Agenda

Santa Cruz Mid-County Groundwater Sustainability Plan (GSP)

Advisory Committee Meeting #8

Wednesday, June 27, 2018, 5:00 – 8:30 p.m.
Simpkins Family Swim Center
Room B - 979 17th Avenue Santa Cruz CA 95062

Meeting Objectives

1. Discuss and share Advisory Committee input on Undesirable Result Options with Underlying Significant and Unreasonable Conditions for the following Sustainability Indicators:
    a. Surface Water Interactions
    b. Water Quality

Agenda

Item No.	Time[1]	Topic	Presenter & Materials
	4:30 p.m.	*Arrivals/Committee members collect food for dinner*	
1	5:00 p.m.	Welcome, Introductions, Meeting Objectives, and Agenda Review • Review project timeline • Share project updates • Outreach/communications	• Ron Duncan, Soquel Creek Water District • Eric Poncelet, Facilitator • Jason Hoppin, County of Santa Cruz *Materials:* *1.1 Agenda* *Refer to PowerPoint Presentation*
2	5:20 p.m.	Oral communications • *Members of the public to comment on non-agenda items*	• All
3	5:30 p.m.	Surface Water Interactions – Significant and Unreasonable Conditions • Background information • Discuss staff proposal and Committee to provide input	• John Ricker, County of Santa Cruz • Sierra Ryan, County of Santa Cruz • Georgina King, HydroMetrics • All *Materials:* *3.1 Proposal: Significant and Unreasonable Interconnected Surface Water Depletion* *Refer to PowerPoint presentation.*

[1] The times allotted on this agenda are approximate and are subject to change

Item No.	Time[1]	Topic	Presenter & Materials
4	6:40 p.m.	Public comment • *Focus on Surface Water Interactions and other agenda items*	Public
5	*6:50 p.m.*	Break	
6	7:05 p.m.	Water Quality – Undesirable Results with Underlying Significant and Unreasonable Conditions • Background information • Discuss staff proposal and Committee to provide input	• Georgina King, HydroMetrics *Materials:* *6.1 Proposal: Degraded Groundwater Quality Minimum Thresholds* *Refer to PowerPoint Presentation*
7	8:10 p.m.	Public Comment • *Focused on Water Quality and other agenda items*	Public
8	8:20 p.m.	Confirm: • May 23, 2018 GSP Advisory Committee Meeting Summary Distribute/Request Review: • Draft Minimum Thresholds Proposals for Groundwater Levels and Subsidence	• All • Eric Poncelet, Facilitator *Materials:* *8.1. Draft Meeting Summary from May 23* *8.2 Proposed Draft Chronic Lowering of Groundwater Level Sustainable Management Criteria* *8.3 Proposed Draft Subsidence Minimum Thresholds*
10	8:25 p.m.	Recap and Next Steps	• Eric Poncelet, Facilitator
	8:30 p.m.	*Adjourn*	

Written Communications and Correspondence (included in the meeting materials packet).

1. Email correspondence from B. Steinbruner, May 18, 2018
2. Email correspondence from B. Steinbruner, June 20, 2018

Technical Staff Proposal
Significant and Unreasonable
Interconnected Surface Water Depletion

This document is organized into the following three sections:

1. Background – This section describes:
    - Information on the Surface Water Working Group.
    - What we currently know about surface water and groundwater interconnection from initial model analysis of surface water/groundwater interaction, and the Surface Water Working Group's investigation into impact on priority ecosystems.
    - Which aquatic species are most vulnerable to depletion of surface water interconnected with groundwater.
2. Guidance from the Surface Water Working Group
3. Technical staff proposal – What is considered a Significant and Unreasonable depletion of interconnected surface water (conditions we want to avoid).

This is the first step in an iterative process. Once additional modeling has been completed, the technical staff will be seeking input on the minimum threshold as well as the measurable objectives. After that point, the recommendation in this document may be reassessed.

1. BACKGROUND

SURFACE WATER WORKING GROUP

The Surface Water Working Group was established as an ad-hoc sub-committee of the Groundwater Sustainability Plan (GSP) Advisory Committee to bring experts on wildlife and aquatic ecosystems into the discussion around how groundwater management can and should be used to improve the condition for surface water species. The Working Group includes staff and representatives from the following entities:

- GSP Advisory Committee
- California Department of Fish and Wildlife
- City of Santa Cruz
- County of Santa Cruz
- Friends of Soquel Creek
- NOAA Fisheries
- PV Water

- Regional Water Management Foundation/MGA
- Resources Conservation District of Santa Cruz County
- The Nature Conservancy
- US Fish and Wildlife Service

The Working Group met twice, and plans to meet again once additional model runs have been completed.

Members of the Working Group emphasized the importance of preventing depletion of interconnected surface water that would have significant and unreasonable adverse impacts on beneficial uses of the surface water and the groundwater dependent ecosystems (GDEs) they support. The Working Group discussed the fact that fish habitat and streamflow are influenced by many factors, including surface diversions, geology, soils, morphology and precipitation, among others, not just groundwater. Additionally, there may be a number of locations in the basin where groundwater is not historically connected to streamflow due to geologic conditions in those areas.

The consensus of the group is that the Mid-County Groundwater Agency (MGA) should strive to achieve groundwater levels high enough to maintain or increase groundwater contributions to stream flow that protect fish habitat. The GSP Advisory Committee should recommend minimum thresholds that protect against significant and unreasonable impacts to GDEs in the basin that are linked directly to groundwater levels in principle aquifers, and which can be addressed through sustainable groundwater management. Groundwater levels were seen by the Working Group as an appropriate proxy for measuring effect on interconnected surface water.

EVALUATING RELATIONSHIP BETWEEN GROUNDWATER AND SURFACE WATER

Surface water (streams, ponds and wetlands) receive their water from a combination of rainfall and runoff, seepage from groundwater, and interflow, which is water moving through the soil, generally in response to rainfall, but not connected to the underlying groundwater. Surface water can be fed by shallow, perched groundwater, that is not directly connected to the deeper underlying aquifers. Some of this may occur in adjacent alluvial materials, with only an indirect connection the deeper aquifers. Water can move into surface water bodies from groundwater and soil (gaining conditions) and can also seep out of the surface water body back into groundwater (losing conditions). Baseflow is the flow in a stream that occurs during periods when there is no storm runoff. After the winter, the amount of baseflow in the stream gradually recedes at a rate that is a

function of the ongoing groundwater contribution. The amount of flow is also influenced by other factors such as riparian evapotranspiration and pumping by surface diversions.

Surface water/groundwater interactions are measured and evaluated by a variety of methods:

- Direct measurement of water-level differences between creeks and monitoring wells
- Pump tests to observe drawdown of groundwater level and potential changes in flow relative to pumping of individual wells
- Direct measurement of streamflow to show gains, losses and fluctuations along stream reaches
- Baseflow comparisons to reference streams to identify possible long-term changes in baseflow
- Rainfall-runoff regression models to identify changes in flow relative to rainfall
- Low-flow frequency distribution to determine increased frequency of lower flows
- Observed or modelled baseflow recession rates
- Groundwater modelling which calculates groundwater levels relative to stream levels and amounts of groundwater loss or gain for specific stream reaches

With regard to groundwater surface water interactions in Soquel Creek, there have been over 15 reports by ten different investigators over the past thirty years. They have generally concluded that groundwater pumping does influence flow in Soquel Creek, but that the relationship has been challenging to quantify. Previous studies and preliminary model runs have indicated the following:

- Soquel Creek went dry at the U.S. Geological Survey (USGS) gage for periods of more than 30 days during the late summer of 1992 and 1994. This was also a time of depressed groundwater levels in the basin due to groundwater pumping. As already noted, measured streamflow is also impacted by surface diversions, evapotranspiration and streambed aggradation, which can fill the bed with coarse bed material resulting in the flow going subsurface.
- Prior to 2001, based on streamflow measurements, the mainstem of Soquel Creek above the USGS gage was determined to lose flow during dry summers and gain flow from groundwater during the summer of wetter years.
- More accurate measurements of shallow groundwater levels adjacent to Soquel Creek since 2001 have confirmed reaches that showed groundwater levels below the steam bottom, but in recent years those levels have come up (See the Main Street and Balogh well levels in Figure 11).

- In the lower section of Soquel Creek, the groundwater model simulates the majority of June – September flow into the creek from relatively shallow interflow above the groundwater table with a much smaller amount from deep groundwater. **Error! Reference source not found.**2 shows a streamflow hydrograph of the Soquel Creek gage between October 1991 and December 1995. The two lines on the hydrograph represent the model simulated flow (solid green) and the measured flow (dashed blue). The measured data in dry years (1992 and 1994) have continually declining flows through summer and fall that suggest other influences on streamflow besides groundwater (such as surface water diversions). In the wetter years (1993 and 1995), flow stabilizes, indicating that groundwater is more influential (possibly because of increased groundwater levels) than in dry years.
- Figure 3 shows measured historical groundwater data at SC-10, which is located near Soquel Creek upstream of the losing reach from Figure 1. The data indicates moderate fluctuations in regional groundwater at that location.
- Additional model simulations to be conducted over the next few months will help inform the extent to which managing groundwater levels in various parts of the basin will affect the amount that groundwater flow contributes to basin waterways.

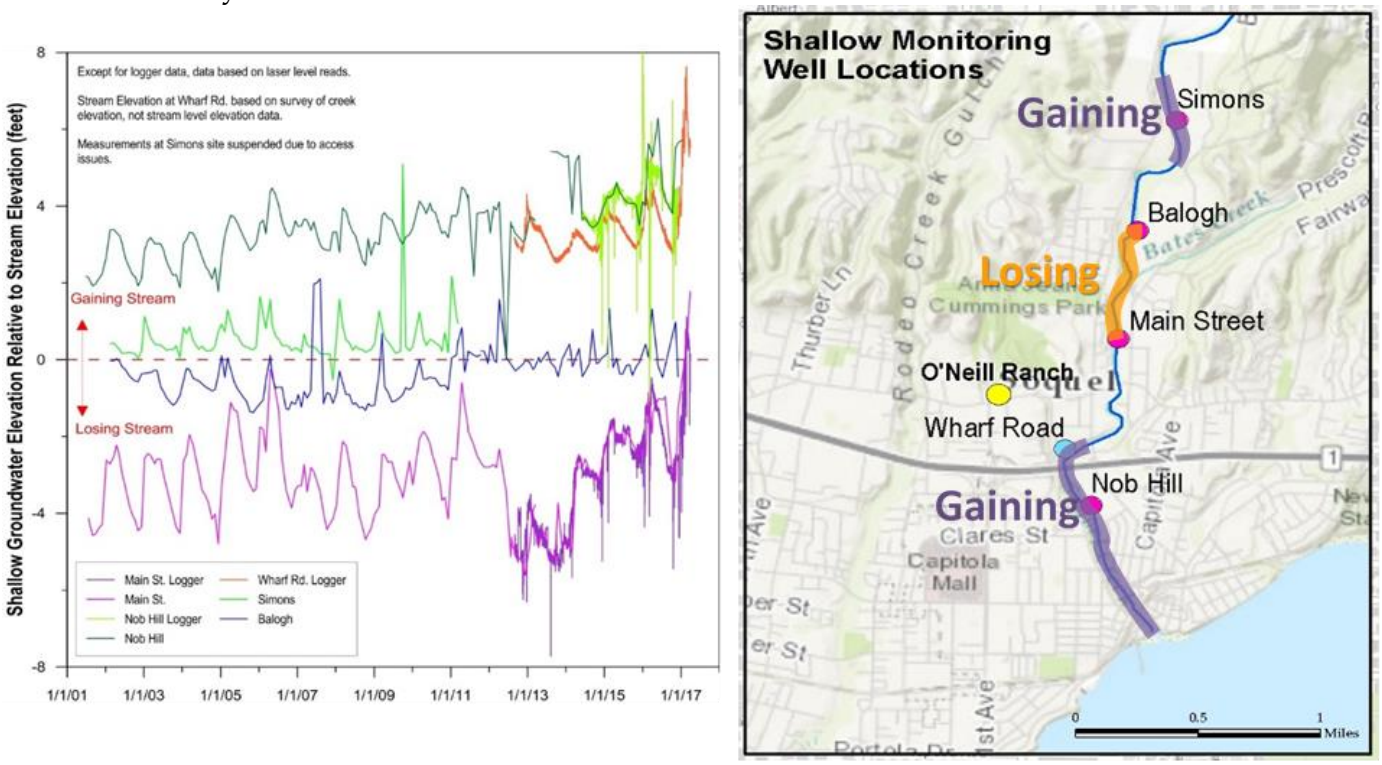

Figure 1: Shallow Groundwater Elevations in Relation to Streambed Elevations

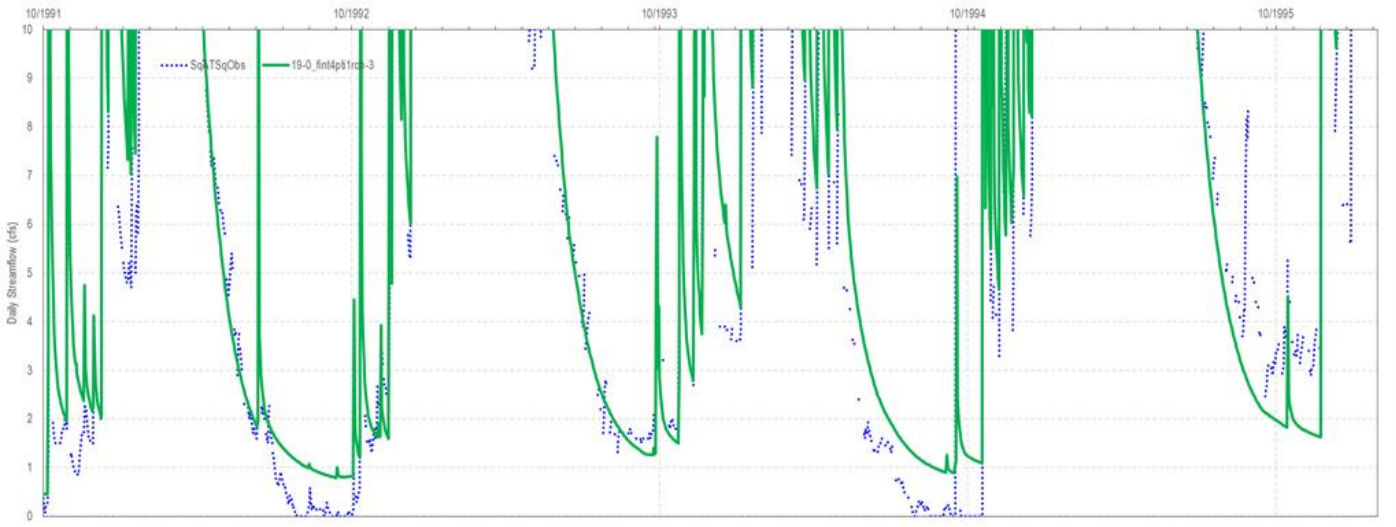

Figure 2: Soquel Creek at Soquel USGS Streamflow Gauge Measurements between October 1991 and December 1995 (Blue is actual flow, green is modelled flow)

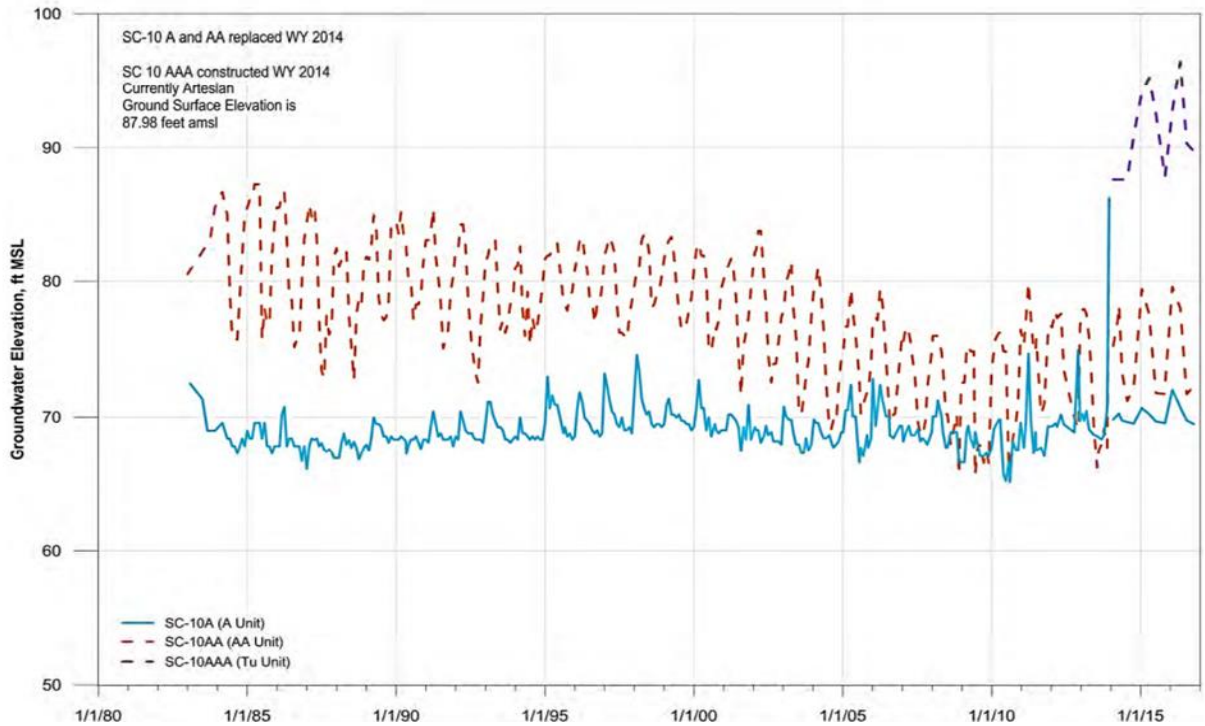

Figure 3: Monitoring Well SC-10 Groundwater Elevations (Near Soquel Creek at the end of Cherryvale)

LOCATIONS WHERE SURFACE WATER IS CONNECTED TO GROUNDWATER

The groundwater model calculates the percent of time that surface waters are connected to groundwater by comparing the elevation of the surface water and the groundwater elevation as determined by the model. These calculations can be verified by field measurements at locations where there is good data on groundwater elevation. Throughout the basin there is significant variation in the percent of time surface water is connected to groundwater. In the locations where streams are disconnected, groundwater levels are well below the bottom of the stream. Where streams are disconnected, water percolates out of the stream to the underlying groundwater through an unsaturated zone at a rate that is determined by the permeability of the underlying material. Under these conditions, the rate of loss is not affected by the elevation of the groundwater. Where streams are connected to groundwater, the stream may be gaining or losing water to or from groundwater, and the rate of gain or loss is affected by the groundwater elevation relative to the stream channel.

- The Eastern side of the basin, specifically upper Valencia Creek, Trout Gulch Creek, as well as a number of ponds, are connected to groundwater less than 5% of the time. This may be a geologic condition of the highly permeable underlying Aromas and Purisima F units and/or it also may be influenced by the lowered groundwater levels in the adjacent Pajaro Valley Sub-Basin.
- Soquel and Branciforte Creeks have the most connection to groundwater of the perennial streams in the basin. Some reaches in those streams are connected to groundwater more than 95% of the time.
- The remainder of streams in the basin have varying degrees of connection, between 30-95% of time, depending on season, precipitation patters and groundwater demand, among other factors.

- However, management needs to consider not only how often there is connection with groundwater, but also how much that connection influences streamflow.

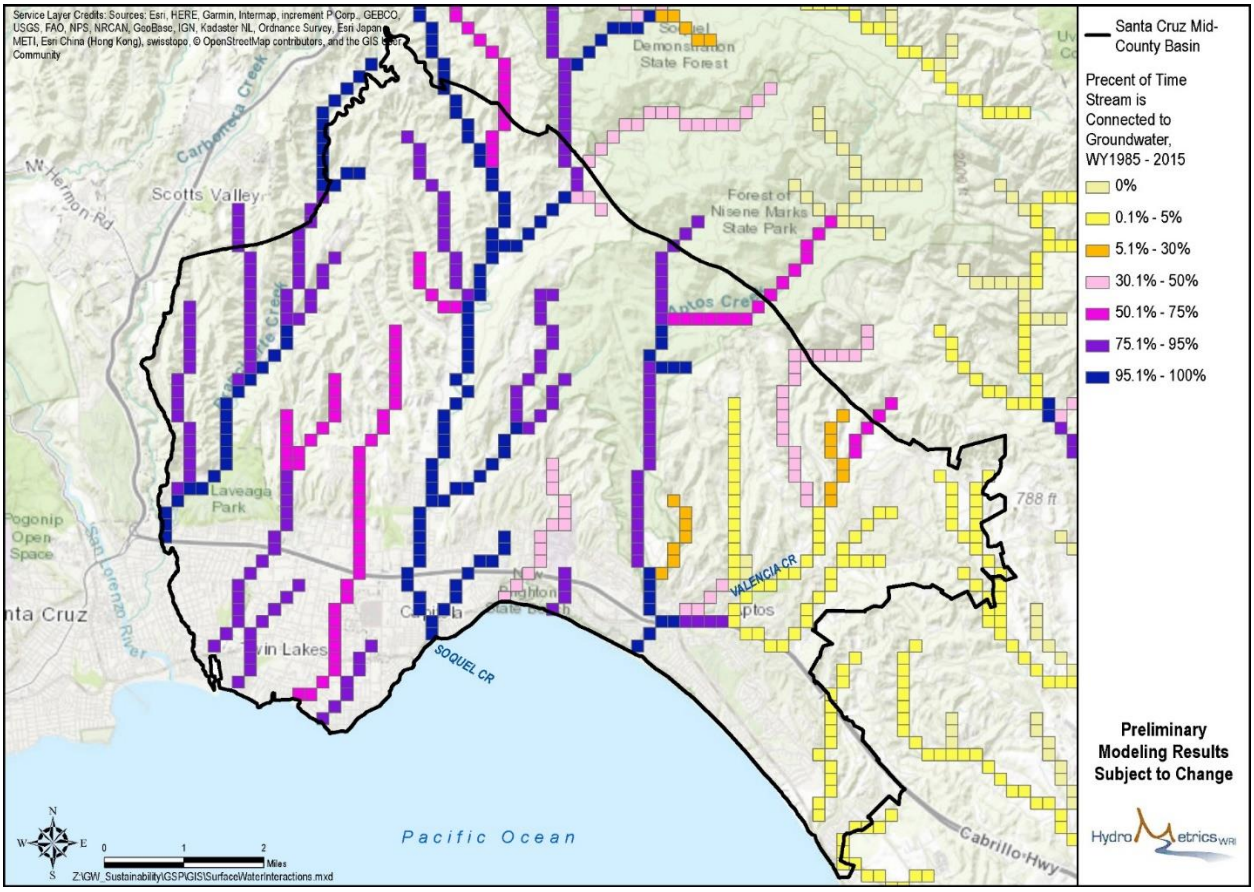

Figure 4: Percent of Time Streams are Connected to Groundwater (WY 1985 – 2015)

In areas of the basin that do have connections between surface water and groundwater, the groundwater model can help identify where and how much streams are gaining or losing. Gaining and losing reaches can also be assessed by measuring the volume of streamflow at the upper and lower ends of a reach and by accurately measuring the groundwater level adjacent to the stream while accounting for surface water diversions. Staff is still evaluating the relationships between streamflow, interflow, and shallow alluvial water to regional groundwater.

AQUATIC SPECIES VULNERABLE TO SURFACE WATER DEPLETION

The Sustainable Groundwater Management Act (SGMA) defines an undesirable result as "depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water." In order to address this issue, it is necessary to identify the potentially affected beneficial uses, the aquatic species and habitats that could be adversely affected by lowered groundwater levels in principle aquifers and interconnected surface water depletions, and the degree to which groundwater and surface water depletion is having an impact when accounting for other changes in the system.

Using guidance developed by The Nature Conservancy (https://groundwaterresourcehub.org/), and input from MGA technical staff, the Working Group reviewed information on the distribution of aquatic species throughout the basin and the habitat requirements for those species. Where possible, the potential effect groundwater management could have on habitat was also discussed with the Working Group. The Working Group agreed to the following:

- The assessment should only address impacts to surface water that are directly related to groundwater. There are many actions that affect stream flow including surface water diversions, evapotranspiration, and rainfall, that are beyond the scope of the Groundwater Sustainability Plan. These actions must still be accounted for in the analysis.
- Steelhead and coho salmon are priority species for focusing on the effects of groundwater management. By managing for their specific habitat requirements in basin streams, the needs of other aquatic species will be met. Maintaining flow for fish will also support other beneficial uses of streams and downstream lagoons, including recreational use and domestic supply, among others. Note that while coho do not appear in the California Natural Diversity Database (Figure 6), they have been seen in the basin though the County's monitoring program.
- Similarly, riparian forest that includes native trees like willow and sycamore were identified as a habitat type that should be prioritized for management. For those species, if groundwater levels are maintained at a level to support streamflow for fish, then the groundwater levels should also be high enough to supply the roots of the riparian vegetation.
- Modeling and management should focus on areas of highest groundwater extraction where streams are interconnected with groundwater.
- Linking the basic water needs of the species and habitats of concern, relative to groundwater elevations is an appropriate way to move forward with the

assessment and development of sustainable management criteria to benefit those species.

- More information is required on the following species and habitat types regarding either occurrence within the basin and/or whether groundwater management would benefit them: Santa Cruz Long-Toed Salamander, California Red-Legged Frog, Lamprey, California Brackishwater Snail, Tidewater Goby, Western Pond Turtle, Wet Meadows (See Table 1 for occurrences of non-salmonid aquatic species found through the County's monitoring program). For example, the Santa Cruz Long-Toed salamander requires breeding ponds, but these appear to all be in locations that are not interconnected with groundwater.
- Species and habitat types that are found in the basin but would not benefit from groundwater management were removed from future consideration. These include the Santa Cruz Black Salamander, Anderson's Manzanita, Santa Cruz tarplant and Santa Cruz Sedge.

The Working Group also considered the issue of possible marine ecosystems dependent on freshwater outflow of groundwater into the marine environment. However, after discussions with researchers and further consideration, the Group determined that any possible ecosystem effects would be both challenging to evaluate, are likely quite small if they exist at all, and will benefit from the management policies put in place to protect priority aquatic species.

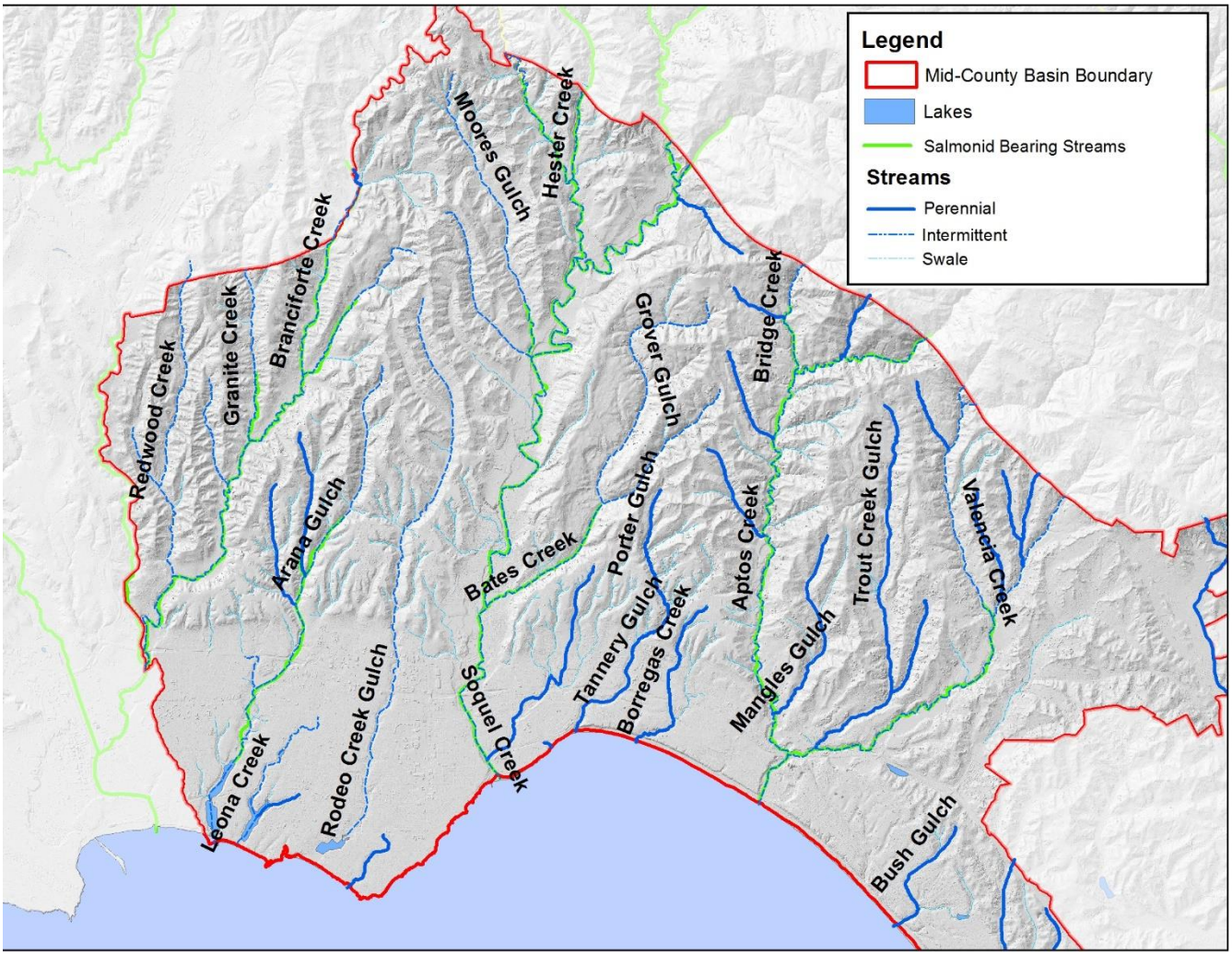

Figure 1: Stream Habitat in the Mid-County Basin

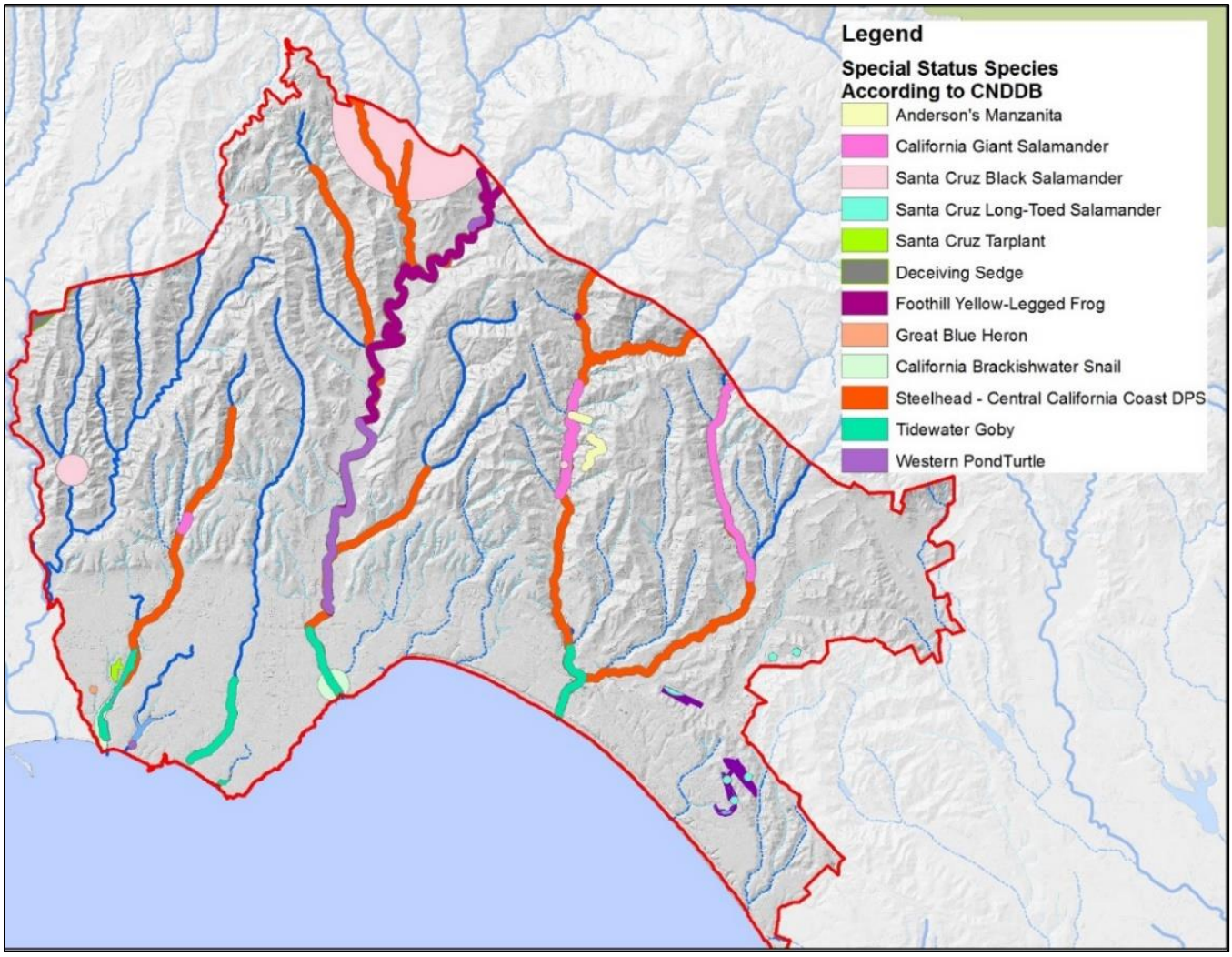

Figure 2: Distribution of Species throughout the Mid-County Basin according to the California Natural Diversity Database. Several streams support multiple species. Note that due to the layering of species on the map, some species that use the entire stream reach, steelhead for example, may appear only to use part of it.

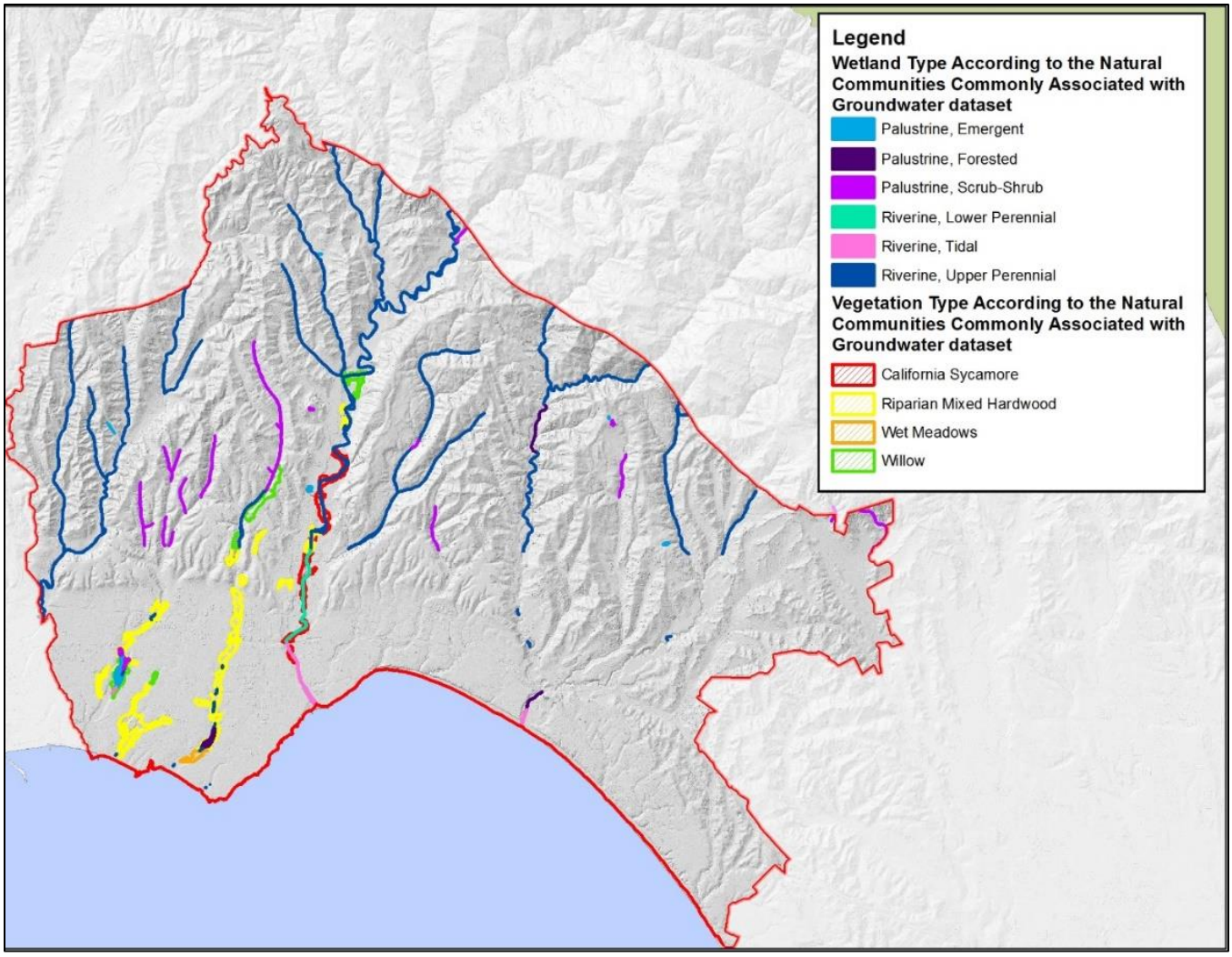

Figure 3: Wetland and Vegetation Types according to the Natural Communities Commonly Associated with Groundwater Dataset

Table 1: Non-salmonid Aquatic Species Identified in Mid-County Streams During Field Sampling Program, 1996-2017. The Sample Count column indicates the number of times over the sampling period that the site was visited. The other Columns show the number of times that specific species were found during those visits.

Site	Sample Count	LAMPREY	GIANT SALAMANDER	YELLOWLEGGED FROG	TIDEWATER GOBY	REDLEGGED FROG	WESTERN TURTLE
SLR-bran-21a1	2	0	0	0	0	0	0
SLR-bran-21a2	15	10	0	0	0	0	0
SLR-bran-21b	10	2	0	0	0	0	0
SLR-bran-21c	5	0	0	0	0	0	0
SOQ-east-13b	4	0	0	1	0	0	0
SOQ-main-1	20	8	0	1	0	0	0
SOQ-main-2	9	1	0	0	0	0	0
SOQ-main-3	7	1	0	1	0	0	0
SOQ-main-4	21	8	1	14	0	0	0
SOQ-main-5	6	0	0	3	0	0	0
SOQ-main-6	9	1	0	3	0	0	0
SOQ-main-7	6	1	0	2	0	0	0
SOQ-main-8	7	1	0	5	0	0	0
SOQ-main-9	10	2	0	3	0	0	0
SOQ-main-10	22	6	2	10	0	0	0
SOQ-main-11	5	1	0	1	0	0	0
SOQ-main-12	21	10	2	11	0	0	0
SOQ-east-13a	22	5	3	9	0	0	0
SOQ-west-19	17	4	3	1	0	0	0
SOQ-west-20	9	0	3	0	0	0	0
SOQ-east-14	10	3	0	5	0	0	0
SOQ-west-21	13	2	9	0	0	0	0
APT-apto-3	13	1	1	0	1	0	0
APT-apto-4	13	1	3	0	0	0	0
APT-vale-2	9	0	0	0	0	0	0
APT-vale-3	9	0	1	0	0	0	0

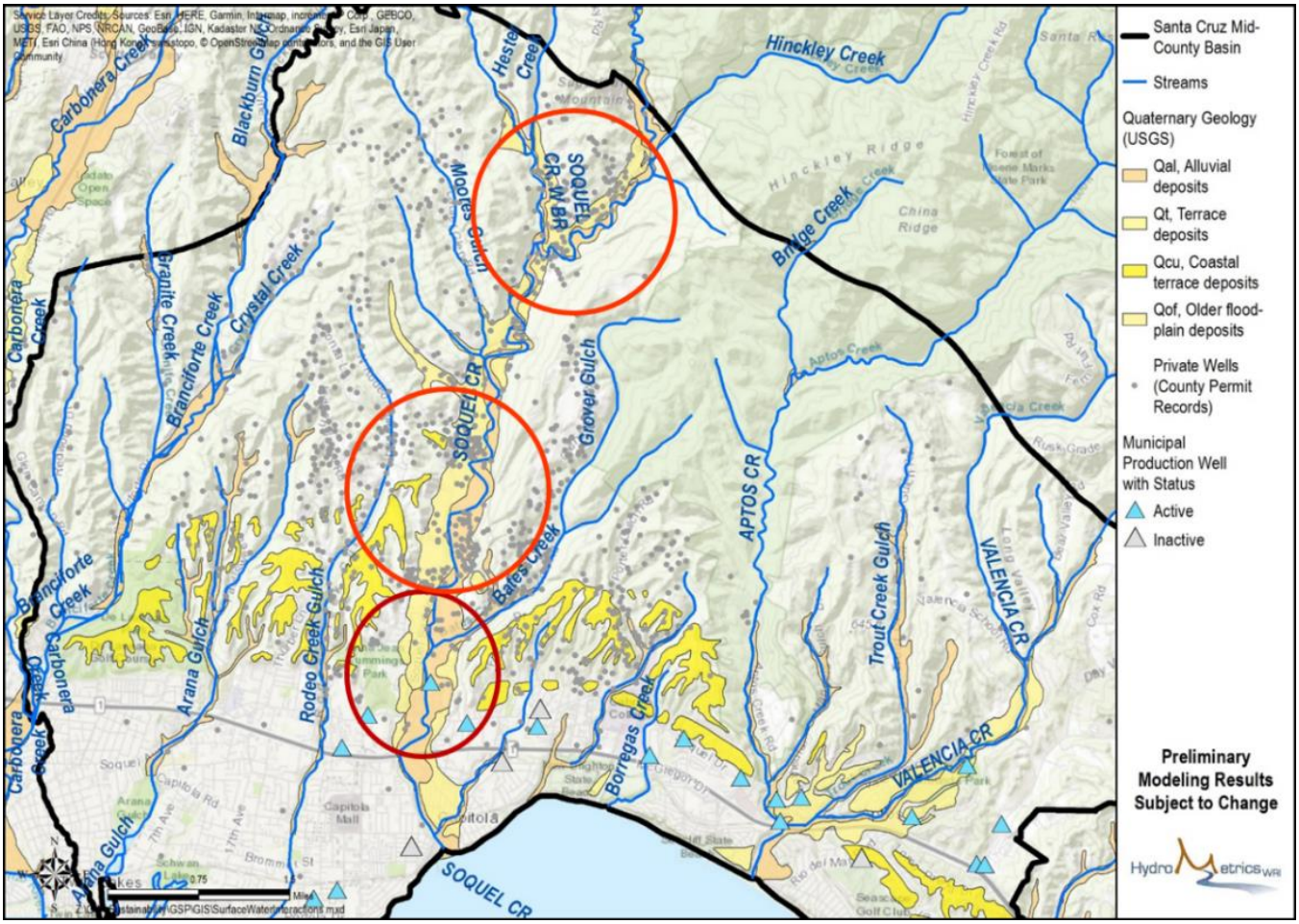

Figure 4: Areas of Concentrated Groundwater Pumping along Soquel Creek

2. GUIDANCE FROM THE WORKING GROUP

Based on the discussion from the Working Group, it is important that the Advisory Committee understand that the lowering of groundwater levels in areas with interconnected surface waters can lead to the following potential impacts:

1. Reducing stream baseflow that supports Groundwater Dependent Ecosystems (GDEs) and aquatic species as a result of lowering groundwater levels beneath the streambed causing loss of water from the stream to groundwater, or by reducing the hydraulic gradient and the rate of groundwater flow to the stream.
2. Increasing temperature of surface water by reducing the inputs of cooler groundwater.
3. Possibly reducing freshwater inputs to brackish water systems, changing the salinity of those habitats.

4. Lowering groundwater levels below the rootzone of riparian vegetation, causing reduced growth, or in the extreme, die-off.

The Working Group focused on the use of groundwater level as a proxy for surface water depletion and examined whether there has been any Significant and Unreasonable impacts to interconnected surface water in the basin in past history. Technical staff advised that during periods of historic low groundwater levels this may have been more likely. The extended periods of zero flow in 1992 and 1994 in Soquel Creek could be considered a significant and unreasonable condition (see Figure 2). This occurred during a period of drought and increased groundwater pumping.

Staff and the Working Group concluded that until more groundwater modeling has been completed, it will be difficult to determine any numeric thresholds for depletion of surface water. The Working Group discussed several variations of groundwater and habitat conditions to both understand and describe significant and unreasonable conditions related to stream flow. These ideas were discussed either by the whole committee or in breakout groups at the end of the meeting. They included:

- Groundwater contributions to streamflow needed to support salmonid habitat requirements at each life cycle stage is important, but it is extremely challenging to identify specific thresholds, given the wide variation in natural conditions and the effects of other factors such as surface diversions, evapotranspiration, and geology.
- Reduction of streamflow needed for salmonid habitats in interconnected surface waters where groundwater pumping is a significant cause of flow depletion would be significant and unreasonable. It may be possible to use the model to help determine groundwater elevations required to support stream flows.
- Groundwater pumping that reduces the rate that groundwater contributes to surface water flows in gaining reaches of interconnected streams may turn gaining reaches into losing reaches, or may increase the rate of seepage in losing reaches.

3. TECHNICAL STAFF PROPOSAL FOR WHAT IS CONSIDERED SIGNIFICANT AND UNREASONABLE SURFACE WATER DEPLETION DUE TO LOWERED GROUNDWATER LEVELS (what we want to avoid)

Advisory Committee Objective: Select a statement that represents what beneficial users of the basin want to avoid happening from depletion of interconnected surface waters.

Generic Framing of a Significant and Unreasonable Condition: "Lowering of groundwater levels adjacent to <Historically> interconnected <Surface Water Type> *as a result of groundwater extraction* that results in a decrease in stream baseflow during <Time Period>"

The words in < > represent variables that change how we set this standard.
<historically> options

- Pre-development: Least flexible, would rely on modeling to establish thresholds. Difficult in the East side of the basin to account for Pajaro Valley pumping.
- Currently/Blank: Use the term Currently or delete this descriptor. Most Flexible, addresses the needs of SGMA, but could provide less protection.

<Stream Type> options

- Based on flow: perennial creeks (most flexible), perennial and intermittent creeks, any surface water (least flexible).
- Based on ecosystems: surface waters that support GDEs, salmonid bearing streams

<Time Period> options

- Year-round
- During the dry season of April-October
- During the driest period from August-October
- During key lifecycle stages for species they are supporting

Technical Staff Recommendation for Significant and Unreasonable Conditions: Lowering of groundwater levels adjacent to interconnected <u>salmonid bearing streams</u> *as a result of groundwater extraction* that results in a significant decrease in stream baseflow during <u>the driest period from August-October.</u>

Rationale: After examining the aquatic species and Groundwater Dependent Ecosystems within the basin, staff and the Working Group concluded that preserving or increasing flows in salmonid bearing streams should be the top priority of the work, and in doing so, the needs of other aquatic species and ecosystems should be met. Trying to estimate

historical connectivity would be very difficult to validate, particularly with so many variables. Surface water systems are most dependent on groundwater during the dry season as surface runoff diminishes. The most critical time that groundwater benefits surface water systems is August-October, when young salmonids still rely on adequate flow. Meeting the objective for this time period of lowest seasonal groundwater levels, will also result in maintaining groundwater contribution during other times of the year.

Technical Staff Proposal
Degraded Groundwater Quality
Minimum Thresholds

This document is organized into the following four sections:

1. Background – Description of groundwater quality in the basin, including trends.
2. Technical staff proposal for what is considered Significant and Unreasonable degraded groundwater quality (i.e., groundwater quality we want to avoid).
3. Technical staff proposal for what is considered Undesirable Results regarding degraded groundwater quality (i.e., how we evaluate groundwater quality to avoid significant and unreasonable groundwater degradation).
4. List of proposed Representative Monitoring Wells.

1. BACKGROUND

GROUNDWATER QUALITY

The municipal water agencies routinely analyze their untreated groundwater to determine the groundwater quality of the basin and to comply with state water quality reporting requirements. Groundwater quality parameters analyzed include general minerals, general physical parameters, and organic/inorganic compounds. Analyses for these constituents are conducted in accordance with requirements of the California Code of Regulations, Title 22. Groundwater quality results are compared to primary and secondary drinking water standards, established by the US Environmental Protection Agency (USEPA), and water quality standards established by the California State Water Resources Control Board's Division of Drinking Water (DDW).

Primary drinking water standards are concentrations that, in the judgment of the State Water Resources Control Board (SWRCB), may have an adverse effect on human health. Secondary standards are set for constituents that are not health threatening, but public water systems still need to test for them and treat their water to meet secondary standards, unless they obtain a waiver. Exceeding these secondary standards may cause undesirable tastes or odors, effects which do not damage the body but are still undesirable, or damage to water equipment or reduced effectiveness of treatment for other contaminants.

Private domestic use wells are not subject to DDW drinking water regulations. However, the County of Santa Cruz requires one-time testing of nitrate, total dissolved solids (TDS), and chloride for any new private well, and since 2013, testing for iron and manganese.

Small water systems that supply groundwater to 15 – 199 service connections also report water quality to the County that includes: inorganics, nitrates, arsenic, perchlorate, chromium, radiation, synthetic organic compounds, and volatile organic compounds (including methyl tertiary-butyl ether (MTBE)). The frequency of reporting ranges between one year and nine years depending on the constituents. Smaller water systems of between 5 – 14 service connections have limited one-time testing requirements for inorganics.

Groundwater produced in the Mid-County Basin is generally of good quality and does not regularly exceed primary drinking water standards. A few naturally occurring constituents, including iron, manganese, arsenic and chromium VI, exceed drinking water standards in a few areas of the basin. Some monitoring wells along the coast have elevated chloride and TDS concentrations associated with seawater intrusion.

In the Purisima A unit the dominant dissolved constituents are calcium and bicarbonate. The dominant dissolved constituents in the upper Purisima units and Aromas aquifer are calcium, magnesium, and bicarbonate.

The following subsections describe the groundwater quality of both naturally occurring constituents and contaminant related constituents, including: emerging contaminants such as pharmaceuticals and personal care products, industrial chemicals present at low concentrations, and chemicals that may affect hormone status, referred to as "endocrine disruptors."

NATURAL GROUNDWATER QUALITY

Total Dissolved Solids (TDS) and Chloride Concentrations

TDS concentrations measured in production wells in the Purisima Formation have historically ranged between 270 and 740 mg/L. TDS concentrations measured in municipal production wells in the Aromas aquifer have historically ranged between 95 and 470 mg/L. Inland private wells typically have TDS concentrations between 210 and 480 mg/L. The secondary maximum contaminant level for TDS is 1,000 mg/L. There is a small water system well near Pot Belly Beach Club, east of New Brighton State Beach, that has historically had TDS concentrations close to 1,000 mg/L, since at least 1994, but there is no increasing trend.

Chloride concentrations measured in production wells in the Purisima Formation have typically ranged between 10 and 100 mg/L. Chloride concentrations measured in production wells in the Aromas aquifer have historically ranged between 8 and 58 mg/L. Inland private wells generally do not have chloride concentrations greater than 20 mg/L.

The secondary maximum contaminant level for chloride is 250 mg/L. The private well at Pot Belly Beach Club has historically had chloride concentrations no higher than 140 mg/L

TDS and chloride concentrations in production wells do not indicate any impacts from seawater intrusion. Chloride in groundwater that is associated with seawater intrusion is addressed separately from overall water quality by the seawater intrusion sustainability indicator.

The only changes in TDS and chloride trends that have been observed in the basin are associated with seawater intrusion.

Iron and Manganese

Groundwater in the Purisima Formation regularly has iron and manganese concentrations above secondary drinking water standards of 300 µg/L and 50 µg/L, respectively. Production wells with elevated iron concentrations can reach 3,000 µg/L, and manganese can reach up to 600 µg/L. Both iron and manganese occur naturally in the Purisima Formation as a result of the dissolution of metals within the aquifer. Neither constituent poses a major health concern, but can result in undesirable aesthetics, causing discoloration of the water. Because iron and manganese are naturally occurring, there have been no increasing trends in their concentrations. Groundwater pumped from the Purisima Formation for municipal purposes is treated to reduce iron and manganese levels prior to distribution.

The Aromas aquifer does not have iron and manganese concentrations above secondary drinking water standards.

Arsenic

Very low arsenic concentrations near the laboratory detection limit are found throughout the basin (generally less than 1 µg/L). Slightly higher arsenic concentrations of between 1.6 and 5.5 µg/L are regularly detected at two municipal water supply wells that produce groundwater from the Purisima Formation, near Aptos Village. All concentrations are below the state drinking water standard of 10 µg/L.

Soquel Creek Water District (SqCWD) conducted a special investigation of the low concentrations of arsenic in 2003 and concluded that the arsenic detections are most likely associated with the natural occurrence of arsenic resulting from the depositional and geochemical conditions in the coastal environment. Desorption or dissolution of arsenic oxyanions from iron oxide appears to be the most common cause of arsenic in

groundwater. Managed aquifer recharge projects can cause dissolution and mobilization of arsenic in the aquifer that may increase the arsenic concentrations above drinking water standards.

There have been no increasing concentration arsenic trends in affected wells because the source of arsenic occurs naturally within the sediments and is not being added to from a point source.

Chromium VI

Chromium is a naturally occurring metallic element that can be found naturally in water, soil, and rocks, but it may also occur in groundwater due to industrial contamination. In water, chromium exists either in its more reduced form, trivalent chromium (chromium III), or its more oxidized form, hexavalent chromium (chromium VI). Chromium III is an essential nutrient; however, chromium VI may pose a potential public health risk, even when present at low levels. Inhalation of chromium VI is known to cause cancer in humans and is likely to be more toxic when inhaled than when ingested. Studies indicate that most of the total chromium in the basin comprises chromium VI.

Chromium VI, from natural sources, has been detected at concentrations ranging between 5 and 40 µg/L in the coastal Aromas aquifer where both SqCWD and Central Water District (CWD) have production wells. These concentrations are below the current state drinking water standard of 50 µg/L for total chromium. A lower chromium VI standard of 10 µg/L, set by the State Water Resources Control Board (SWRCB) regulations in July 2014 was suspended by a Sacramento trial court in May 2017 because the SWRCB failed to address the economic concerns of small water systems before setting the chromium VI standard. However, it is expected that the state will likely adopt a drinking water standard lower than 50 µg/L in the near future. There have been no increasing chromium VI concentration trends in affected wells.

Where the overlying Aromas aquifer has elevated chromium VI concentrations, the underlying Purisima F unit sometimes has very low detections of chromium VI. Groundwater in other Purisima Formation units does not have detectable chromium VI.

CONTAMINATED GROUNDWATER QUALITY

Nitrates

Nitrate is a naturally occurring compound that is formed in the soil when nitrogen and oxygen combine. Elevated nitrate concentrations are most likely due to runoff and leaching from fertilizer use, leaching from septic tanks and sewage, and erosion of natural deposits. Infiltration of nitrate through the unsaturated zone and into groundwater is a

greater concern in areas with highly permeable sandy soils. A large area of the basin is on septic systems because of the rural, low residential density, but only limited areas have highly permeable soils. High nitrate concentrations can cause health problems for infants that results in a dangerous condition called methaemoglobinaemia, also known as "blue baby syndrome". State primary drinking water standards are 10 mg/L for nitrate as nitrogen (N); 10 mg/L for nitrate plus nitrite as N; and 1 mg/L for nitrite as N.

The Mid-County Basin has historical nitrate as N concentrations in production wells that range from mostly non-detectable to a maximum of 11 mg/L. The highest concentrations are found in the La Selva Beach area of the Aromas aquifer where concentrations have averaged 4 mg/L over the past five years. In multi-depth monitoring wells, the highest nitrate as N concentrations are at shallowest depths. All recent nitrate as N concentrations are below the state drinking water standards and have not impacted the municipal water supplies that produce groundwater from depths greater than 200 feet.

In areas with sandy soils where septic systems are used, nitrate contamination can be an issue. However, groundwater quality data from private wells in the Mid-County Basin, which generally produce groundwater from shallower depths than municipal production wells, suggests that septic systems have not adversely increased nitrate concentrations in private wells.

Organic Compounds

Organic compounds are those that include Volatile Organic Chemicals (VOCs) and pesticides. VOCs are chemicals that are carbon-containing and evaporate, or vaporize, easily into air at normal air temperatures. VOCs are found in a variety of commercial, industrial, and residential products, including gasoline, solvents, cleaners and degreasers, paints, inks and dyes, and pesticides. VOCs in the environment are typically the result of human activity, such as a spill or inappropriate disposal where the chemical has been allowed to soak into the ground. Once released into the environment, VOCs may infiltrate into the ground and migrate into the underlying production aquifers.

The SWRCB's Geotracker database was used to provide the status and location of contamination sites within the Mid-County Basin (Figure 1.) Geotracker tracks regulatory data about leaking underground fuel tanks (LUFT), Department of Defense (DoD) cleanup sites, Spills-Leaks-Investigations-Cleanups (SLIC), and landfill sites. Figure 1 shows that just less than half of contaminant sites in the basin are located within the area of municipal production, with none occurring in the inland portions of the basin where private wells are used for water supply. The proximity of contaminated sites to municipal wells poses a greater risk to the municipal wells; however, most released

contaminants remain shallow and rarely migrate down to the aquifers used by municipal production wells. Regulation and oversight of the remediation of contaminated sites in the basin is overseen by the Regional Water Quality Control Board (RWQCB) and Santa Cruz County Environmental Health.

The following bullets describe all known organic contaminant impacts to municipal production wells.

- A localized plume of 1,2,3-trichloropropane (TCP) at the SqCWD's Country Club production well within the Aromas aquifer and Purisima F unit. 1,2,3-TCP in groundwater at this location may be due to a legacy of fumigant use associated with the historic agricultural use of the well site. The maximum 1,2,3-TCP concentration has been 13 ppt in 2008 and 2010, and currently concentrations are generally less than 0.000009 mg/L. As the groundwater quality remains over the state drinking water standard of 0.000005 mg/L (or 5 parts per trillion), SqCWD is currently not pumping from this well but plans to use it again once a treatment plant for 1,2,3-TCP has been constructed.

- SqCWD's Rosedale production well has had low MTBE concentrations associated with a former leaking underground storage tank (LUST) located on Soquel Drive east of the well that was reported to be leaking in 1989. After undergoing remediation and monitoring, the case was closed in March 2014. Beginning in October 2014, the Rosedale well had a confirmed detection of MTBE at 0.88 μg/L increasing to 1.2 μg/L in July 2016. Currently, MTBE concentrations are around 1 μg/L. The state drinking water standard is 13 μg/L, and the secondary standard for taste and odor concerns is 5 μg/L. MTBE has not been detected in any other municipal wells in the basin.

Small water systems in the basin have had no detects of MTBE in their groundwater.

Perchlorate

Perchlorate can be manufactured or occurs naturally as a colorless, odorless chemical that is most commonly used in rocket fuel. As there is no rocket fuel use or manufacturing in the Mid-County Basin, other possible sources of manufactured perchlorate and perchlorate salts may in: matches, dyes, rubber, lubricating oils, car air bag inflators, road flares, drying and etching agents, gunpowder, batteries, chlorine and chlorine-based cleaners, pool chlorination chemicals, electronic tubes, paint, enamel, fertilizers, and nuclear reactors. Perchlorates can form naturally in the atmosphere, leading to low levels of perchlorate in precipitation.

In the Mid-County Basin, perchlorate has been found intermittently in a few Aromas area production wells. Concentrations are generally below 0.8 μg/L. In 2009, one well had the highest detection on record of 1.2 μg/L. The state's primary drinking water standard is 6 μg/L. A source of perchlorate in the Aromas area may be from fertilizer use in the area.

Small water systems in the basin have had no detections of perchlorate in their groundwater.

Contaminants of Emerging Concern

Contaminants of emerging concern (CECs), including pharmaceuticals and personal care products (PPCPs), are increasingly being detected at low levels in surface water and water infiltrating to groundwater from septic systems. Groundwater may be impacted by recharge of treated wastewater, surface water, and from septic systems. New and emerging contaminants are currently unregulated but may be subject to future regulation. Examples of new and emerging contaminants are N-Nitrosodimethylamine, a semi-volatile organic compound (NDMA and other nitrosamines), and 1,4-dioxane, etc.

Unregulated contaminants for which monitoring is required (UCMR) are tested by SqCWD every five years. Additionally, in 2007 SqCWD participated in the first phase of a joint U.S. Geological Survey (USGS) – U.S. Environmental Protection Agency (USEPA) study on 96 CECs in drinking water. The production wells that have had detections of CECs are the same wells in the La Selva area where nitrates are elevated in the Aromas aquifer. Both these wells are no longer pumped because of exceedances of drinking ing water standards. The detected CECs are pharmaceuticals, PPCPs, 1,4-dioxane and 1,1-dichloroethane, which occur at extremely low concentrations.

CEC data has been collected since 2001, and there is a good baseline set of background data to compare against when potential projects that recharge treated wastewater into the basin as a supplemental source of water are implemented.

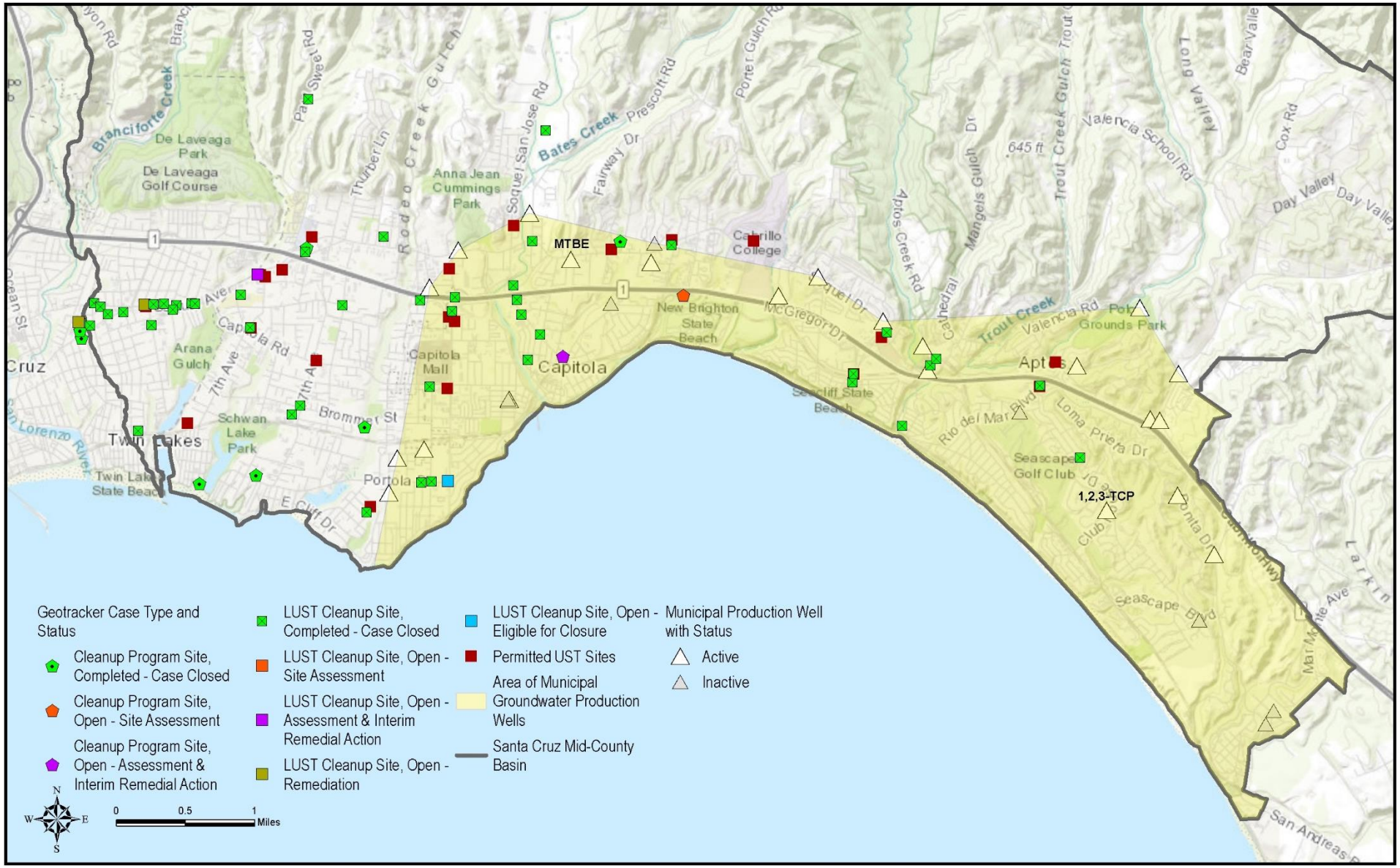

Figure 1: Geotracker Contamination Sites

2. **TECHNICAL STAFF PROPOSAL FOR WHAT IS CONSIDERED SIGNIFICANT AND UNREASONABLE DEGRADED GROUNDWATER QUALITY** (i.e., groundwater quality we want to avoid)

Advisory Committee Objective: Select a statement that represents what beneficial users of the basin want to avoid happening from degraded groundwater quality.

Technical staff proposal for Significant and Unreasonable Condition regarding degraded groundwater quality:

Significant and unreasonable conditions occur when groundwater quality, attributable to groundwater pumping or managed aquifer recharge, exceeds state drinking water standards.

Rationale: The Sustainability Indicator of degraded water quality is a "do no harm" indicator of sustainability. Essentially, this means that groundwater quality in the basin should not be allowed to degrade due to projects and management actions implemented under the Groundwater Sustainability Plan (GSP). For example, nitrate is a historical diffuse contaminant source in areas where septic systems are in use, and as a result nitrate contamination in wells in the Aromas area has occurred in the past and will continue to do so in the future. This will occur whether or not the GSP is implemented. The migration of nitrates into groundwater is not an activity the Groundwater Sustainability Agency (GSA) has control over, and unless it is attributable to groundwater pumping or managed aquifer recharge, which the GSA can control, it cannot be considered a significant and unreasonable condition.

VOCs are another example to which the same concept applies. Contaminant spills and improper handling of chemicals cannot be stopped by sustainable groundwater management. What can be controlled by groundwater management is the inadvertent spread of contaminant plumes by production wells. Wells pumping groundwater draw groundwater towards them, and this may cause a contaminant plume to increase in size, thereby impacting a greater volume of groundwater. The portion of the significant and unreasonable statement that says "**attributable to groundwater pumping or managed aquifer recharge"** purposely excludes local contamination and only focuses on those aspects that can be controlled by the GSA. Regulation and remediation of contaminated sites in the basin is overseen by the Regional Water Quality Control Board and Santa Cruz County Environmental Health Services.

While municipal agencies might have the resources to treat water to drinking water standards, small systems and private domestic and agricultural users are generally not able to afford the high cost of treatment. The Mid-County Basin has overall good

quality groundwater that apart from disinfection and municipal treatment for some naturally occurring constituents in specific locations, does not require treatment. Keeping groundwater quality below drinking water standards keeps the *status quo* for all beneficial users.

Primary drinking water standards are human health based standards, while secondary standards are not health threatening but may cause undesirable tastes or odors, effects which do not damage the body but are still undesirable, or damage to water equipment or reduced effectiveness of treatment for other contaminants. The proposed statement above includes both primary and secondary standards, where applicable.

In the Mid-County Basin, arsenic and chromium VI occur naturally in certain aquifers but generally do not exceed primary drinking water standards. However, there is a possibility that if drinking water standards are lowered in the future (as expected for chromium VI), this might result in an exceedance of drinking water standards for some wells. Additionally, since these constituents existed in groundwater before the basin was development, their presence cannot be considered significant and unreasonable as the groundwater has been put to beneficial use for decades. For these reasons, impacts by arsenic and chromium VI are only considered significant and unreasonable if their elevated concentrations are due to contamination or managed aquifer recharge that mobilizes arsenic above naturally occurring concentrations.

Similar to arsenic and chromium VI, iron and manganese are naturally occurring, and their exceedance of secondary standards cannot be considered a significant and unreasonable condition.

3. **TECHNICAL STAFF PROPOSAL - UNDESIRABLE RESULTS** (i.e., what set of conditions cause significant and unreasonable impacts to occur)

Overarching Advisory Committee Objective: Select a set of conditions for groundwater quality Minimum Thresholds that if exceeded would cause significant and unreasonable groundwater water degradation to occur.

Best management practice guidance by DWR states that minimum thresholds for water quality degradation can be defined at a site (i.e., Representative Monitoring Wells), along an isocontour line, or as a calculated volume. As isocontours are difficult to develop for a whole basin (it is easier for a small area with a lot of monitoring points) and a volume is difficult to estimate because of a lack of data points to define the volume, setting water quality minimum thresholds at Representative Monitoring Wells is the most straightforward to measure and monitor over time. As production wells are the point of extraction for beneficial users in the basin, it is important to use these locations as representative monitoring points for water quality degradation. It may be necessary to add some monitoring wells as Representative Monitoring Wells in areas where there are no production wells.

Generic Framing: Undesirable results in the basin occur when, as a result of groundwater pumping or managed aquifer recharge, <percentage> or more Representative Monitoring Wells exceed <constituent> <Minimum Threshold> over <time period>.

<Percentage> options:

- 25% or more Representative Monitoring Wells. If there are 40 Representative Monitoring Wells, ten or more wells exceeding minimum thresholds will cause undesirable results. This percentage provides less flexibility in avoiding undesirable results than a higher percentage.
- 33% or more Representative Monitoring Wells. If there are 40 Representative Monitoring Wells, 13 or more wells exceeding minimum thresholds will cause undesirable results. This percentage provides more flexibility in avoiding undesirable results than a lower percentage.

<Constituent> options:

- Any constituents. This means that if any constituent exceeds its drinking water standard, this would constitute an undesirable result. It also means that Representative Monitoring Wells could have different constituents exceeding their minimum thresholds. This is the recommended option because an exceedance of

any constituent means the water cannot be used for drinking water unless treated; it doesn't matter what the constituent is.

- Respective constituents. This means the exceedance of a minimum threshold must be for the same constituent. A lower percentage of wells (e.g., 25%, or 10 wells out of 40) with exceedances should be selected for this option, compared to the any option. The occurrence of minimum threshold exceedances will likely be less than the any constituent option because exceedances are limited to just one constituent. Depending on the percentage exceeding allowed, this option can provide more flexibility in avoiding undesirable results.

<Minimum Threshold> option:

- State drinking water standards are recommended. Note: concentrations that are stricter than state drinking water standards will be used for Measurable Objectives to ensure the good water quality in the basin is conserved.

<Time period> options:
Samples for all constituents selected as part of the water quality degradation indicator will need to be collected at least annually.

- Annually – each year, the number of Representative Monitoring Wells exceeding the minimum threshold will be evaluated. This option provides less flexibility in avoiding undesirable results than using results over a longer time period.
- Over a two year period – concentrations are averaged from samples taken over two consecutive years. This option provides more flexibility in avoiding undesirable results than an annual period.

Potential for Management Areas

The Aromas area wells are more susceptible to groundwater contamination because of the unconfined permeable nature of the aquifer (i.e., no overlying layers to protect them from contamination). Nitrate, perchlorate, and CECs are constituents that have been detected in the Aromas aquifer from surface or near-surface sources. There is an option for the Aromas area to get its own set of conditions that lead to undesirable results. The Purisima area has very limited contamination from surface sources and could have a lower percentage of Representative Monitoring Wells exceed minimum thresholds before undesirable results occur.

If different undesirable results are assigned to the two areas, this may suggest separate Management Areas may be appropriate for the Aromas and Purisima areas.

Technical staff proposal of undesirable results for the Aromas area:
Undesirable results in the basin occur when as a result of groundwater pumping or managed aquifer recharge, 33% or more Representative Monitoring Wells exceed any <minimum threshold> annually.

Technical staff proposal of undesirable results for the Purisima area:
Undesirable results in the basin occur when as a result of groundwater pumping or managed aquifer recharge, 25% or more Representative Monitoring Wells exceed any <minimum threshold> annually.

Rationale: The Aromas area percentage of wells that can exceed the minimum threshold is greater than the Purisima wells percentage because of the greater susceptibility for contamination in the Aromas aquifer/Purisima F wells. Any constituent exceeding minimum thresholds is preferred because an exceedance of any constituent means the groundwater at that location cannot be used for drinking water unless treated no matter what the contaminant is. At least annual groundwater samples should be collected and tested for all Representative Monitoring Wells, and exceedances of minimum thresholds evaluated annually.

Other considerations:
If a constituent's concentration exceeds its relevant minimum threshold/drinking water standard for the first time, a follow up sample must be collected and tested to verify that the result is repeatable and not a laboratory or sampling error.

As new drinking water standards are developed for CECs or drinking water standards are revised to lower concentrations, minimum thresholds for groundwater quality degradation will need to be adjusted accordingly.

Production wells are not currently tested annually for the full range of organics. The GSP will need to specify the sampling and testing frequency for Representative Monitoring Wells. Wells near potentially contaminating activities may need to be tested annually for a range of VOCs and CECs, in addition to the typical constituents tested.

Representative Monitoring Wells

A proposed list of wells to use as Representative Monitoring Wells is provided below. As future projects, which may impact groundwater quality in the basin, are implemented, it will be necessary to add Representative Monitoring Wells to represent the groundwater quality associated with those projects.

Figure 2 shows the location of proposed Representative Monitoring Wells within the Mid-County Basin.

Area of Municipal Production

The area of municipal production has just under 50% of the reported contaminated impacts in the basin. Most municipal production wells are included, plus some dedicated monitoring wells in areas where there are no production wells. Municipal production wells that are excluded are those that are screened in the same aquifers as another nearby municipal production well which is included as a proposed Representative Monitoring Well.

Aromas Area Wells (12)

The Aromas area is more susceptible to surface contamination due to the unconfined nature of the Aromas aquifer. This includes the La Selva Beach area of the Aromas aquifer where nitrate from septic tanks and agricultural activities have impacted groundwater.

Altivo
Seascape
San Andreas
Bonita
Country Club
Polo Grounds
Rob Roy 10
Rob Roy 12
Aptos Jnr High
SC-A1C (shallowest)
SC-A2C (shallowest)
SC-A3C (shallowest)
SC-A8C (shallowest)

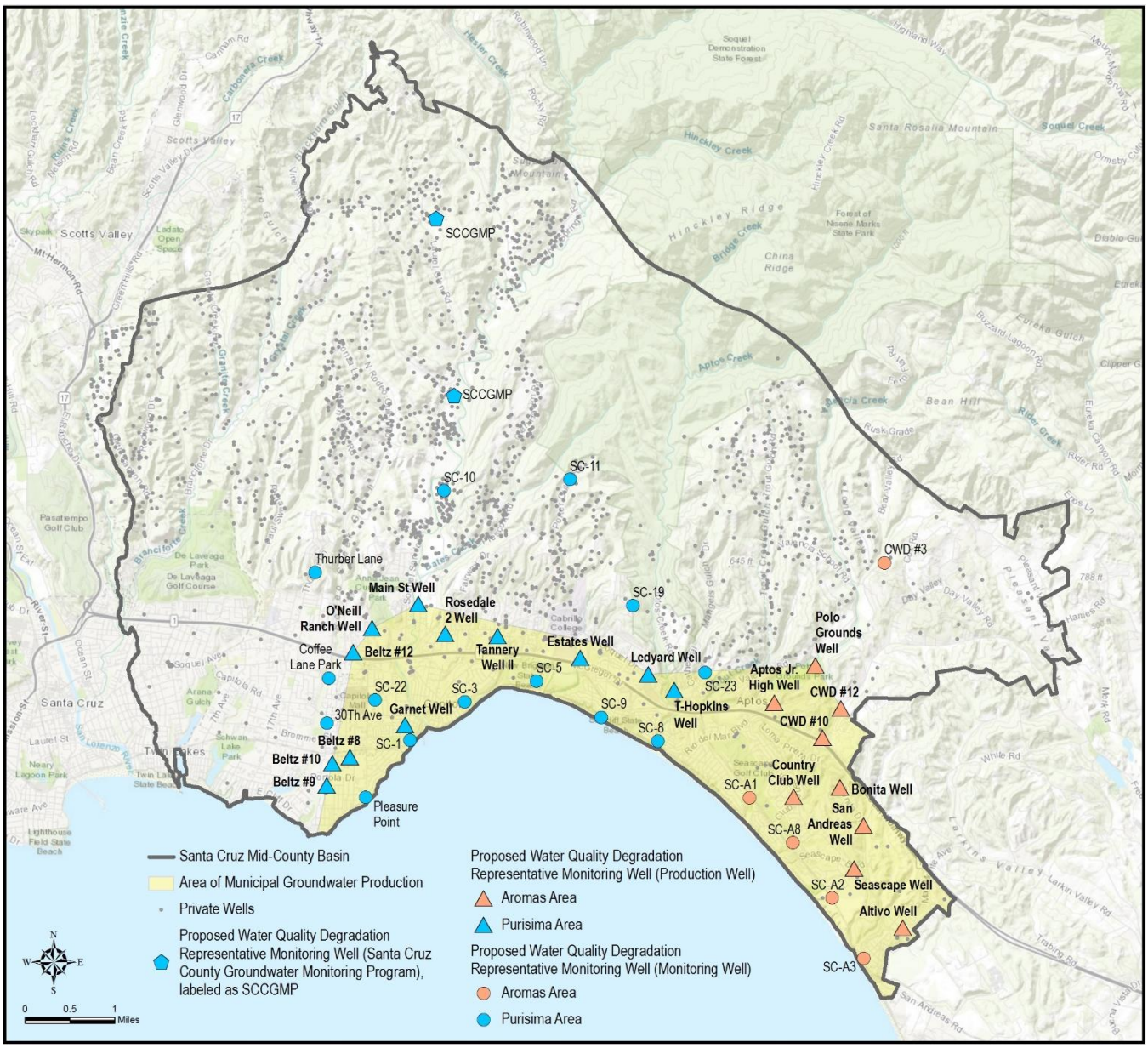

Figure 2: Potential Representative Monitoring Wells for Water Quality Degradation

Purisima Production Wells (12)

T-Hopkins
Ledyard
Estates
Tannery II
Rosedale 2
Main St
O'Neill Ranch
Beltz 12
Garnet
Beltz 8
Beltz 9
Beltz 10

Purisima Monitoring Wells in Non-Seawater Impacted Areas (10)

SC-1
SC-3
SC-8
SC-9
SC-5
SC-22
Pleasure Point
30th Ave
Coffee Lane Park
Thurber Lane

Non-municipal pumping area (inland) (7)

Less wells are proposed here because potentially contaminating activities do not occur much in this area.

SC-10
SC-11
SC-19
SC-23
Mountain School
Twin Lanes or other?
Cox #3 (Aromas area)

Draft Meeting Summary

Santa Cruz Mid-County Groundwater Sustainability Planning (GSP) Advisory Committee Meeting #7

May 23, 2018, 5:30 – 9:00 pm

This meeting was the seventh convening of the Groundwater Sustainability Planning (GSP) Advisory Committee. It took place on May 23, 2018 from 5:30-9:00 p.m. at the Santa Cruz County Sheriff's Office. This document summarizes a presentation to the Advisory Committee and discussion focused on two Sustainability Indicators: Chronic Lowering of Groundwater Levels and Subsidence. In particular, it describes project updates by staff; presentation of a technical staff proposal and options covering Chronic Lowering of Groundwater Levels and Subsidence Minimum Thresholds; Committee perspectives on Significant and Unreasonable Conditions, and Undesirable Results related to Chronic Lowering of Groundwater Levels and Subsidence under various different options; report on technical staff incorporation of Advisory Committee input from the April 25, 2018 meeting; action items; and an overview of public comment received. It is not intended to serve as a detailed transcript of the meeting.

Meeting Objectives

The objectives for the meeting were to:

1. Discuss and share Advisory Committee input on Minimum Threshold and Undesirable Result Options with Underlying Significant and Unreasonable Conditions for the following Sustainability Indicators:
    a. Chronic Lowering of Groundwater Levels
    b. Subsidence
2. Report back on Technical Staff incorporation of Advisory Committee input from the April 25 meeting.

Action Items

Key action items from the meeting include the following:

1. Darcy Pruitt, Regional Water Management Foundation, to keep Advisory Committee apprised of email address assignment process.
    - John Ricker, County of Santa Cruz to update the Advisory Committee on the County's email policy, once it is final.
2. Sierra Ryan, County of Santa Cruz, to confirm Jason Hoppin's (the County's communications officer) participation in June 27 meeting.
3. Staff to remind Advisory Committee members of Jason Hoppin's availability at June 27 meeting for outreach support.
4. Advisory Committee members to review Proposed Draft Seawater Intrusion Minimum Thresholds and provide any additional feedback to Ms. Pruitt by May30. Ms. Pruitt to send out a

reminder to the Committee on May 29.

Meeting attendance

Committee members in attendance included:

1. Kate Anderton, Environmental Representative
2. John Bargetto, Agricultural Representative
3. David Baskin, City of Santa Cruz
4. Rich Casale, Small Water System Management
5. Keith Gudger, At-Large Representative
6. Bruce Jaffe, Soquel Creek Water District
7. Dana Katofsky McCarthy, Water Utility Rate Payer
8. Jon Kennedy, Private Well Representative
9. Jonathan Lear, At-Large Representative
10. Douglas P. Ley, Business Representative
11. Marco Romanini, Central Water District
12. Allyson Violante, County of Santa Cruz
13. Thomas Wyner for Cabrillo College, Institutional Representative

Committee members who were absent included:

1. Charlie Rous, At-Large Representative

Meeting Key Outcomes (linked to agenda items)

1. Introduction and Discussion of GSP Process Timeline and Project Updates

John Ricker, County of Santa Cruz, opened the meeting and welcomed participants. Mr. Ricker then asked the GSP Advisory Committee members, Santa Cruz Mid-County Groundwater Agency (MGA) Executive Team, and the consultant support team around the room to introduce themselves. He also addressed members of the public in attendance and asked them for self-introductions.

Eric Poncelet, Facilitator, reviewed the agenda, meeting objectives, and the updated GSP process timeline, and asked staff to provide the following project updates:

- **June 14, 2018 Mid-County Stakeholder Meeting**
  Ms. Ryan, referred to a flyer she had distributed, providing some details on the anticipated June 14 stakeholder meeting, scheduled to occur at the Congregational Church in Soquel.

- **Trend Data**
  Mr. Ricker updated the group on his work with HydroMetrics on developing further trend data on groundwater usage, indicating that the data will depend on the targets set by the Committee. Staff will share additional data in July.

- **Advisory Committee Email Addresses**

Ms. Pruitt provided an update on setting up email addresses for Advisory Committee and MGA Board members. The group had a brief discussion on this topic.

- **Outreach Support for Advisory Committee**
  Ms. Ryan introduced Jason Hoppin, communications officer for the County, and informed the Advisory Committee that Mr. Hoppin will be available to discuss his services at the June 27 Advisory Committee meeting.

- **Advisory Committee Field Trip**
  Ms. Pruitt distributed field trip ballots to the Advisory Committee members, indicating that the ballot results will assist her in coordinating useful and meaningful field visits for the Committee.

2. Oral Communications (for items *not* on the agenda)

Members of the public provided comments on non-agenda items during this session.

One speaker thanked the Committee for its hard work as volunteers and staff for giving consideration to setting up email addresses for Committee members, which had been requested at earlier Committee meetings. This speaker further thanked staff for the update at the last MGA meeting regarding the availability of the groundwater modeling for review in November and for inviting DWR to attend meetings. Additionally, this speaker expressed concern that the County was downplaying the issue of groundwater recharge from septic tanks and encouraged the Committee to consider the solutions being proposed by the organization Water for Santa Cruz County. Finally, this speaker commented that some of the audio recordings of the meetings were poor in quality.

3. Chronic Lowering of Groundwater Levels – Undesirable Results with Underlying Significant and Unreasonable Conditions.

Georgina King, from HydroMetrics, presented a technical staff proposal and options for Chronic Lowering of Groundwater Levels Minimum Thresholds, which included requests for Advisory Committee members to determine: 1) what the they want to avoid for the Basin (i.e., what is considered Significant and Unreasonable); and 2) what set of conditions they view as causing significant and unreasonable impacts for the Basin (i.e., Undesirable Results). Prior to soliciting Committee input on the staff proposals, Ms. King provided the Committee with some historical information on historic changes in groundwater elevations in various areas of the basin, including illustrating impacts of lowered groundwater levels on pumping wells.

The Advisory Committee provided their input on the technical staff proposal for avoiding chronic lowering of groundwater levels. A synthesis of the Advisory Committee input will be prepared by HydroMetrics and shared with the Advisory Committee for review (separate from this summary).

<u>General Committee Reflections on Chronic Lowering of Groundwater Levels</u>

The Committee expressed the general view that it is important to keep groundwater levels high enough to protect against seawater intrusion. The Advisory Committee understood the need to address chronic

lowering of groundwater levels separately from seawater intrusion because it is a separate state mandated sustainability indicator that must be included in the GSP. Committee members generally agreed with technical staff's assertion that protective groundwater elevations that prevent seawater intrusion will also generally avoid chronic lowering of groundwater levels near the coast.

Committee Perspective on Significant and Unreasonable Conditions - Chronic Lowering of Groundwater

"Significant and Unreasonable Conditions" are the conditions we want to avoid related to chronic lowering of groundwater levels in our groundwater basin.

Committee members responded to the following technical staff proposal: Lowering of groundwater levels that cause 5% or more of all groundwater pumping wells to fell below a level that is 20 feet from the bottom of the well would be a significant and unreasonable condition in the groundwater basin. Staff's rationale was that groundwater levels falling to 20 feet above the bottom of a production well will reduce well productivity and the ability to pump groundwater from the well.

The Committee expressed the general view that the proposed statement was too numerical and needed to be more qualitative. Additionally, as we do not know where all the private wells are in the basin, this would make it impossible to determine the 5% or more measure in the staff proposal. There is also not yet enough statistical information on the depth of wells in relation to the well screens to come up with a defendable distance above the bottom of wells. Several committee members wanted to look at simulated groundwater levels from the model for this indicator when they are available and discuss the technical proposal in greater detail at that time. Other Committee members suggested that significant and unreasonable conditions might be better evaluated by determining the water demand needed to support current and planned land uses, and relate that to groundwater levels.

Committee Perspective on Undesirable Results – Chronic Lowering of Groundwater

"Undesirable Results" are the set of conditions that would cause significant and unreasonable impacts to occur related to chronic lowering of groundwater levels, as measured at representative monitoring wells and adjacent to municipal production wells.

Committee members responded to the following technical staff proposal: An Undesirable Result will occur if the "one-month average representative monitoring well groundwater elevation" falls below the minimum threshold, provided that all representative monitoring wells have data loggers. Staff's rationale was that a monthly average would identify and monitor for seasonal low groundwater levels.

The Committee shared the general view that the staff proposal, which provides for continuous monitoring of groundwater levels and compares a monthly average to the minimum threshold, would protect groundwater in the basin. The Committee requested clarification on how the "monthly average" would be determined and what back-up monitoring measurements would be implemented in case a well's data logger were to fail.

4. Public Comment

During this segment, Mr. Poncelet invited members of the public to comment on the Committee's discussions on Groundwater Levels and any other Advisory Committee work.

A participant asked whether it would make sense to tie in the qualitative proposal with objectives for private well owners. Further, the participant commented that it would be beneficial to private well owners to know that the water district prioritizes providing a healthy environment and also that it would be an Unreasonable Condition if water could not be delivered to users. The participant asked whether the City and County are maintaining a database to record monitoring wells in this respect.

5. Subsidence - Undesirable Results with Underlying Significant and Unreasonable Conditions

Georgina King, from HydroMetrics, presented a technical staff proposal and options for Subsidence Minimum Thresholds, which included requests for Advisory Committee members to determine: 1) what they want to avoid for the basin (i.e., what is considered Significant and Unreasonable); and 2) what set of conditions they see as causing significant and unreasonable impacts for the Basin (i.e., Undesirable Results). Prior to soliciting Committee input on the proposals, Ms. King provided the Committee with background information on what subsidence is and how it is related to lowering of groundwater levels. She also provided some historical information on changes in groundwater elevations in various areas of the basin and how no subsidence has been reported that was related to lowered groundwater levels.

The Advisory Committee then provided their input on the technical staff proposal for avoiding subsidence in the basin. A synthesis of the Advisory Committee input will be prepared by HydroMetrics and shared with the Advisory Committee for review (separate from this summary).

<u>General Committee Perspective on Subsidence:</u>

The general view of the group was to keep groundwater levels high enough to prevent any measurable subsidence within our groundwater basin. Technical staff indicated that the geology found in the Mid-County region is not susceptible to subsidence, even during times of historically low groundwater levels. Technical staff also indicated that if groundwater levels were to fall below historic lows related to subsidence, other sustainability indicators, especially related to seawater intrusion, would be exceeding their respective minimum thresholds. Committee members recognized that there has been no documented subsidence linked to groundwater pumping in the basin. Several members questioned the need to address subsidence in our GSP. However, the Advisory Committee understood the need to address subsidence within the plan because it is a separate state mandated sustainability indicator that must be included for plan approval. They also understood that basin management that protects against seawater intrusion will also protect against subsidence. There were concerns expressed about the costs involved to directly monitor subsidence in the Purisima AA/TU unit, especially if the geology is not susceptible to subsidence.

<u>Committee Perspective on Significant and Unreasonable Conditions - Subsidence</u>

Committee members responded to the following technical staff proposal: any land subsidence occurring within the basin would be considered a significant and unreasonable condition. Staff's rationale was that land within the MGA groundwater basin has shown no evidence of subsidence related to past groundwater pumping.

Committee members shared the general view that the technical staff proposal reflects their view that subsidence should not occur. However, because the technical recommendation involves using historic low groundwater levels as a "proxy" to evaluate subsidence, several committee members suggested

investigating a process with DWR to acknowledge that the basin is not susceptible to subsidence, so that additional subsidence monitoring would not be required if groundwater levels were to temporarily fall below historic lows.

Committee Perspective on Undesirable Results – Subsidence in Aromas and Purisima A BC, and DEF

Committee members responded to the following technical staff proposal: an Undesirable Result would be any Representative Monitoring Well in the Aromas and Purisima A, BC, and DEF units with average annual groundwater elevations below their historic lows in any part of the basin. Staff's rationale was that no subsidence occurred related to groundwater pumping at historical low groundwater levels within the groundwater basin. Staying above those historic low groundwater levels will ensure land subsidence does not happen in the future.

Committee members shared the general view that the staff proposal, which provides for continuous monitoring of groundwater levels and compares an annual average groundwater level to the minimum threshold will protect against subsidence in the basin. However, because the technical recommendation involves using historic low groundwater levels as a "proxy" to evaluate subsidence, several committee members suggested a groundwater elevation "trigger." The suggested trigger would require direct subsidence monitoring should groundwater elevations fall below historic lows to ensure that subsidence is not occurring.

Committee Perspective on Undesirable Results – Subsidence in Purisima AA/Tu:

Committee members responded to the following technical staff proposal: any land subsidence occurring where groundwater is being pumped or injected into from the Purisima AA/Tu unit would be an undesirable result. Staff's rationale was that direct monitoring of subsidence is needed for the Purisima AA/Tu unit because there is not enough data to determine the impact of groundwater production based on historic low groundwater levels.

Committee members shared the general view that the staff proposal, which would monitor subsidence directly, would provide data to prevent the impacts of subsidence in the basin. The committee continued its discussion that there might be an argument that the basin is not susceptible to subsidence. Committee members asked that the proposal be revised to remove the words "injected into."

6. Public Comment

During this last public comment session, Mr. Poncelet invited members of the public to focus comments on the Committee's recent discussions on Subsidence or on any other Advisory Committee work. The participants commented as follows:

- One speaker with experience working on a recycled water study clarified that the proposed sites for injection are close to Beltz 12 and Monitoring Well SC-22 in the Tu aquifer.
- Another speaker asked whether a proxy for using historic low and annual average should be lowered to a monthly average instead, as by the time compaction occurs, there would be storage loss. The participant explained that, in this case, a user would want to know sooner than the average annual data could be collected, thus enabling more timely resolution of any issues. The speaker also

commented that one would not want an impacted aquifer to damage infrastructure (e.g., pipelines) and that staff and Committee members should consider these points.

7. Confirm Various Project Documents

- **April 25, 2018 Advisory Committee Meeting Summary**

  The Advisory Committee members did not have any edits or comments on the draft April 25, 2018 Advisory Committee meeting summary. Mr. Poncelet confirmed it for submission to the MGA Board.

- **Staff incorporation of Advisory Committee input from April 25 meeting – to inform development of Minimum Thresholds**

  Georgina King, HydroMetrics reviewed the proposed draft Seawater Intrusion Minimum Thresholds based on her incorporation of Advisory Committee input from the April 25 meeting. The group discussed the draft proposal, and there was general agreement that the format and synthesis was helpful to the Committee as it continues advising on the GSP development. Staff invited Committee members to review Proposed Draft Seawater Intrusion Minimum Thresholds document and provide any additional feedback to Ms. Pruitt by May 30, 2018.

8. Next Steps

In closing, Mr. Poncelet reviewed the anticipated meeting objectives for the June Advisory Committee meeting and the July joint MGA and Advisory Committee meeting. Executive staff members closed the meeting by thanking the attendees for their participation.

Santa Cruz Mid-County Basin
Proposed Draft Chronic Lowering of Groundwater Level Sustainable Management Criteria

This document is a proposed draft that documents preliminary development of some of the Sustainable Management Criteria to be included in the Groundwater Sustainability Plan (GSP). Specifically, the Sustainable Management Criteria included in this document are:

- Chronic lowering of groundwater level conditions that are considered significant and unreasonable,
- The set of conditions that cause undesirable results that will lead to significant and unreasonable chronic lowering of groundwater levels, and

For each topic above, this document covers the following:

1. Recap the initial staff proposal presented at the May 23, 2018 GSP Advisory Committee meeting.
2. Summary of Committee input provided at the May 23 meeting.
3. Revised technical recommendations to original staff proposals, with a rationale for each specific recommendation, taking into account Committee input.

The recommendations are used to develop proposed draft minimum thresholds needed as metrics against which to evaluate future projects and management actions using the groundwater model.

Chronic Lowering of Groundwater Levels - Significant and Unreasonable Conditions

Technical Staff Proposal Discussed at the May 23, 2018 Advisory Committee Meeting

Staff's initial proposal was that **lowering of groundwater levels that cause 5% or more of all groundwater pumping well's to fall below 20 feet from the bottom of wells** would be considered significant and unreasonable.

Summary of Advisory Committee Discussion

The Advisory Committee, in general, felt that the proposed statement was too numerical and needed to be more qualitative. Additionally, as we do not know where all the private wells are in the basin, this would make it impossible to determine the 5% or more measure in the staff proposal. There is also not yet enough statistical information on the depth of wells in relation to the well screens to come up with a defendable distance above the bottom of wells. However, in general, the Advisory Committee agreed with the

concept of not allowing wells to go dry (i.e., groundwater levels falling below the bottom of the well) but allowing groundwater levels to remain some distance above the bottom of the well.

There was a suggestion that lowering of groundwater levels be correlated with overlying land use rather than groundwater levels in wells. This would mean setting the lowest groundwater level acceptable in an area to support the existing/desired land use. Thus, minimum thresholds would vary regionally within the basin based on land use or beneficial user. There was concern that it might be difficult to set a qualitative minimum threshold when geology and land use water demands vary across the basin.

Revised Statement of Significant and Unreasonable Conditions

~~**Lowering of groundwater levels that cause 5% or more of all groundwater pumping well's to fall below 20 feet from the bottom of wells.**~~

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

Rationale: Groundwater levels should be managed to support existing and/or proposed overlying land uses and environmental water user's beneficial needs.

Chronic Lowering of Groundwater Level Undesirable Results

Technical Staff Proposal at April Advisory Committee Meeting

Staff's initial proposal was that undesirable results will occur if **the average Representative Monitoring Well groundwater elevation over one month falls below the <Minimum Threshold>.**

Summary of Advisory Committee Discussion

Generally, the Advisory Committee thought the staff proposal using an average monthly groundwater level to identify when undesirable lowering of groundwater levels is occurring was adequate. The Committee requested clarification on how the "monthly average" would be determined and what back-up monitoring measurements will be implemented in case a well's data logger were to fail.

Revised Technical Recommendation: Undesirable Results for Chronic Lowering of Groundwater Levels

The average monthly Representative Monitoring Well groundwater elevation ~~over one month~~ falls below the <Minimum Threshold>. All Representative Monitoring Wells to be equipped with data loggers.

Rationale: Monthly average groundwater levels will adequately monitor and identify seasonal low groundwater elevations.

"Average monthly" means all groundwater levels recorded by the data logger over each month (at least daily measurements) will be averaged to result in an average groundwater level for each month. For each Representative Monitoring Well, a chart will be created annually showing 12 average groundwater elevations compared to the minimum threshold for each well. We will provide theses charts in our annual GSP report to DWR. An undesirable result will occur if the average monthly groundwater level falls below the minimum threshold for any Representative Monitoring Well.

Minimum Thresholds

Further technical work will be carried out to establish Chronic Lowering of Groundwater Levels Minimum Thresholds for each Representative Monitoring Well. The work will involve:

1. Selecting Representative Monitoring Wells that are representative of the surrounding wells. This will involve sourcing and compiling all the well log data of wells around the Representative Monitoring Wells, and analyzing the screen depth information.
2. Taking into account the overlying land use and beneficial users of groundwater, a groundwater elevation that represents a level below which the majority of well users will not be able to produce enough water to provide for their typical demands will be determined.

From: John Ricker [mailto:John.Ricker@santacruzcounty.us]
Sent: Friday, May 18, 2018 2:22 PM
To: Becky Steinbruner <ki6tkb@yahoo.com>
Subject: RE: Please Notify Me of Future Midcounty Groundwater Agency GSP Working Group Meetings

Becky,
I have given your request some consideration and consulted with the other managers. We will not be inviting you to attend the Ad Hoc working groups. The purpose of the groups is to assemble agencies, technical experts, persons with established experience in the topic at hand and Advisory Committee members to review technical information in some depth. The information will be organized and presented to the full Advisory Committee for their consideration in establishing management objectives relative to groundwater dependent ecosystems. You and other interested members of the public will have an opportunity to hear and comment on the information presented at that time, and again when it goes to the MGA Board. No decisions are being made by the Ad Hoc group.

As information is compiled, we will also be posting it on the website under the GSP Advisory Committee. I can let you know when information is first posted.

Thank you for your continued interest in this process,
John

John Ricker
Water Resources Division Director
County of Santa Cruz – Health Services Agency – Environmental Health
701 Ocean St. Rm 312
Santa Cruz, CA 95060
831-454-2750
john.ricker@santacruzcounty.us
http://scceh.com/Home/Programs/WaterResources.aspx

From: Becky Steinbruner <ki6tkb@yahoo.com>
Sent: Friday, May 18, 2018 1:41 AM
To: John Ricker <John.Ricker@santacruzcounty.us>
Cc: Darcy Pruitt <dpruitt@cfscc.org>; Becky Steinbruner <ki6tkb@yahoo.com>
Subject: Please Notify Me of Future Midcounty Groundwater Agency GSP Working Group Meetings

Dear Mr. Ricker,
I was interested in your report at the MGA Board meeting last night about the Ad Hoc Working Committee on Groundwater Levels and Streamflows. I have before expressed interest at the GSP meetings in being notified of such Working Group meetings and had been told they would be public, but since they do not fall under Brown Act provisions, they need not be noticed.

I was sorry to hear that one meeting happened last week, and was attended by experts from various agencies. I would have very much enjoyed attending and learning about the issues.

I understand there is to be a second meeting next week. I would like to attend. Please add my e-mail contact to the list of those who are participating on this Working Group.

I also understand that there will be a second Working Group for Outreach that will begin meeting soon. I would also like to attend those meetings if able, and ask that I be added to that notification/communication list also.

Thank you very much.
Sincerely,
Becky Steinbruner

From: Darcy Pruitt
Sent: Wednesday, June 20, 2018 10:16 AM
To: 'Becky Steinbruner' <ki6tkb@yahoo.com>
Cc: Rob Marani <rjmarani@icloud.com>; Richard Casale <richcasale3@gmail.com>; James Kerr <jmkerrs@earthlink.net>
Subject: RE: Correspondence for MidCounty Groundwater Agency Board and Advisory Committee Meetings

Dear Ms. Steinbruner:

Thank you for your email and question. The MGA's plans for individual email accounts for board and committee members without member agency emails are moving forward.

As you recall from the GSP Advisory Committee meeting on May 23, 2018, I was subbing in on the email item. I said that we expected individual email addresses would be available in a few weeks, which was accurate when spoken. You may also recall that several committee members shared concerns and comments about the pending change. Based on the feedback we received, we intend to bring the email policy to the MGA Board for consideration in July. As I understand it, email addresses will be available once the email policy is approved and in place.

Please feel free to check in for further updates. Thank you again for your ongoing interest in our groundwater basin.

Best,

Darcelle Pruitt Senior Planner
Groundwater Sustainability Planning for the Santa Cruz Mid-County Groundwater Agency
REGIONAL WATER MANAGEMENT FOUNDATION
COMMUNITY FOUNDATION SANTA CRUZ COUNTY
7807 Soquel Drive | Aptos, CA 95003 | 831.662.2052
dpruitt@cfscc.org | www.cfscc.org | www.midcountygroundwater.org

From: Becky Steinbruner [mailto:ki6tkb@yahoo.com]
Sent: Sunday, June 17, 2018 11:43 PM
To: Darcy Pruitt <DPruitt@cfscc.org>
Cc: Rob Marani <rjmarani@icloud.com>; Richard Casale <richcasale3@gmail.com>; James Kerr <jmkerrs@earthlink.net>; Becky Steinbruner <ki6tkb@yahoo.com>
Subject: Correspondence for MidCounty Groundwater Agency Board and Advisory Committee Meetings

Dear Ms. Pruitt,

Please include the letter below in the next agenda packet for the MGA Board and Advisory Committee meetings.

At the May 23 Advisory Meeting, it was announced that there would be direct e-mail addresses for non-governmental representatives available to the public within two weeks. I have looked for such direct communication avenues on the MGA website but cannot find any such thing.

Will the contact addrresses be posted soon? I feel it is important.

Thank you,

Becky Steinbruner

****

Dear MidCounty Groundwater Agency Board and Advisory Committee,

i am writing to request that you reconsider the decision of the MGA Executive Committee to exclude members of the public from the recent Ad Hoc Committee meetings.

I publicly asked to be notified of the Ad Hoc Committee on Surface Water Planning during the May 17, 2018 MGA Board meeting, and also submitted my request in writing with Mr. John Ricker. He wrote back within hours stating that the Executive Committee had decided not to invite me to any Ad Hoc meetings.

I feel this is a violation of my public right to know about the formation of the scientific data being considered in the formation process of the MidCounty Groundwater Sustainable Groundwater Management Plan and only serves to erode public trust in the leadership and process now underway.

Please reconsider the decision to exclude members of the general public from any and all Ad Hoc Committee gatherings. It is not acceptable to justify this exclusion by stating the information will be grouped and presented to the MGA Board before the Plan is approved. This amounts to censorship, and will erode public trust.

Thank you very much.

Sincerel;y,
Becky Steinbruner