
OVERVIEW OF PROPOSED APPROACH TO DEVELOPING SUSTAINABLE MANAGEMENT CRITERIA

GROUNDWATER SUSTAINABILITY PLAN DEVELOPMENT UPDATE

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Vina Groundwater Sustainability Agency Board Meeting
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TODAY

- Overview of Sustainable Management Criteria work and next steps
- Review and clarify the approach to setting Minimum Thresholds and Measurable Objectives
 - Policy level overview
 - Provide input to staff

Slide 2

BC4 WE may want to refine this..
Buck, Christina, 3/9/2021

SUSTAINABLE MANAGEMENT CRITERIA CHAPTER

- Draft Sustainable Management Criteria Chapter
 - 30 day public comment period
 - Complete Chapter with description of the methodology
 - “Initial” Minimum Thresholds and Measurable Objectives
 - Emphasis on seeking input on where to set Minimum Thresholds and Measureable Objectives, and the Undesirable Results Statements
 - Key Management Decisions, not a Scientific Decision

PROCESS AND ANTICIPATED TIMELINE

- April: Draft Sustainable Management Criteria Chapter Released for 30 Day Public Comment Period
- May: Stakeholder Advisory Committee reviews Draft Chapter and received public comments. Provide recommendation to Vina GSA Board
- June: Vina GSA Board and Rock Creek RD GSA Board- decision making regarding components of the Sustainable Management Criteria
 - Undesirable Results Statements
 - Minimum Thresholds and Measurable Objectives
- The Draft Chapter is revised accordingly for inclusion in the Groundwater Sustainability Plan
- Sustainable Management Criteria Chapter not completely final until the entire Groundwater Sustainability Plan is adopted

SUSTAINABLE MANAGEMENT CRITERIA (SMC)

Includes

- Sustainability Goal (qualitative)
- Undesirable Results (quantitative)
- Minimum Thresholds (quantitative)
- Measurable Objectives (quantitative)

Defines what **SUSTAINABILITY** is and looks like in the subbasin

What's considered "significant and unreasonable" is left for the local GSAs and stakeholders to decide. → Management Decision



Lowering
GW Levels



Surface Water
Depletion



Degraded
Quality



Land
Subsidence



Seawater
Intrusion

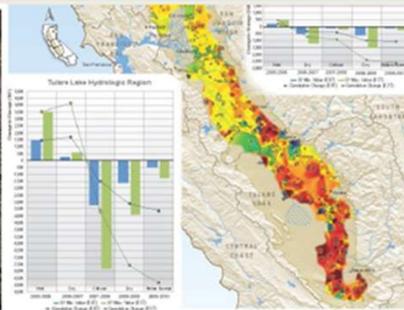


Reduction
of Storage

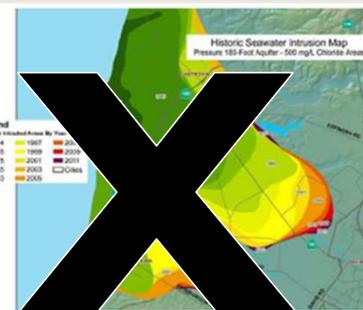
SUSTAINABILITY INDICATORS



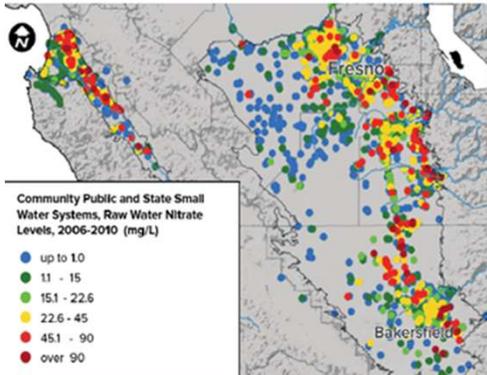
Lowering of GW Levels



Reduction
of GW Storage



Seawater Intrusion



Community Public and State Small Water Systems, Raw Water Nitrate Levels, 2006-2010 (mg/L)

- up to 1.0
- 11 - 15
- 15.1 - 22.6
- 22.6 - 45
- 45.1 - 90
- over 90



Water Quality Degradation



Land Subsidence



Depletion of
Interconnected Streams

SUSTAINABILITY GOAL

- Sums it all up in a statement
- Description of
 - objective for management of the basin
 - measures that will be taken to manage the basin (projects and management actions)
 - how those measures will lead to sustainability

INITIAL DRAFT SUSTAINABILITY GOAL STATEMENT

The sustainability goal description for the Vina Subbasin is to ensure the basin is regulated and managed within its sustainable yield and **avoids undesirable results for groundwater uses and users by 2042**. Special emphasis will be placed on avoiding undesirable results for **domestic wells, agricultural wells, groundwater dependent ecosystems and municipal water supplies** by managing the basin within its sustainable yield or by modification of existing management to address future conditions. The sustainability goal will be achieved through the implementation of a mix of supply and demand type projects and management actions consistent with the Groundwater Sustainability Plan's implementation plan.

Implementation of the Vina GSP may achieve sustainability before 2042, however, groundwater levels in the Vina subbasin may continue to decline during the implementation period. As projects are implemented and basin operations are modified, sustainable groundwater management will be achieved. The Subbasin will be managed to prevent undesirable results throughout the implementation period, despite the possible decline of groundwater elevations. This sustainability goal is supported by locally-defined minimum thresholds that will avoid undesirable results. Demonstration of stable groundwater levels on a long-term average basis combined with the absence of undesirable results will ensure the Subbasin is operating within its sustainable yield and the sustainability goal will be achieved.

ESTABLISHING MINIMUM THRESHOLDS & MEASURABLE OBJECTIVES

- Overview of approach for each Sustainability Indicator
- Clarification of the goal and methodology



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MINIMUM THRESHOLD

LOWERING OF GROUNDWATER LEVELS



- **WHERE?** Developed **uniquely** for each Representative Monitoring Site
- **WHY?** Potential Significant and Unreasonable Conditions
 - Dewatering of domestic wells
 - Increased pumping costs
 - Impacts to groundwater dependent ecosystems
- **WHAT?** Supporting Information
 - Depths of nearby domestic wells
 - Historic Observed Groundwater Levels
- **HOW?** Approach
 - Dewatered Domestic wells is the “indicator” of “undesirable result”
 - Objective: identify the threshold that is protective of active domestic wells that meet current standards (ex. 50 foot well seal)

MINIMUM THRESHOLDS



Minimum Thresholds – Level where “undesirable result” occurs for groundwater users

- Minimum Threshold for Chronic Lowering of Groundwater Levels set where domestic wells would be dewatered

Methodology

- Minimum Threshold set for each Representative Monitoring Site
- Use available well data within 3 mile radius of monitoring site
- Identify the depth of the shallowest active domestic wells to set the Threshold
- Acknowledge uncertainty of the location and depths of **active** domestic wells
- Refine the well data used to establish the threshold

- Undesirable Result is reached when a certain number/percent of Representative Monitoring Sites reach their Minimum Threshold. This is the point of failure of groundwater sustainability (Management Decision) ||

DEFINING UNDESIRABLE RESULTS



1. Undesirable Results Statement (narrative)
2. Quantitative definition of significant and unreasonable impacts
 - Ex. Undesirable Result is reached when measured fall groundwater levels at **25 %** of Representative Monitoring Sites fall below Minimum Threshold for **2 consecutive years**

This defines the point of failure of groundwater sustainability (Management Decision)

Seek public comment/input on the management “knobs”

- What number or percent of monitoring sites?
- For how many consecutive years?

MINIMUM THRESHOLDS

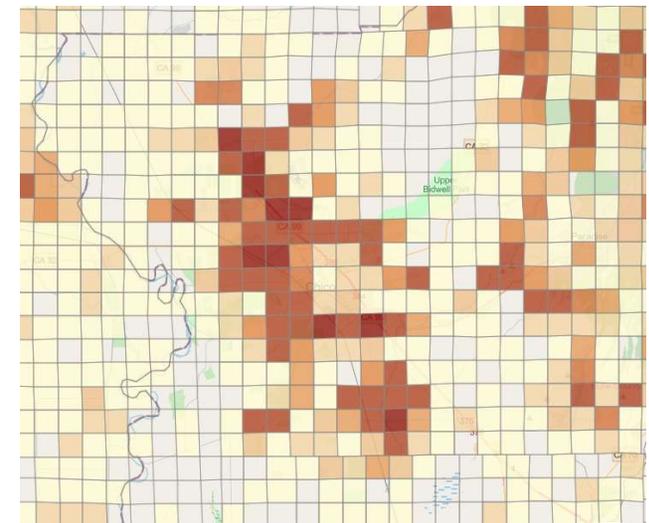


What well data we have to work with:

- Database of information from ALL available well completion reports dating back to early 1900s
- Data is from the Department of Water Resources
- Well characteristics: well depth, date drilled, location specific to a one mile by one mile section

What we do not have:

- A clean dataset of the location and depth of ACTIVE domestic wells



[DWR Well Completion Report Map Application](#)

MINIMUM THRESHOLDS

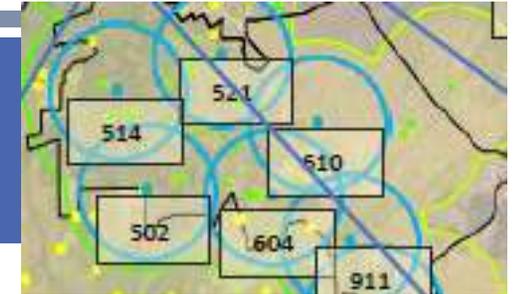


Goal: Identify what threshold will be protective of active wells drilled to current standards

Considerations for Refining the Well Data

- Initially assumed that either 10-15% of the most shallow domestic wells are likely not in use (workshop discussion)
- Post workshop evaluation of dataset and other refinement
 - Current well standards require a well seal of 50 feet
 - Use knowledge about historical groundwater levels during previous droughts
 - Other relevant criteria?
 - Seek input during the comment period
- Use the refined dataset to establish the Minimum Threshold
- Recognize that Minimum Thresholds can be adjusted based on improved data overtime

CLARIFICATION ON “VULNERABLE WELLS”



Well table from SHAC meeting in January:

Total “Vulnerable Wells”

- Misleading and inaccurate
- The 10th/15th percentiles were used to refine the database. Assumed these wells are not Active
- Compiling the number of wells is not relevant if they are not actively being used
- Adding them up by management area/subbasin introduces double counting since overlap of the 3 mile radius between Representative Monitoring Sites exists

RMS Wells: Minimum Threshold Water Level Based on Surrounding Domestic Well Completions										
Be sure and look at the hydrograph for each well as you consider these percentile levels										
RMS Well Identifying Information				These values are proposed Minimum Threshold water level elevations for each proposed RMS Well, based on the reported depths of surrounding domestic wells. SHAC will need to provide guidance on which statistical percentile to choose as the basis for these values.				These values show how many domestic wells are shallower than the respective percentile depth. This is the number of wells that are “vulnerable” to experiencing water levels that drop below the bottom of the well.		
Mgmt Area	RMS Well Number	Is well in Draft Chapter 5 Table?	Total # of Domestic Wells in 3 Mile Radius	Median Well Depth	15th Percentile Well Depth	10th Percentile Well Depth	5th Percentile Well Depth	# of Wells shallower than 15th Percentile	# of Wells shallower than 10th Percentile	# of Wells shallower than 5th Percentile
Vina North	23N02W25C001M	Yes	13	70.8	85.8	85.8	102.7	2	1	1
Vina North	23N01W10E001M	Yes	131	61.9	100.2	108.0	115.2	20	13	7
Vina North	23N01E18A001M	No	443	61.8	95.3	108.0	134.0	66	44	22
Vina North	22N01W5M001	No	113	8.5	51.9	70.2	86.7	17	11	6
Vina North	23N01W36P001	No	680	46.0	77.3	86.7	100.2	102	68	34
Vina North	23N01E33A001	Yes	1039	55.0	89.0	104.7	130.6	156	104	52
Total "Vulnerable" Wells								363	242	121
Vina South	21N01E21C001	No	547	29.3	72.3	79.3	87.8	82	55	27
Vina South	21N02E18C	Yes	1078	53.6	102.2	115.2	134.2	162	108	54
Vina South	20N01E10C002M	Yes	241	-0.5	50.8	61.8	74.8	36	24	12
Vina South	20N03E31M001M	No	14	5.6	21.5	51.9	72.2	2	1	1
Vina South	20N02E24C001M	Yes	23	8.9	51.9	57.2	72.2	3	2	1
Vina South	20N02E09L001M	Yes	327	28.6	72.2	79.8	92.9	49	32	16
Vina South	21N02E26E005M	Yes	357	43.6	84.5	94.8	113.8	54	36	18
Total "Vulnerable" Wells								388	259	129
Vina Chico ¹	CWSCH001	No	1512	59.3	92.8	99.9	109.4	226.8	151.2	75.6
Vina Chico	CWSCH001b	Yes								
Vina Chico	CWSCH002	Yes								
Vina Chico	CWSCH003	Yes								
Vina Chico	CWSCH007	Yes								
Vina Chico	21N01E08K002M	No								
Vina Chico	22N01E28J005M	Yes								
Total "Vulnerable" Wells								227	151	76
Grand Total "Vulnerable" Wells								978	652	326

MEASURABLE OBJECTIVES (OPERATIONAL LEVEL)



Proposed Measurable Objectives

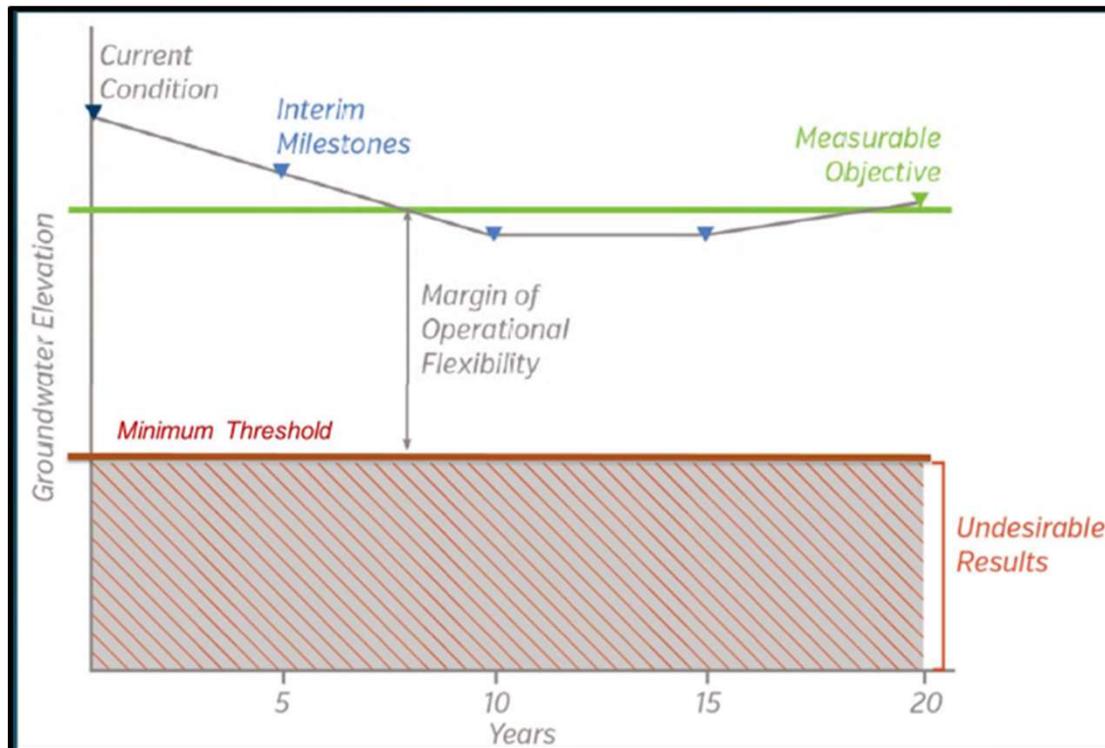
- Specific to each monitoring site: account for basin variability
- Proposed to be set based on projected groundwater elevations in the fall of 2030.

Considerations

- Allows for some decline from current conditions.
- Generally within 10 feet of the historical 2015 groundwater levels
- Operationally about 20-40 feet above the Minimum Thresholds
- Avoid reaching the Minimum Threshold except for the most unusual circumstance (e.g, prolonged drought)
- Could be adjusted to higher groundwater levels if there is sufficient Project and Management Actions

The Measurable Objective is the primary driver for GSP implementation. It's the "desired state" the GSA is managing to.

MINIMUM THRESHOLDS AND MEASURABLE OBJECTIVES



- The **Draft** Chapter will specify and describe an MT and MO for each monitoring site
- The narrative will describe the methodology and the rationale
- Objective: Seek public comment/input on the proposed MT and MO levels for discussion and decision-making by the GSA boards in June

PAUSE: QUESTIONS AND DISCUSSION

SUSTAINABLE MANAGEMENT CRITERIA

AQUIFER STORAGE AND LAND SUBSIDENCE



Reduction
of Storage



Land
Subsidence

- **Groundwater levels are a proxy for Aquifer Storage and Land Subsidence**
 - **SMCs Mimic Groundwater Level SMCs**
- If we manage chronic lowering of groundwater levels, we will also effectively be managing aquifer storage and successfully avoiding conditions likely to lead to land subsidence

SUSTAINABLE MANAGEMENT CRITERIA

DEPLETION OF INTERCONNECTED STREAMS



- **WHERE?** Specific Stream Reaches (interconnected with groundwater)
- **WHY?** Potential Significant and Unreasonable Conditions
 - Adverse impacts to beneficial uses of surface water caused by groundwater pumping
 - Adverse impacts to groundwater dependent ecosystems caused by groundwater pumping
- **WHAT?** Supporting Information
 - Available stream gage data and measured groundwater levels
 - Informed by insights from modeling results
 - Describe data gaps
- **HOW?** Approach
 - Address stream/aquifer interaction differences between upland areas and Sacramento River flood plain
 - Identify and describe the significant data gaps
 - Propose a framework for further data collection and analysis that would be used to better define a quantitative Stream Depletion SMC for specific stream reaches in the future

SUSTAINABLE MANAGEMENT CRITERIA

DEPLETION OF INTERCONNECTED STREAMS



Approach

- Will use all available data (more data available for Big Chico Creek reaches)
- Significant data gaps in most areas of the subbasin related to how the shallowest aquifer zones interact with streams and how deeper pumping affects water levels in shallowest aquifer zone
- In the meantime, managing proposed measurable objectives and minimum thresholds for groundwater levels (either 2015 or a 2030 projection) should maintain the level of connectivity and seasonal interactions that are occurring currently.
- Using the framework, the GSA will develop more specific SMCs, as appropriate, for specific stream reaches and associated GDEs where there is a clear connection to groundwater and ecological integrity.

SUSTAINABLE MANAGEMENT CRITERIA

WATER QUALITY DEGRADATION



- **WHERE?** Developed uniquely for each Representative Monitoring Site
- **WHY?** Potential Significant and Unreasonable Conditions
 - Adverse impacts of groundwater management to drinking water quality
 - Adverse impacts of groundwater management to water supply for crops
- **WHAT?** Supporting Information
 - Salinity used as a proxy for overall water quality
 - Use established State defined Maximum Contaminant Levels
- **HOW?** Approach
 - Use deepest screened interval from multi-completion monitoring wells for water sampling for salinity
 - Other programs and agencies are responsible for enforcing groundwater quality violations. GSA will coordinate with other agencies if water quality degradation is associated with groundwater pumping

SUMMARY

- Upcoming Draft Sustainable Management Criteria Chapter:
 - Will provide the needed documentation for the public and decision-makers to understand and digest the information in detail
- While the Draft Chapter will include and describe specific thresholds and undesirable results, the final policy call is left open for future discussion and decision-making in May and June

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 - Emphasis on Seeking input on where to set Minimum Thresholds and Measureable Objectives, and Undesirable Results Statements
 - Key Management Decision, not a Scientific Decision

QUESTIONS/DISCUSSION

Sustainability is **demonstrated** by the avoidance of Undesirables Results for the six sustainability indicators

If No Undesirable Results Occurring Then Basin operating within its Sustainable Yield And Sustainability Goal is being Achieved



Lowering GW Levels



Surface Water Depletion



Degraded Quality



Land Subsidence



Sewer Intrusion



Reduction of Storage