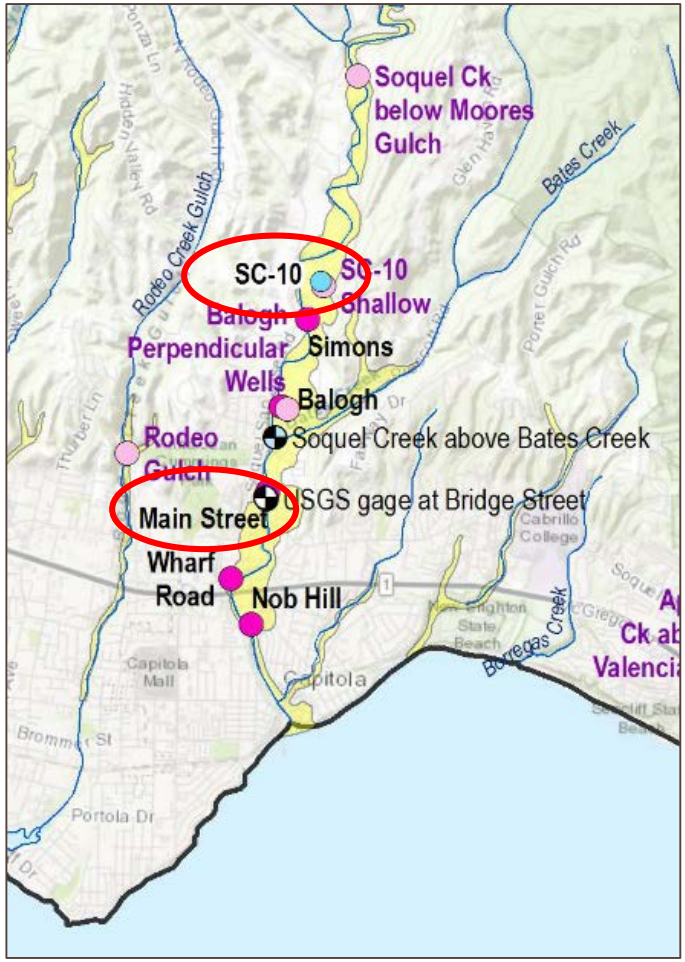
Balance Hydrologics, Inc.

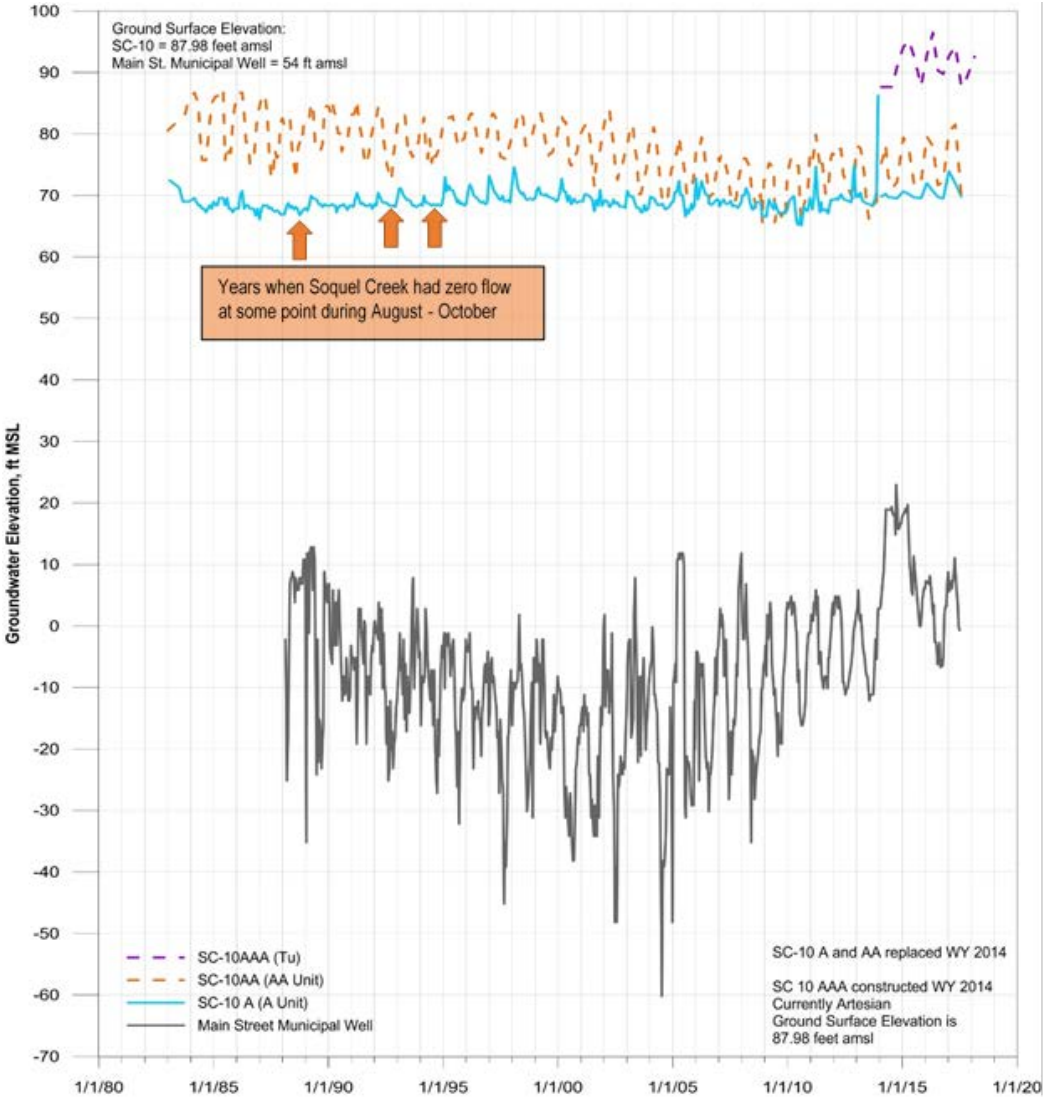
Figure H-7: Comparison of low flow along the Main Branch of Soquel Creek, Summer 2001, Santa Cruz County, California. Flow generally decreases with distance downstream. Flow is also dependent on air tempature, an effect that is magnified at the downstream stations.

Rainfall and Groundwater Pumping

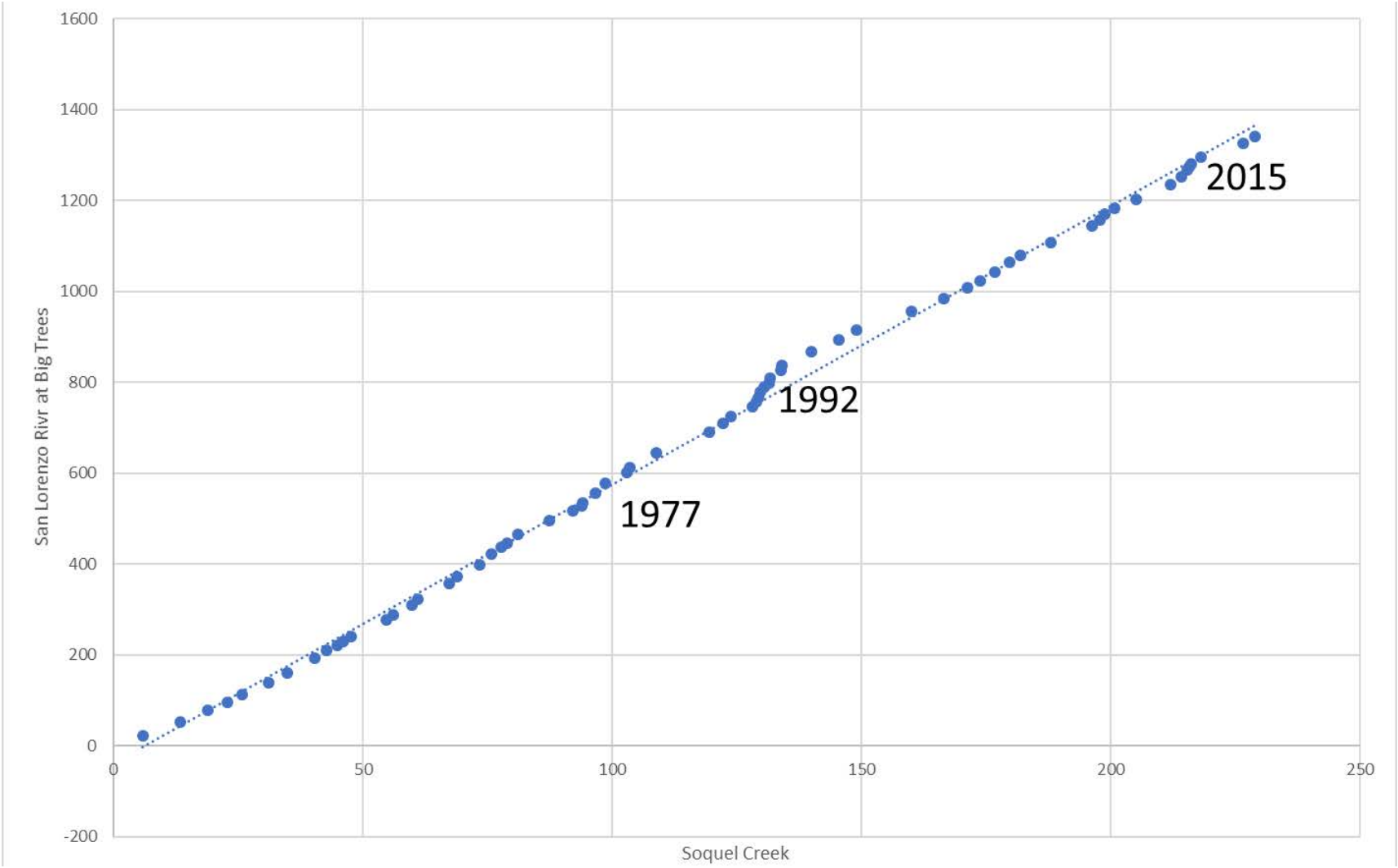


Groundwater Levels Trends at SC-10 and Main Street (1982-2018)



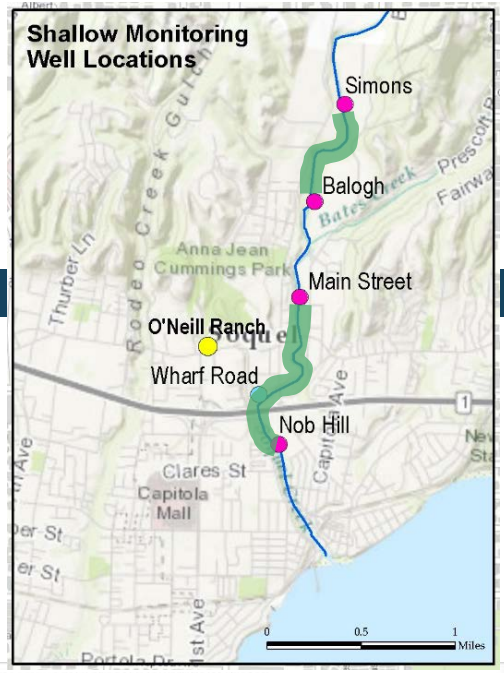


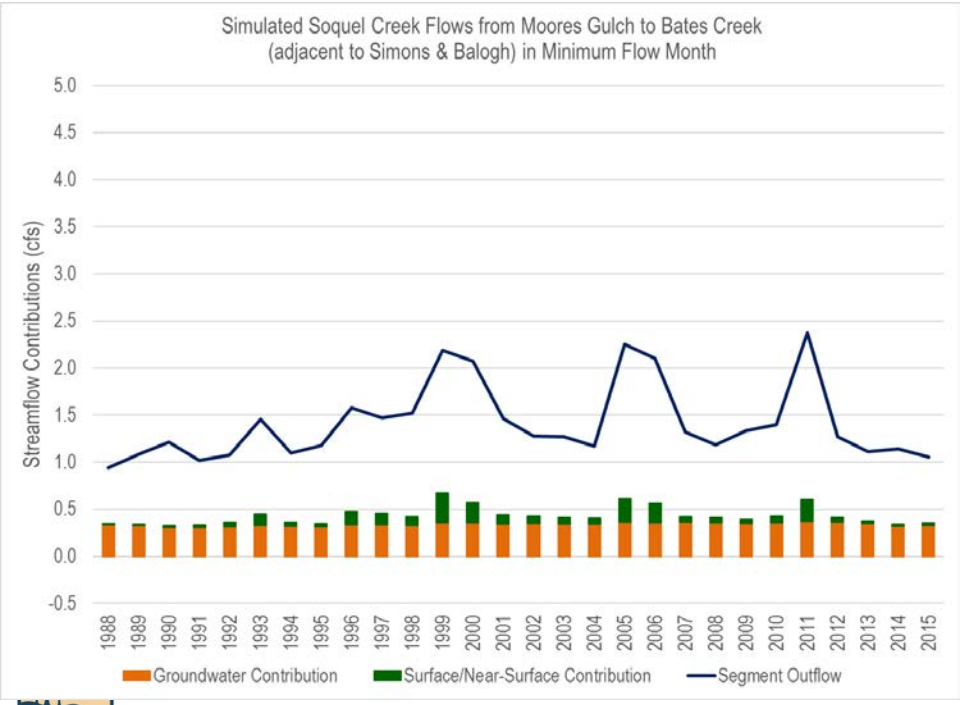
There has been some Observed Increase in Streamflow

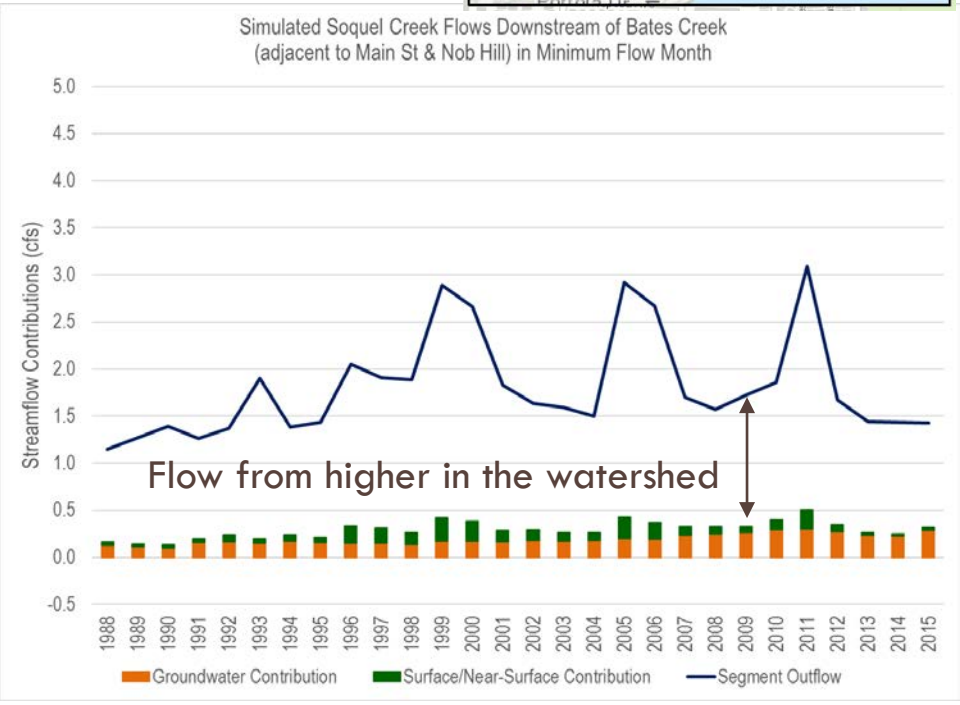


Simulated Groundwater/ Surface Water Interactions

- Groundwater only contributes < 0.5 cfs during low flow periods
- Most flow during these times is from higher in the watershed

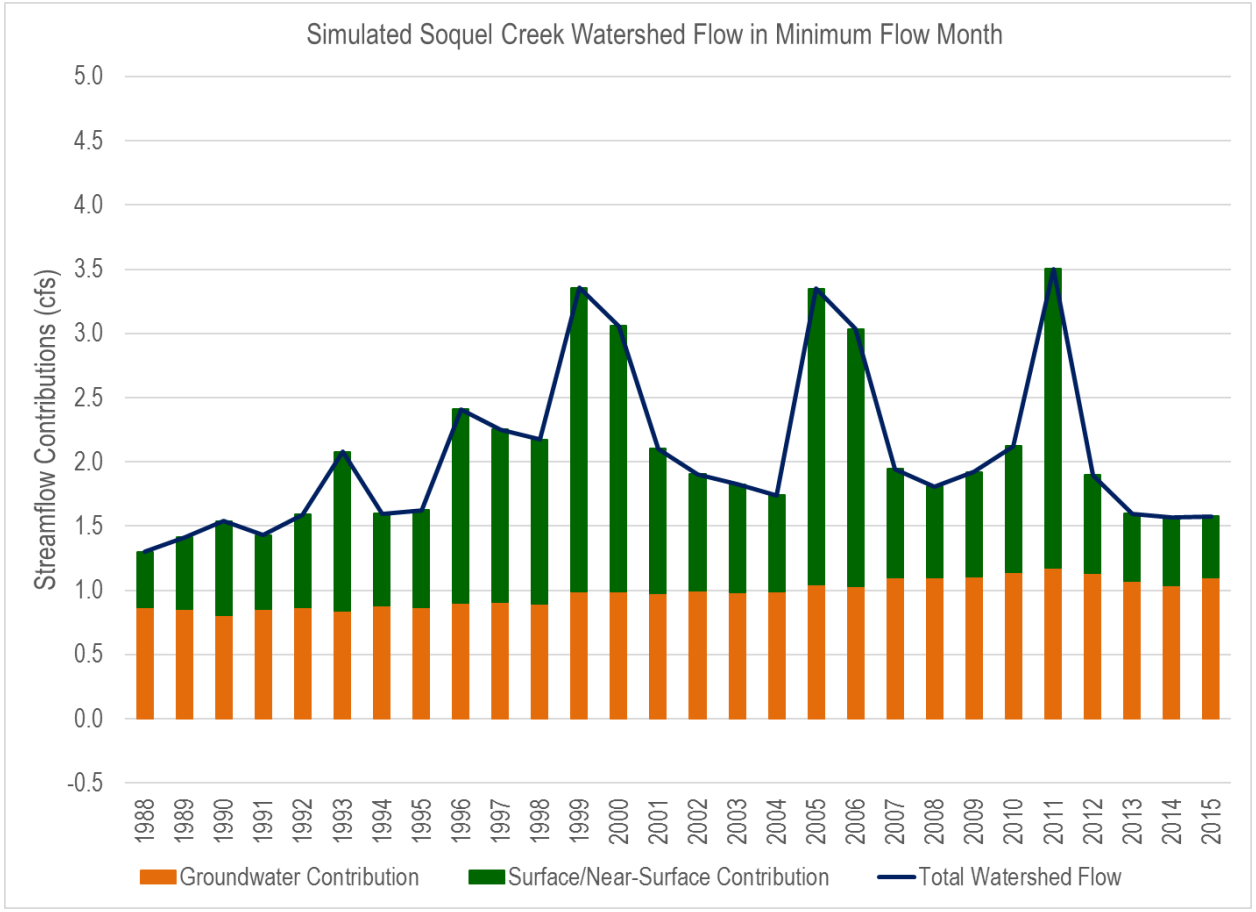






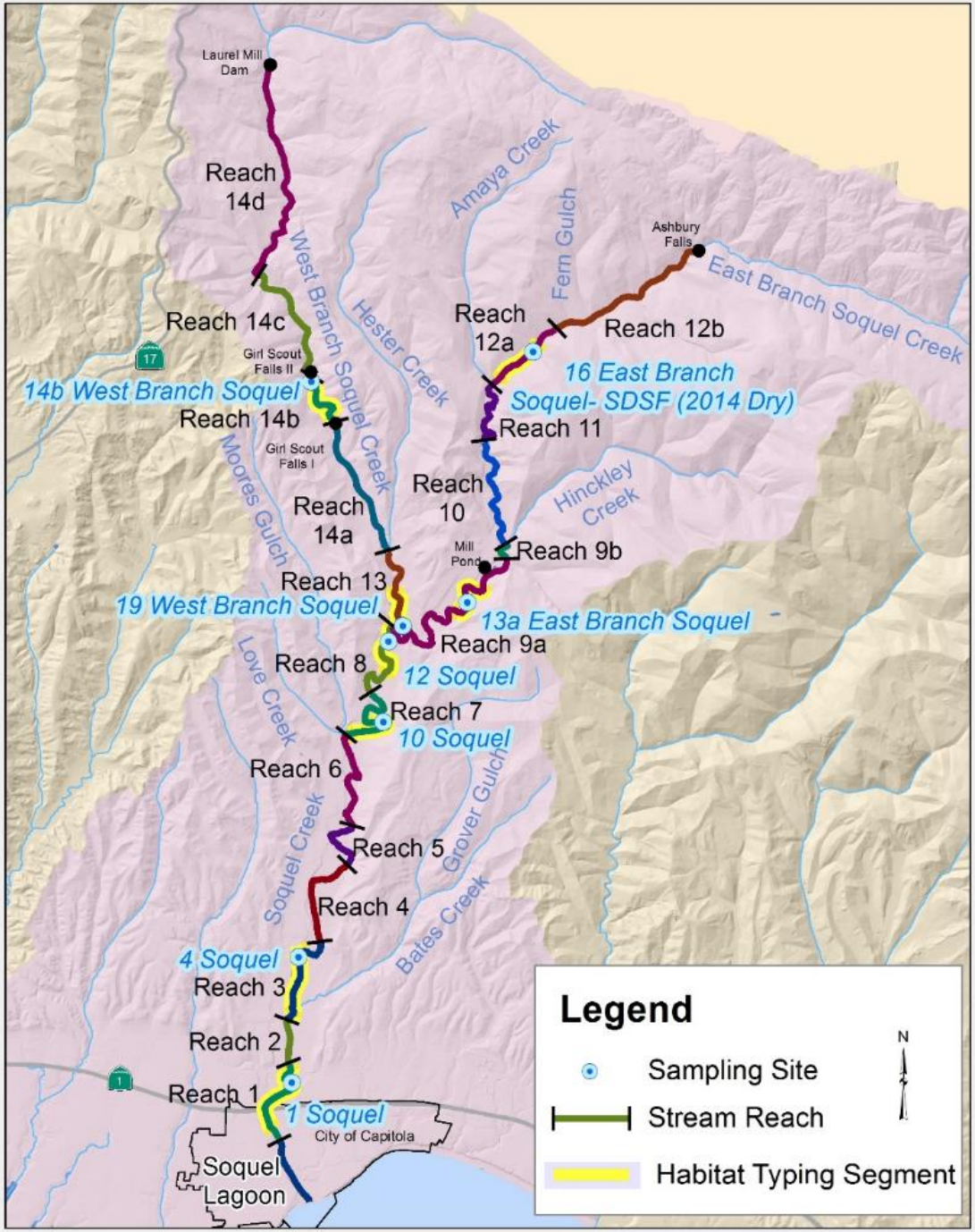
Soquel Creek Watershed

- Groundwater contribution is ~ 1 cfs
- Surface and near surface flows are overall greater than groundwater contributions and drive interannual variability



Relationship of Flow to Fish Habitat and Production

- JSSH Database Website
  - scceh.com/steelhead.aspx
  - Steelhead data for Soquel Creek going back to 1994
  - Collects presence/absence data on other aquatic species
- Recently began process of analyzing results to look for trends and correlations

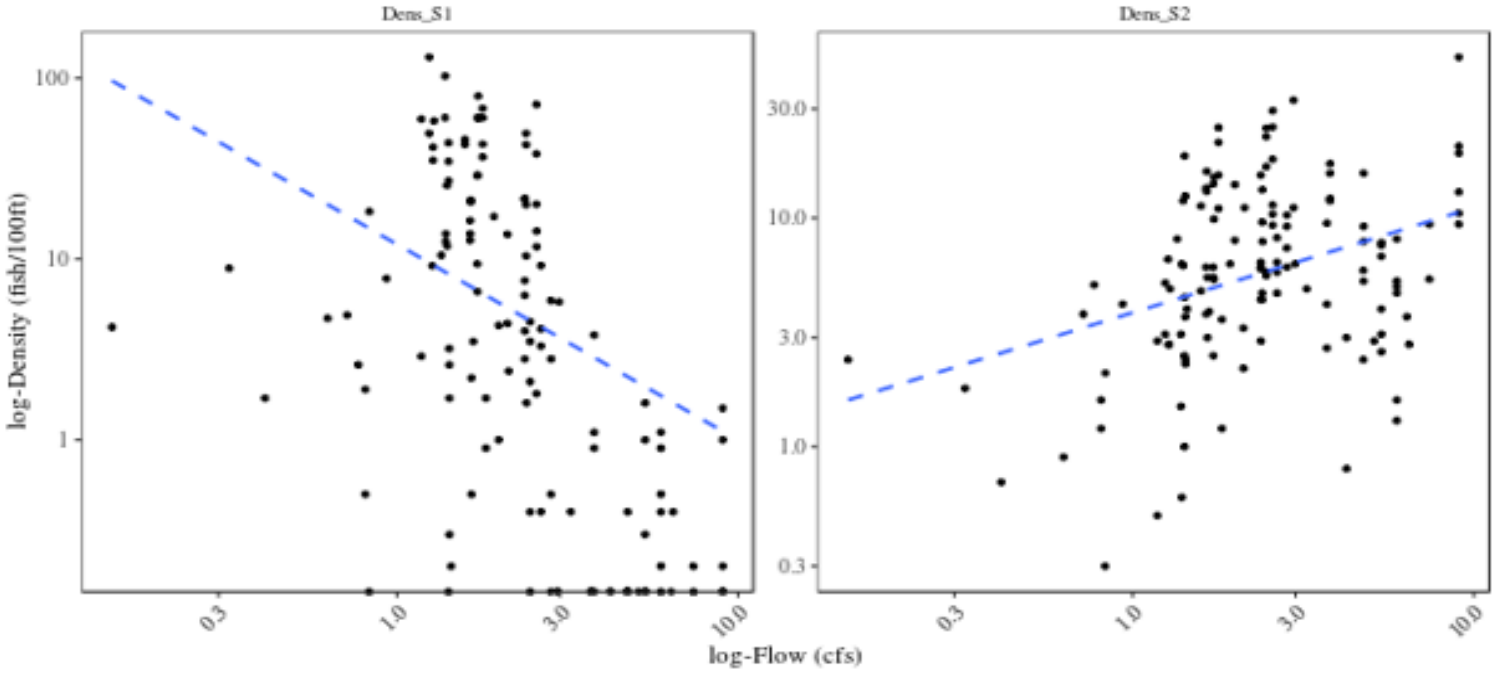


Soquel Watershed Sites

4 sites Soquel Creek
2 sites East Branch Soquel Cr
2 sites West Branch Soquel Cr

+ stream habitat segments

Results: Soquel Mainstem, Flow versus Fish Densities



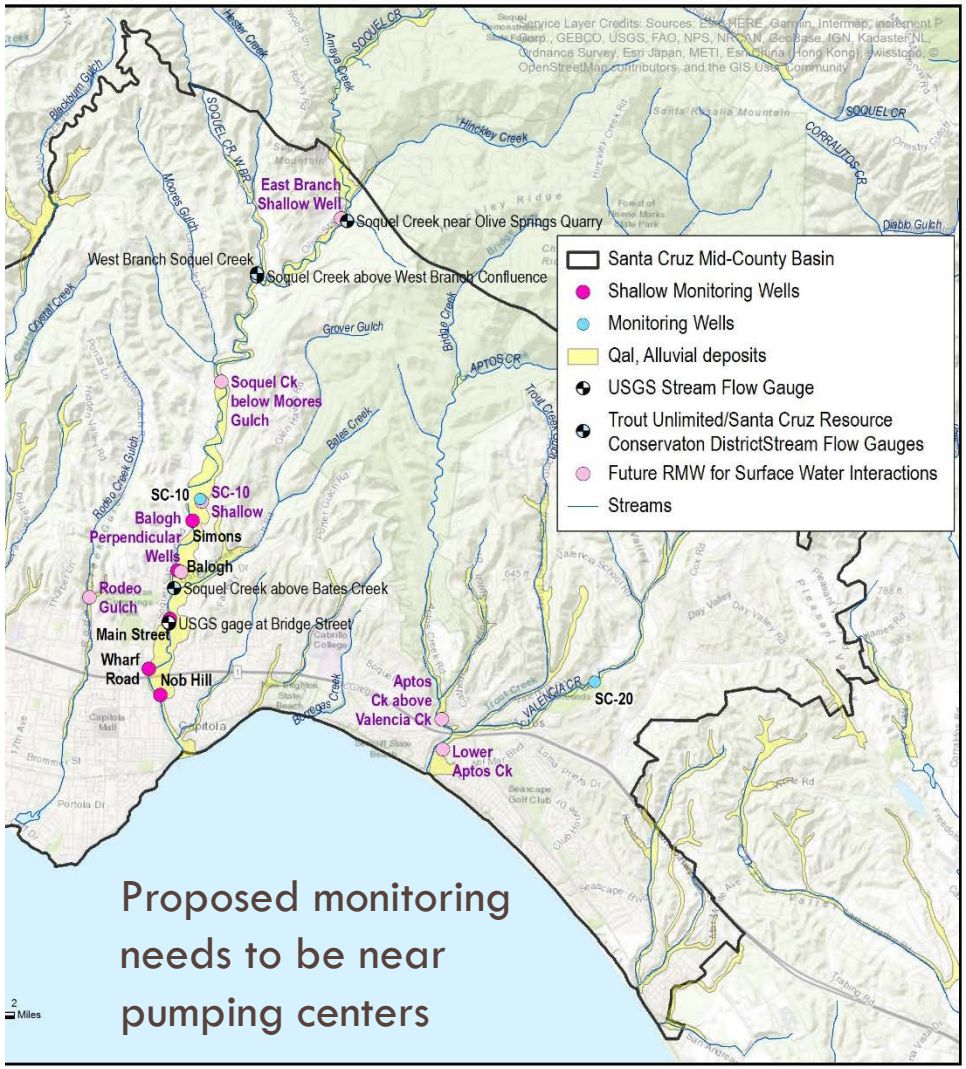
	Dependent variable:	
	Density (fish/100ft)	
	S1	S2
	(1)	(2)
log10(1 + flo)	-1.743***	0.468***
	(0.224)	(0.127)
Constant	1.681***	0.596***
	(0.130)	(0.073)
Observations	136	136
R^2	0.312	0.093
Adjusted R^2	0.307	0.086
Residual Std. Error (df = 134)	0.526	0.298
F Statistic (df = 1; 134)	60.698***	13.681***
Note:	*p<0.1; **p<0.05; ***p<0.01	

Factors Affecting Fish Numbers

- Steelhead numbers have generally been declining since the 1990s
- Some relationship between fish density and streamflow, but low statistical significance
- Many factors affect fish numbers
  - Sedimentation
  - Wood/complexity/Refuge/Cover/Shade
  - Winter flow/Migration/Spawning
  - Ocean conditions

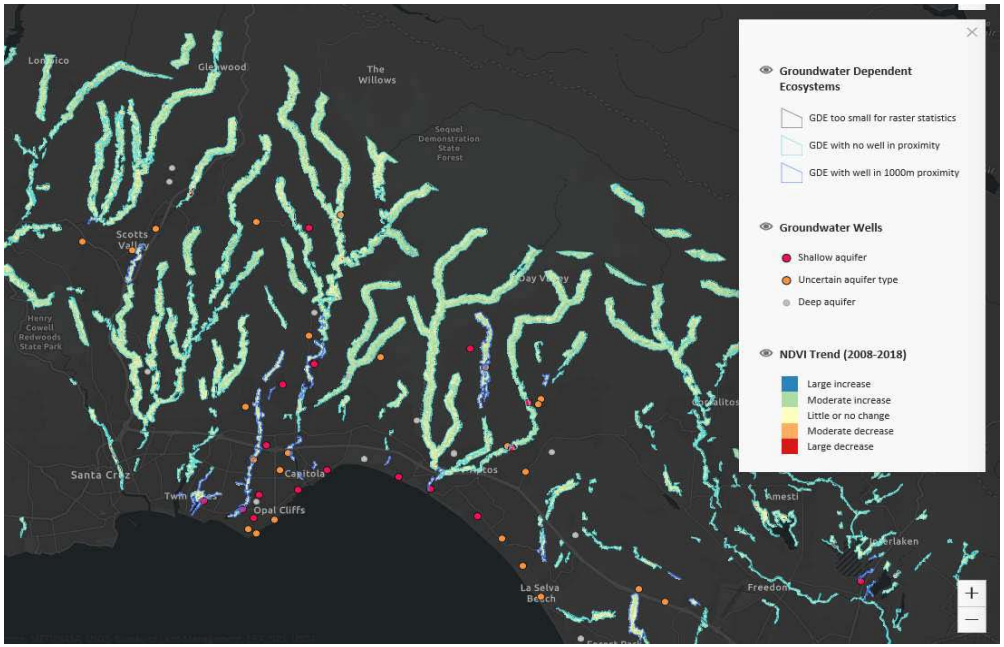
Representative Monitoring Points

- Existing
  - Shallow wells: 5 on Soquel Ck
  - Deeper wells: 1 on Soquel Ck & 1 on Valencia Ck
  - Gauges: 5 on Soquel Ck and tributaries
- Proposed
  - Shallow wells: 5 on Soquel Ck, 1 on Rodeo Gulch, 1 on Aptos Ck, 1 on Valencia Ck
  - Gauges: 3 on Soquel Ck and tributaries, 1 on Aptos Ck, 1 on Valencia Ck



GDE Monitoring

- Continue with Salmonid Monitoring Program
- Continue to note observations of other species in
- that program
- Observe changes in riparian vegetation (GDE Pulse)
- Continue to partner with wildlife agencies



Significant and Unreasonable Depletion of Interconnected Surface Water

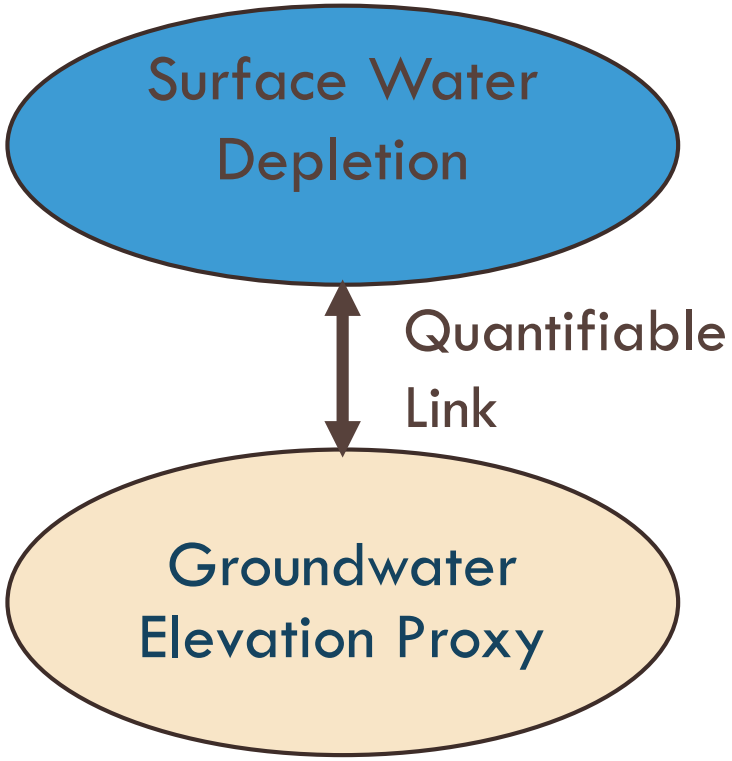
Surface water depletion due to groundwater extraction in interconnected streams supporting priority species, greater than that experienced over the period from the start of monitoring through 2015, would be a significant and unreasonable depletion of surface water

Groundwater Elevations as a Proxy for Streamflow Depletion

- EDF proposed approach with the following advantages
  - Avoids problem of inaccuracies in depletion estimation
  - Allows management flexibility
    - Groundwater levels distant from stream can vary more widely
    - Wide range of actions available for maintaining groundwater levels
  - Analogous to how we are managing seawater intrusion with protective elevations

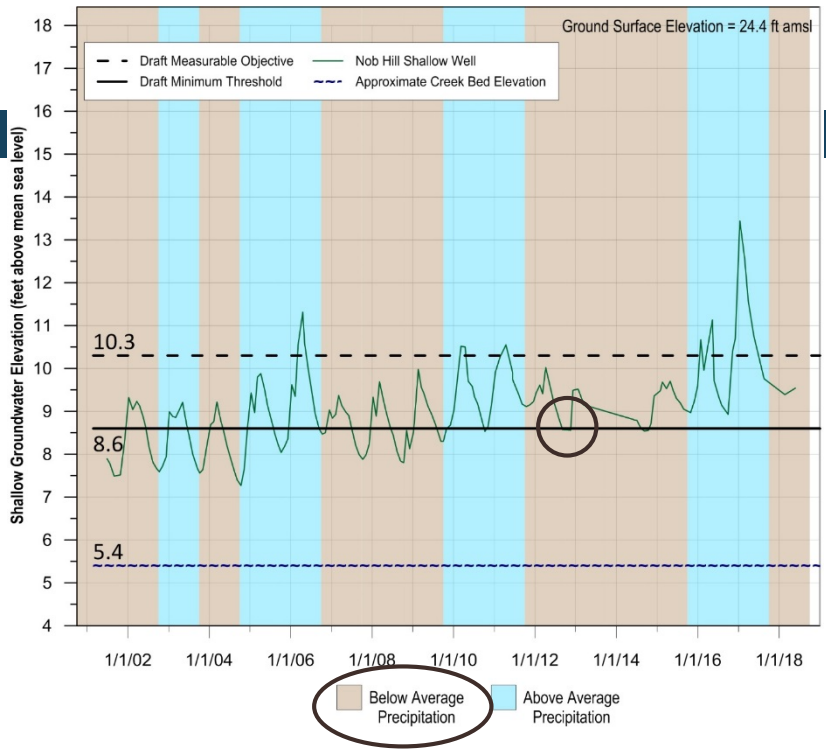
Groundwater Elevations as a Proxy for Streamflow Depletion

- In order to use a groundwater level proxy, we must demonstrate a relationship between groundwater levels and stream depletion



What depletion do observed shallow groundwater levels represent?

Minimum Thresholds



- Because there have been no recent significant and unreasonable depletions of surface water from groundwater pumping, low flow groundwater elevations in the recent record could be selected as the minimum threshold
- Propose to use:

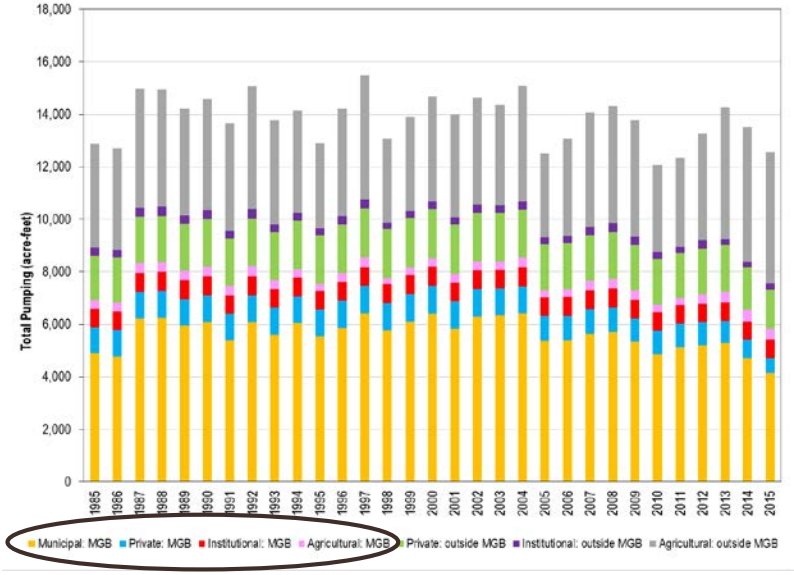
  highest seasonal-low groundwater levels

  during below-average rainfall years

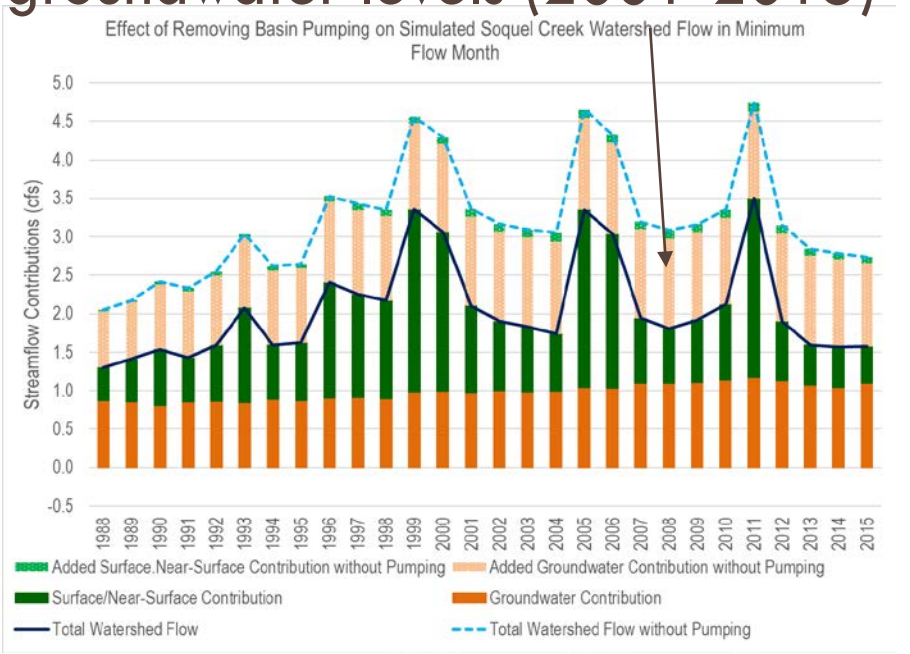
  over the period from the start of monitoring through 2015

Relationship Between Streamflow Depletion and Minimum Threshold Groundwater Level Proxies

Evaluate effect of Basin pumping on streamflow depletion by removing Basin pumping from model



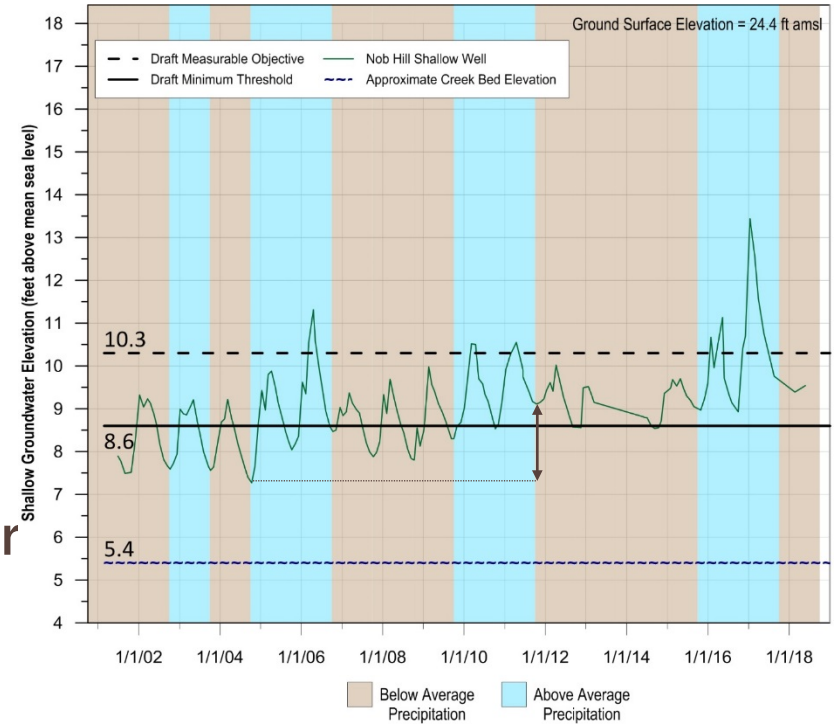
Simulated average depletion from pumping associated with shallow groundwater levels (2001-2015)



Estimate of streamflow depletion occurring historically but groundwater level proxy meant to prevent more depletion than occurred historically, not estimated value

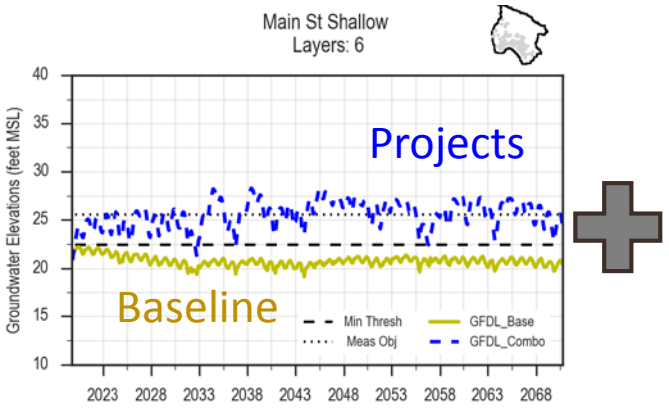
Measurable Objectives

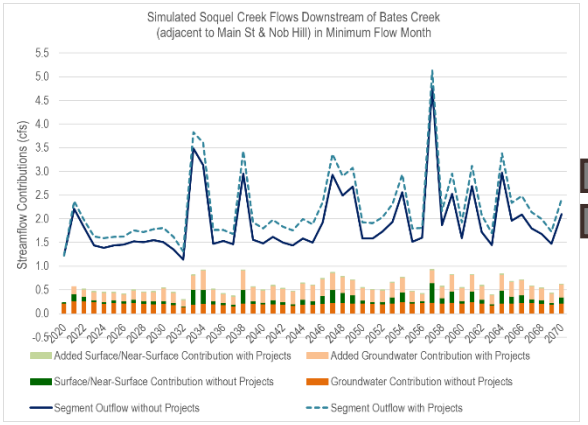
- Higher than creek bed elevations to ensure groundwater contribution to streamflow (gaining stream)
- Higher than the minimum threshold by the range in seasonal-low elevations over the period of record to provide operational flexibility

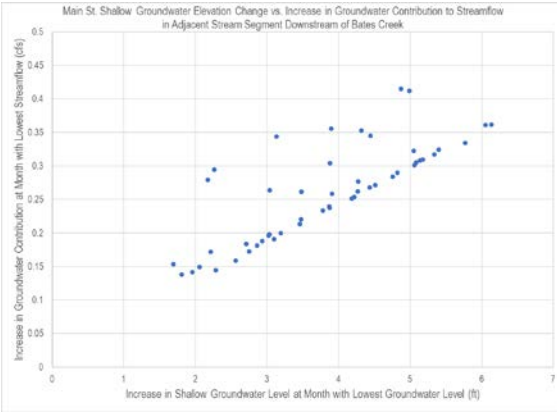


Relationship Between Streamflow Depletion and Measurable Objectives Groundwater Level Proxies

- Projects raise groundwater levels and decrease streamflow depletion
- Use this relationship to estimate decrease in streamflow depletion due to raising shallow groundwater levels

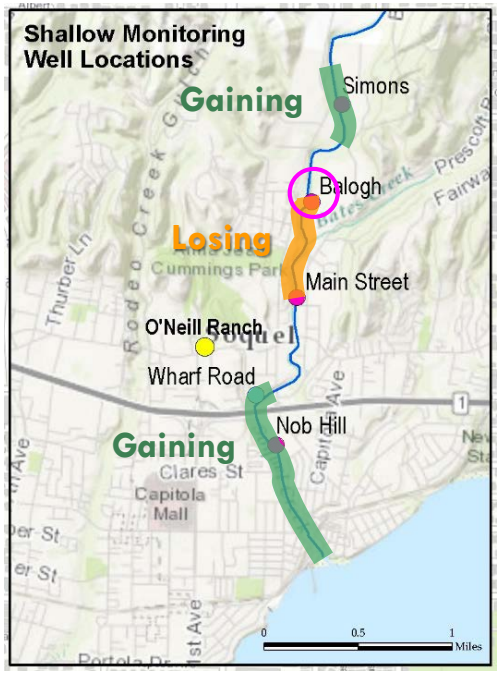


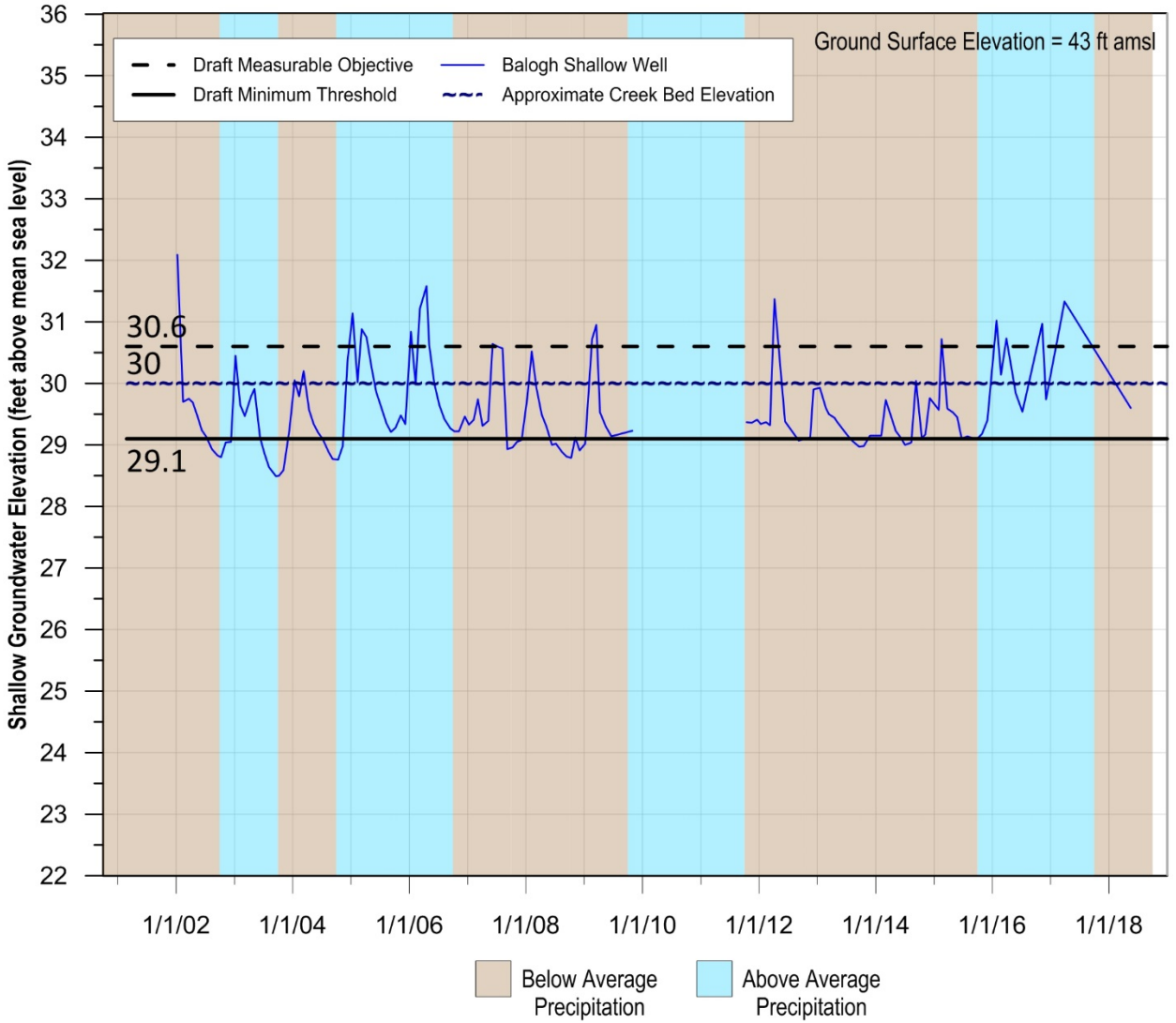




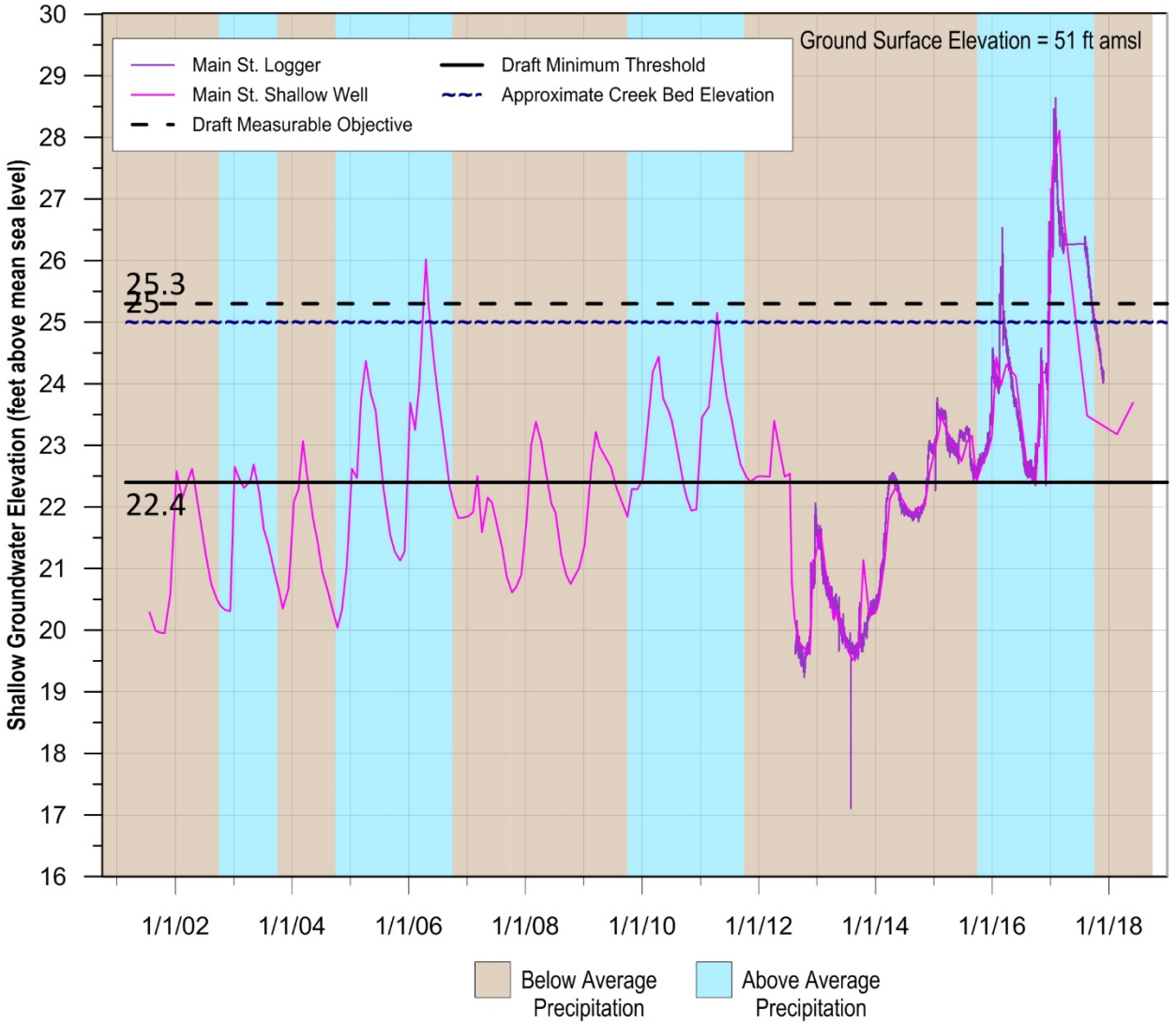
Although the relationship can be used to estimate decrease in streamflow depletion from increased groundwater levels, the measurable objective is set at an elevation that ensures groundwater contribution to streamflow & operational flexibility -- not a specific value of flow increase

Balogh Shallow Well

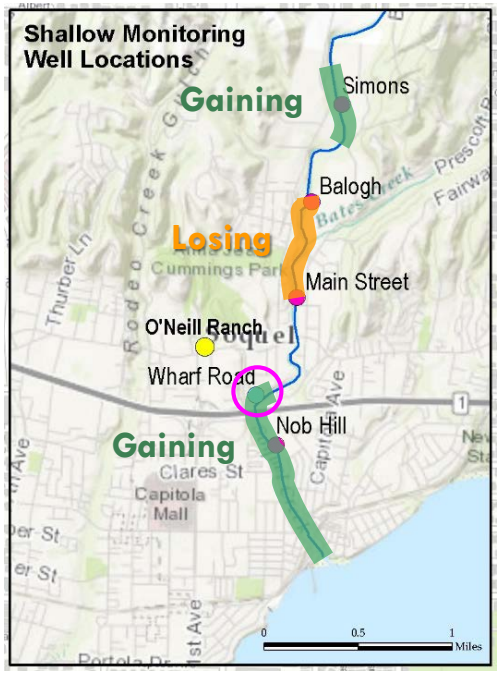


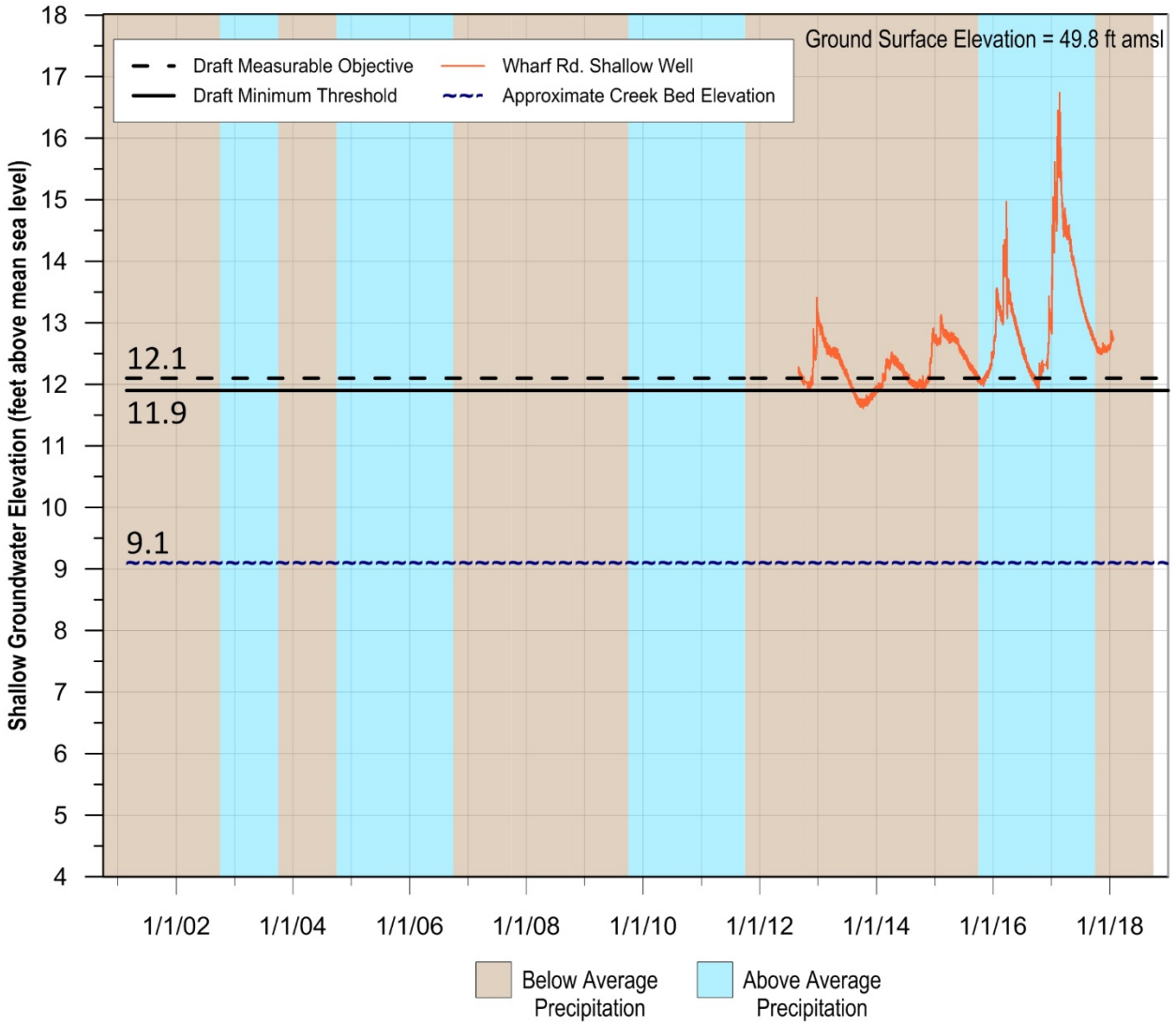


Main Street Shallow Well

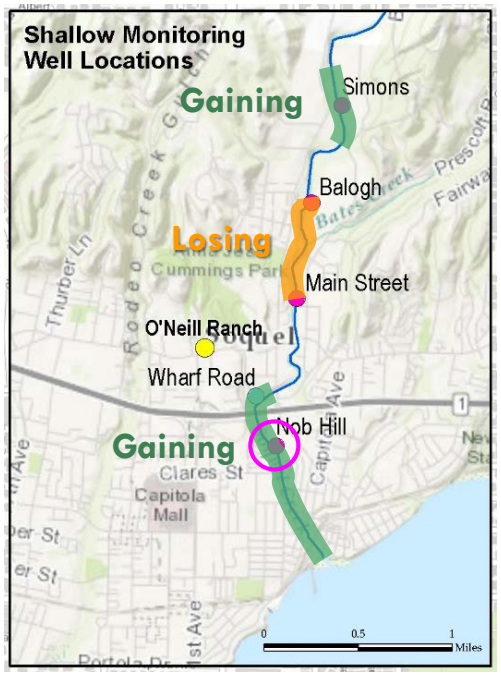


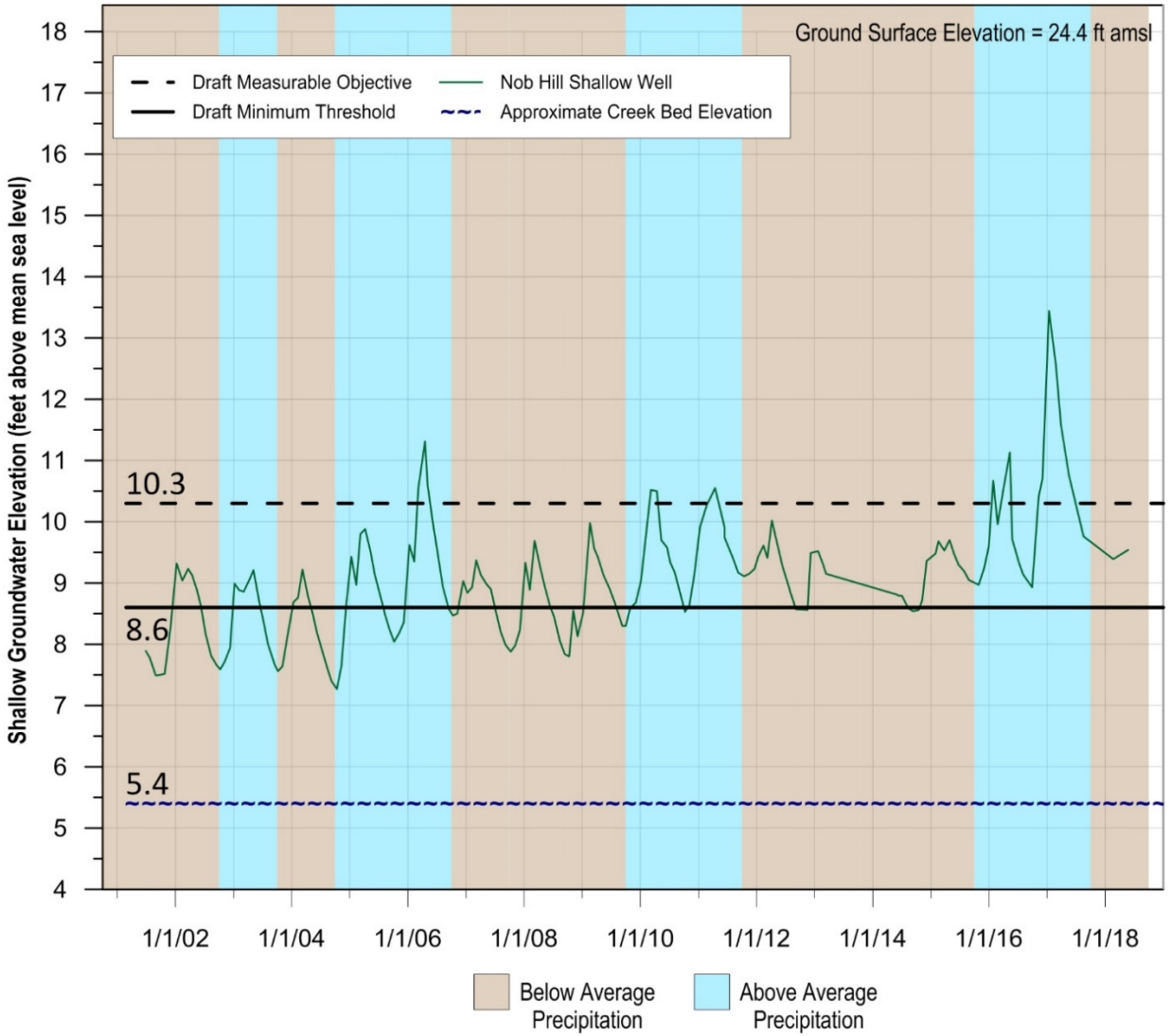
Wharf Rd. Shallow Well





Nob Hill Shallow Well



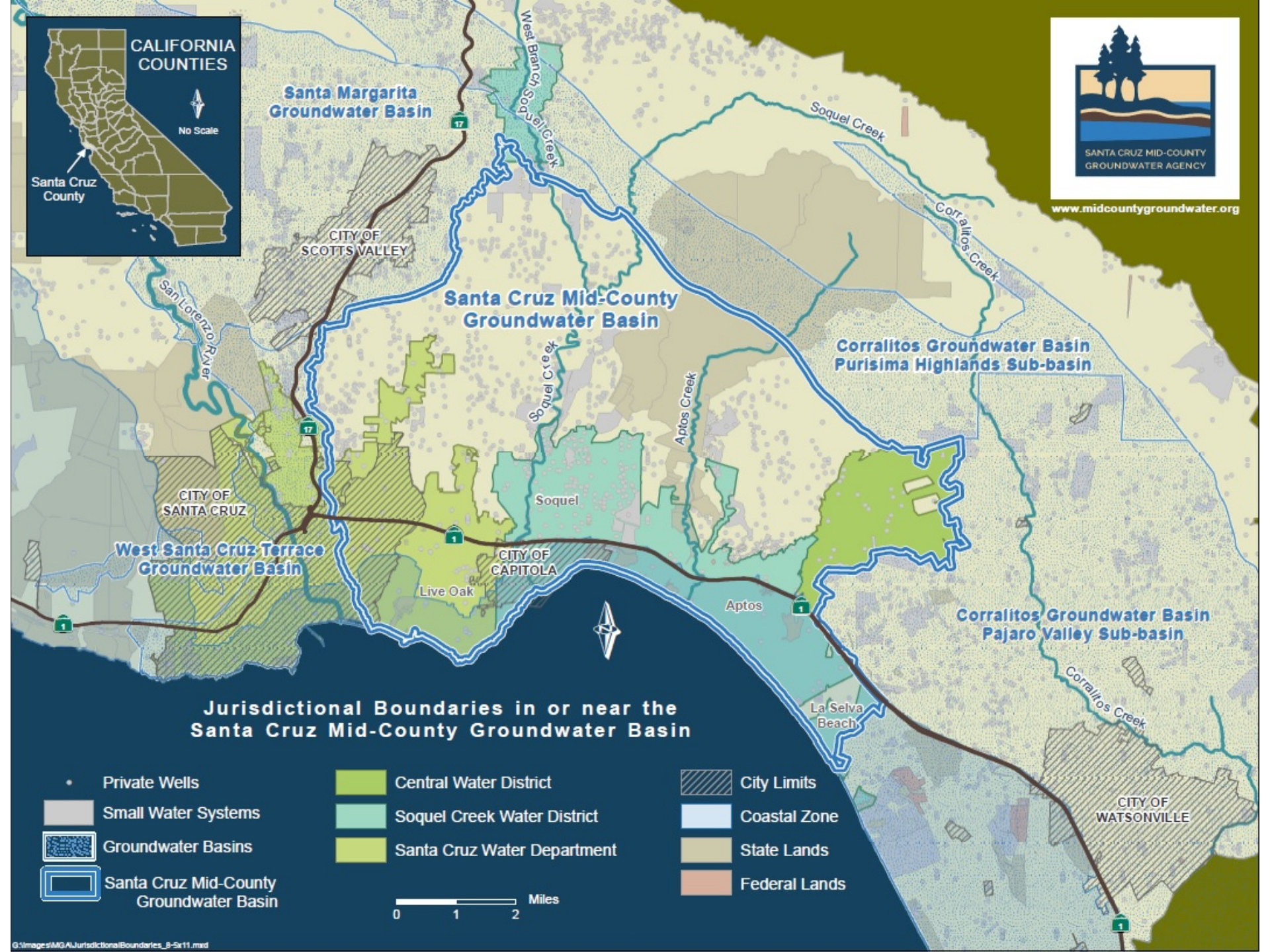


Questions and Discussion

Item 5: Introduction Mid-County Sustainability Goal

DWR Sustainability Goal Requirements

- MGA must establish a basin sustainability goal that culminates in the absence of undesirable results by 2040 and maintains sustainability to 2070
- GSP to include sustainability goal description with
  - information from the basin setting used to establish the sustainability goal,
  - discussion of measures implemented to ensure basin will be operated within its sustainable yield, and
  - explanation of how sustainability goal is likely to be achieved and maintained as required by law.


CALIFORNIA COUNTIES
No Scale
Santa Cruz County
SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY
www.midcountygroundwater.org
Santa Margarita Groundwater Basin
West Branch Soquel Creek
Soquel Creek
Corralitos Creek
CITY OF SCOTTS VALLEY
San Lorenzo River
Santa Cruz Mid-County Groundwater Basin
Soquel Creek
Aptos Creek
Corralitos Groundwater Basin Purisima Highlands Sub-basin
CITY OF SANTA CRUZ
Soquel
West Santa Cruz Terrace Groundwater Basin
CITY OF CAPITOLA
Live Oak
Aptos
Corralitos Groundwater Basin Pajaro Valley Sub-basin
Corralitos Creek
La Selva Beach
CITY OF WATSONVILLE
Jurisdictional Boundaries in or near the Santa Cruz Mid-County Groundwater Basin
Private Wells
Small Water Systems
Groundwater Basins
Santa Cruz Mid-County Groundwater Basin
Central Water District
Soquel Creek Water District
Santa Cruz Water Department
City Limits
Coastal Zone
State Lands
Federal Lands
Miles
0
1
2
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Draft MGA Sustainability Goal

To provide a safe, reliable, and affordable water supply to meet current and expected regional demand without causing undesirable impacts.

Revised During Advisory Committee 4-24-2019 Meeting:

To manage the groundwater basin to ensure beneficial users have access to a safe, reliable, and affordable groundwater supply to meet current and future expected regional demand without causing undesirable impacts.

Draft MGA Sustainability Goal

To achieve this goal will require groundwater management that:

- Ensures groundwater is available to a diverse population of users of all socioeconomic status,
- Resolves problems of groundwater overdraft within the MGA Basin,
- Maintains groundwater levels where groundwater dependent ecosystems exist,
- Maintains groundwater contributions to streamflow,
- Supports reliable groundwater supply and quality to promote public health and welfare,
- Protects groundwater supply against seawater intrusion,
- Ensures operational flexibility within the MGA Basin by maintaining reserve water supply in drought, and
- Does no harm to neighboring groundwater basins in our efforts to achieve regional groundwater sustainability.

DISCUSSION

SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

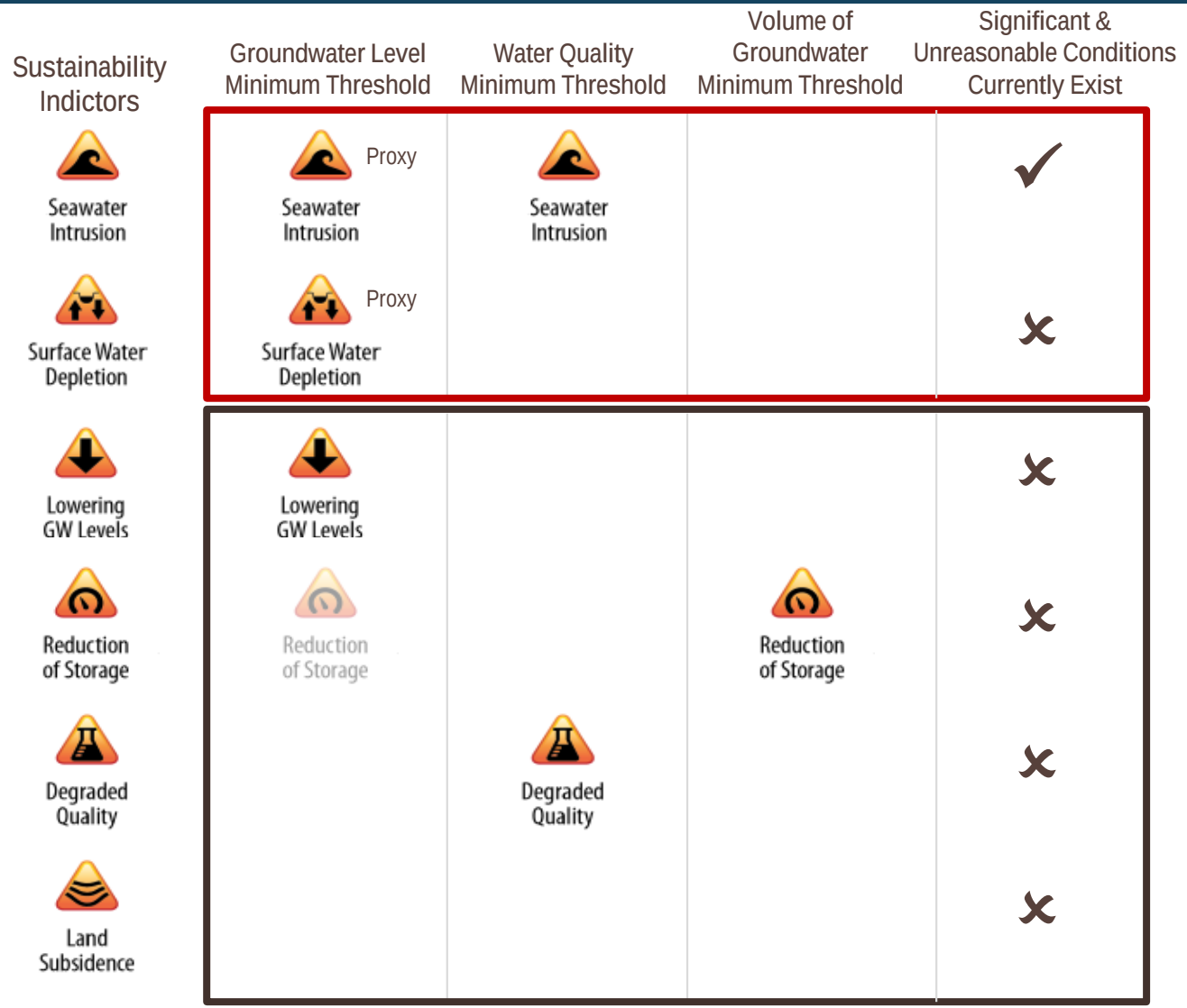
Public Comment

Break

Item 8: Summary of Sustainability Management Criteria

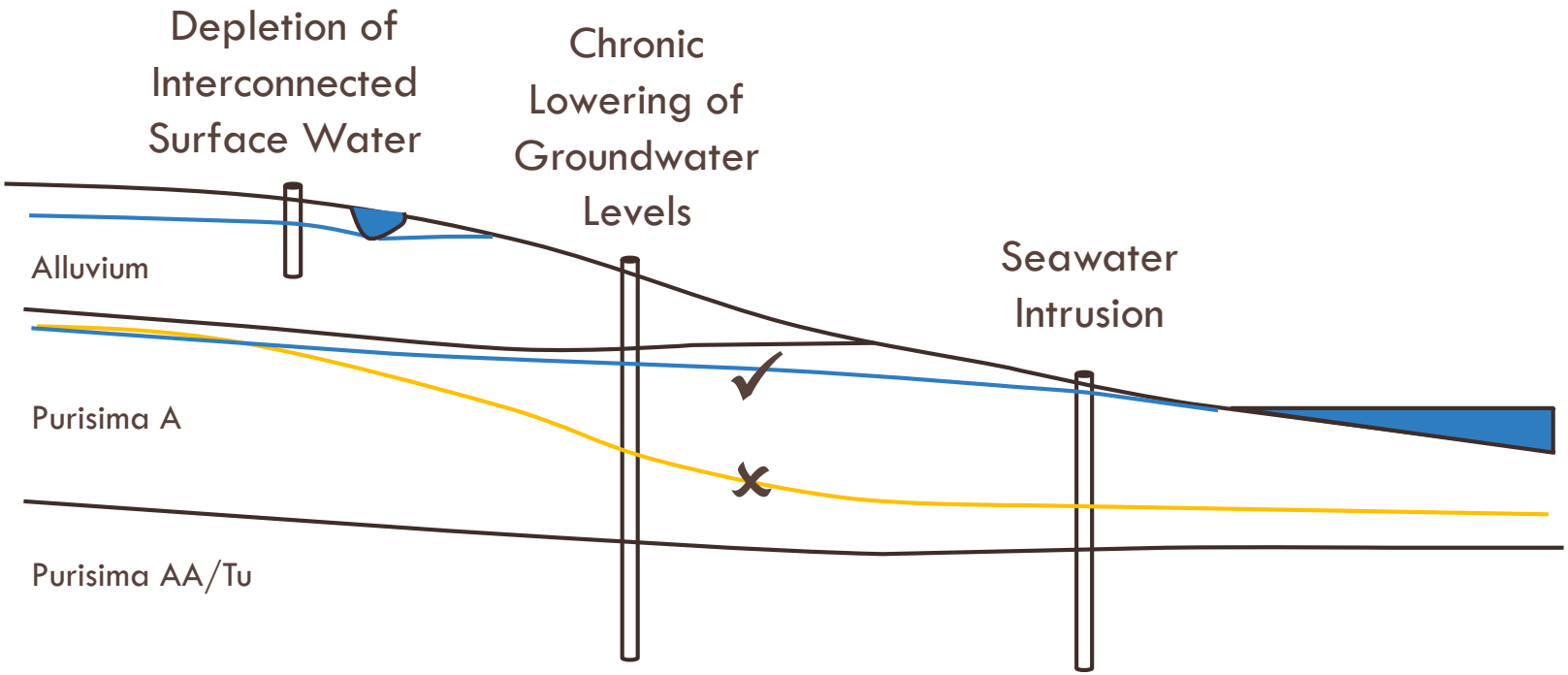
- Chronic lowering of groundwater levels
- Reduction in storage
- Seawater intrusion
- Degraded groundwater quality
- Subsidence
- Depletion of interconnected surface water

Connections between Sustainability Indicators

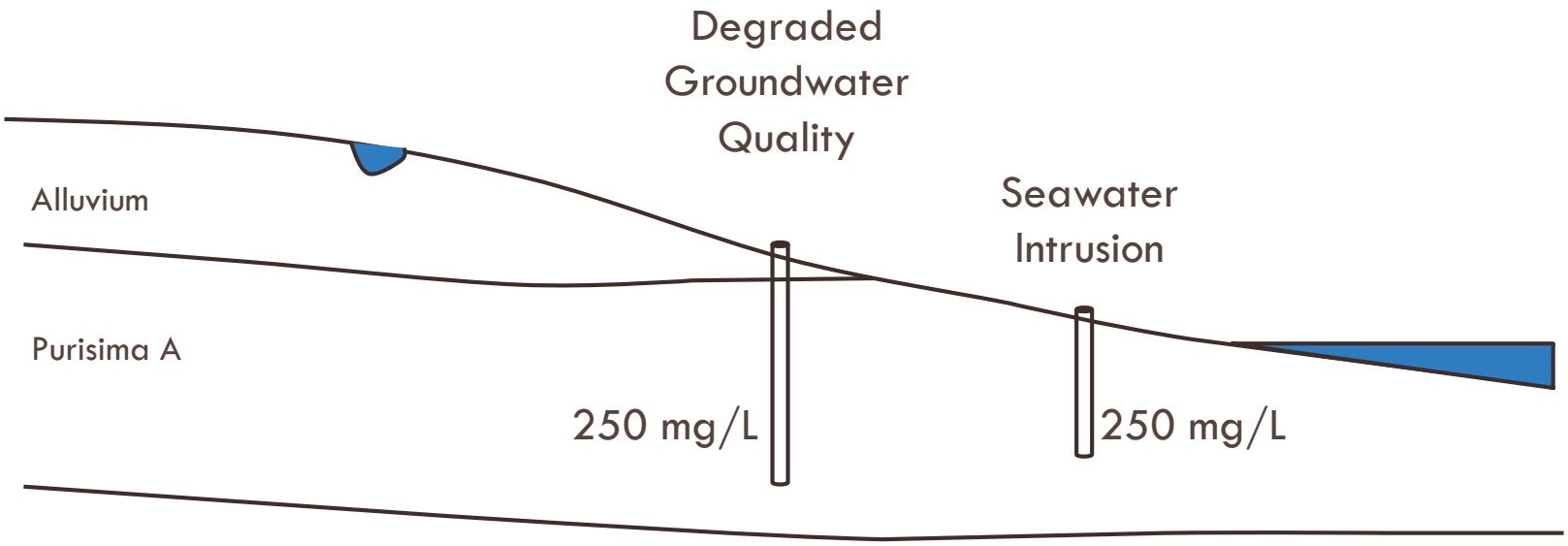


Groundwater Elevations

GSP needs to describe the relationship between minimum thresholds for each sustainability indicator, and how their selection avoids undesirable results for each of the sustainability indicators in the basin and in adjacent basins



Groundwater Quality - Chloride



Chronic Lowering of Groundwater Levels

- Significant and Unreasonable

  A significant number of private, agricultural, industrial, and municipal production wells can no longer provide enough groundwater to supply beneficial uses

- Undesirable Results

  The **average monthly** representative monitoring well groundwater elevation falls below the <Minimum Threshold>

Chronic Lowering of Groundwater Levels

- Minimum Threshold

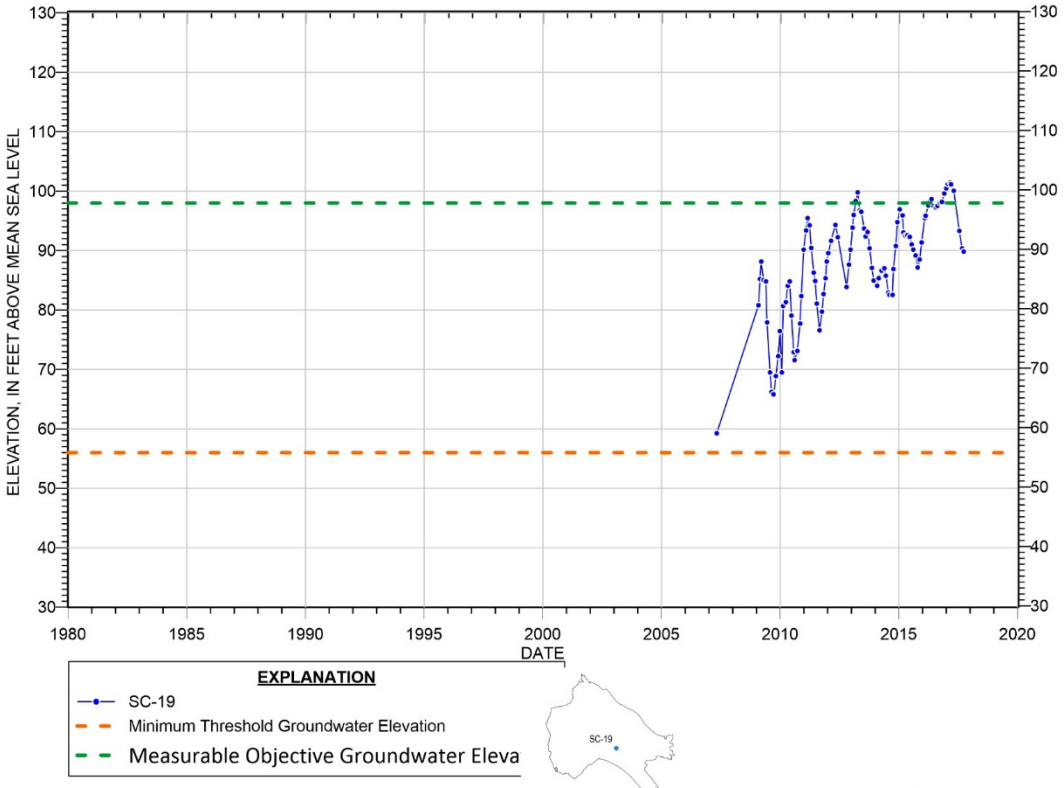
  Based on the **groundwater elevation required to meet the typical overlying water demand in the shallowest well** in the vicinity of the representative monitoring well. The minimum threshold is not allowed to be >30 feet below historic low groundwater elevation

Chronic Lowering of Groundwater Levels

Lowering GW Levels

- Measureable Objectives

  90th percentile of historical groundwater elevations for the period of record



Discussion on Chronic Lowering of Groundwater Levels

Reduction in Storage

- Significant and Unreasonable

  A net volume of groundwater extracted that will likely cause other sustainability indicators to have undesirable results

- Undesirable Results

  Five-year average net extraction exceeding the Sustainable Yield (minimum threshold) for any one of the following groups of aquifers:

  - Aromas aquifer and Purisima F aquifer
  - Purisima DEF, BC, A, and AA aquifer
  - Tu aquifer

Reduction in Storage

- Minimum Threshold

  Sustainable Yield representing the net annual volume of groundwater extracted (pumping minus annual volume of managed aquifer recharge) for any one of the groups of aquifers

- Measurable Objective

  The maximum net annual groundwater to be extracted that ensures if there were four subsequent years of maximum projected net groundwater extraction, net annual groundwater extractions greater than the minimum threshold will not occur for any one of the following groups of aquifers

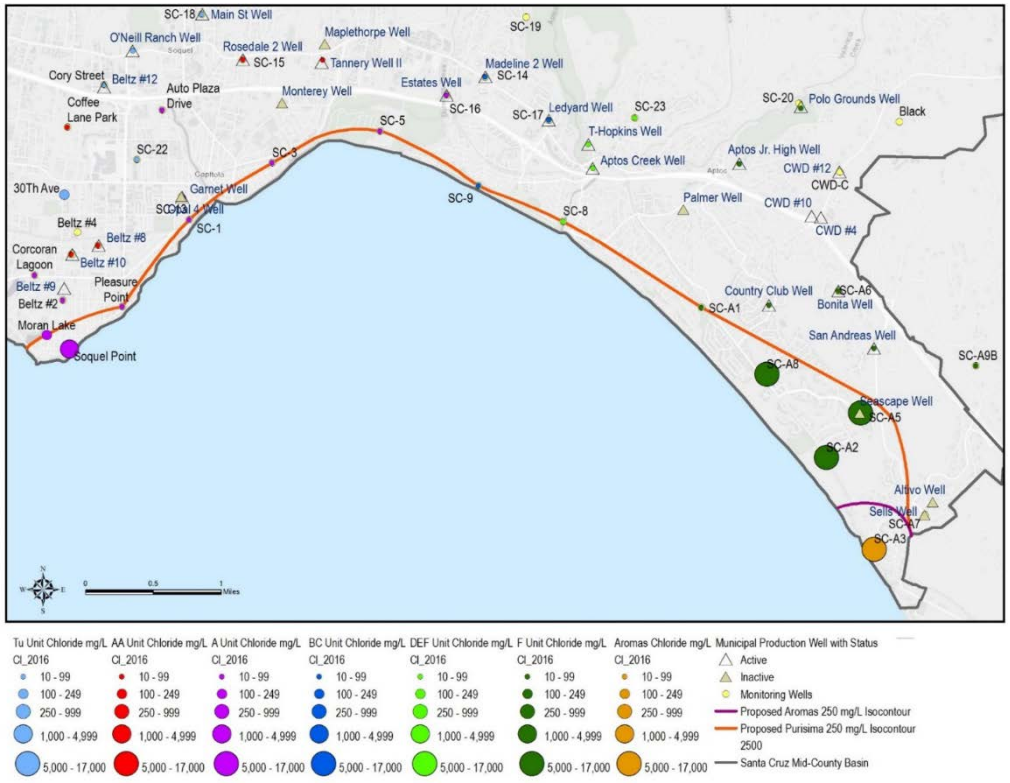
Discussion on Reduction of Storage

Seawater Intrusion

Seawater Intrusion

- Significant and Unreasonable

  Seawater moving farther inland than has been observed in the past five years (2013 – 2017)



Seawater Intrusion

- Undesirable Results for Chloride Isocontours

  Intruded coastal monitoring wells: chloride concentration above its past five year maximum chloride concentration. This concentration must be exceeded in 2 or more of the last 4 consecutive quarterly samples

  Unintruded coastal monitoring wells: chloride concentration above 250 mg/L. This concentration must be exceeded in 2 or more of the last 4 consecutive quarterly samples

  Unintruded inland monitoring & production wells: closest to the coast: chloride concentration above 150 mg/L. This concentration must be exceeded in 2 or more of the last 4 consecutive quarterly samples

Seawater Intrusion

- Undesirable Results for Protective Elevations

  Five-year average groundwater elevations below protective groundwater elevations for any coastal representative monitoring well

  Significant and unreasonable conditions occur if there are undesirable results for either chloride isocontours or protective elevations

Seawater Intrusion

Seawater Intrusion

- Minimum Thresholds

  Chloride Isocontour: Separate 250 mg/L chloride isocontours for Aromas and Purisima aquifers based on current chloride concentrations in coastal monitoring wells

  Protective Elevations (proxy): coastal wells with protective groundwater elevations that keep the equilibrium position of the freshwater / seawater interface from impacting underlying aquifers from which production wells pump

Seawater Intrusion

Seawater Intrusion

- Measurable Objectives

  Chloride Isocontour: Same locations as the minimum threshold isocontour but the concentration is reduced from 250 mg/L (minimum threshold) to 100 mg/L

  Protective Elevations (proxy): higher groundwater elevations than minimum thresholds that are more protective of the full depth of the aquifer

Discussion on Seawater Intrusion

Degraded Groundwater Quality

- Significant and Unreasonable

  Significant and unreasonable degradation of groundwater would occur when groundwater quality, attributable to groundwater pumping or managed aquifer recharge, **fails to meet state drinking water standards**

Degraded Groundwater Quality

- Undesirable Results

  Groundwater quality undesirable results in the basin occur when as a result of groundwater pumping or managed aquifer recharge, any representative monitoring well exceeds any <minimum threshold>

Degraded Groundwater Quality

- Minimum Thresholds

  Minimum thresholds are **state drinking water standards** for each constituent of concern that is monitored in representative monitoring wells for degraded groundwater quality

- Measurable Objective

  Measurable objectives for each representative monitoring well are equal to the **2013 – 2017 average** concentrations for each constituent of concern

Discussion on Degraded Groundwater Quality

Interim Milestones

- Interim milestones equal measurable objectives if we don't expect changes over time
  - Degraded groundwater quality
  - Some chronic lowering of groundwater level representative monitoring wells which are not influenced by projects & management actions
- Projected groundwater elevations from modeling will be used to set interim milestones where we expect improvements in groundwater levels due to projects & management actions

Final Questions and Discussion

Item 9: *Process Preview*
Advisory Committee Recommendations

Advisory Committee Recommendations

- Two main components of Advisory Committee's Recommendations
  - Sustainability Goal
  - Sustainable Management Criteria for all Sustainability Indicators

Support for Recommendations

- From Charter
- "A '**recommendation**' from the GSP Advisory Committee will be achieved if a majority of Committee members present expresses support for a particular decision item."
- Voting/Levels of Support – from Charter
  - General support ("I like it")
  - Qualified support ("I have some issues with it, but I can live with it")
  - Fundamental disagreement ("I don't like it and cannot live with it")

Proposed Voting Process: June 19th Advisory Committee Meeting

- Step 1: Discuss and confirm complete package of recommendations
  - Make final refinements as needed
- Step 2: Vote on complete package; capture results
  - Each Committee member shares level of support and provides rationale (reasons for agreement or disagreement)
  - Staff captures information
  - If fundamental disagreements exist, seek resolution
  - Any disagreements will be shared with MGA Board
- Step 3: Transmit final recommendations to MGA Board
  - "Conveyance letter" will provide overview of process

Public Comment

Confirm

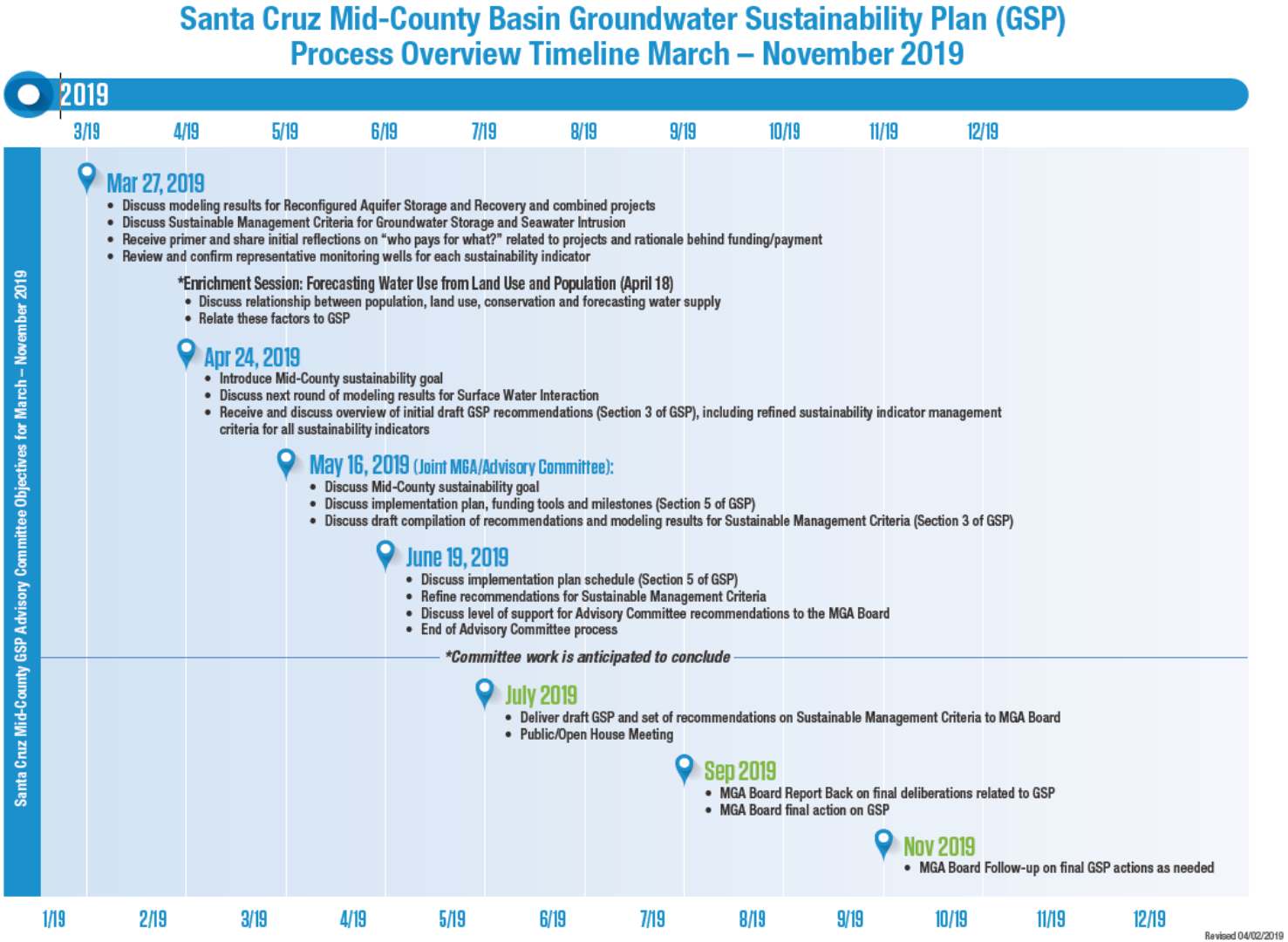
February 27, 2019 GSP Advisory Committee Meeting Summary

and

March 27, 2019 GSP Advisory Committee Meeting Summary

Recap and Next Steps

GSP 2019 Project Timeline



Next Steps: Meetings 19 & 20

- **May 16, 2019 (Joint MGA/Advisory Committee) Meeting (#19)**
  - Discuss Mid-County sustainability goal
  - Discuss implementation plan, funding tools and milestones (Section 5 of GSP)
  - Discuss draft compilation of recommendations and modeling results for Sustainable Management Criteria (Section 3 of GSP)
- **June 19, 2019 (Last Advisory Committee) Meeting (#20)**
  - Refine recommendations for Sustainable Management Criteria
  - Discuss level of support for Advisory Committee recommendations to the MGA Board
  - Commemorate and close the Advisory Committee Process

THANK YOU!

FOR ANY QUESTIONS, PLEASE CONTACT:

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SANTA CRUZ MID-COUNTY GROUNDWATER AGENCY

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