Draft GSP Monitoring Program

Jeff Barry/GSI Water Solutions

Rick Viergutz/SCV Water

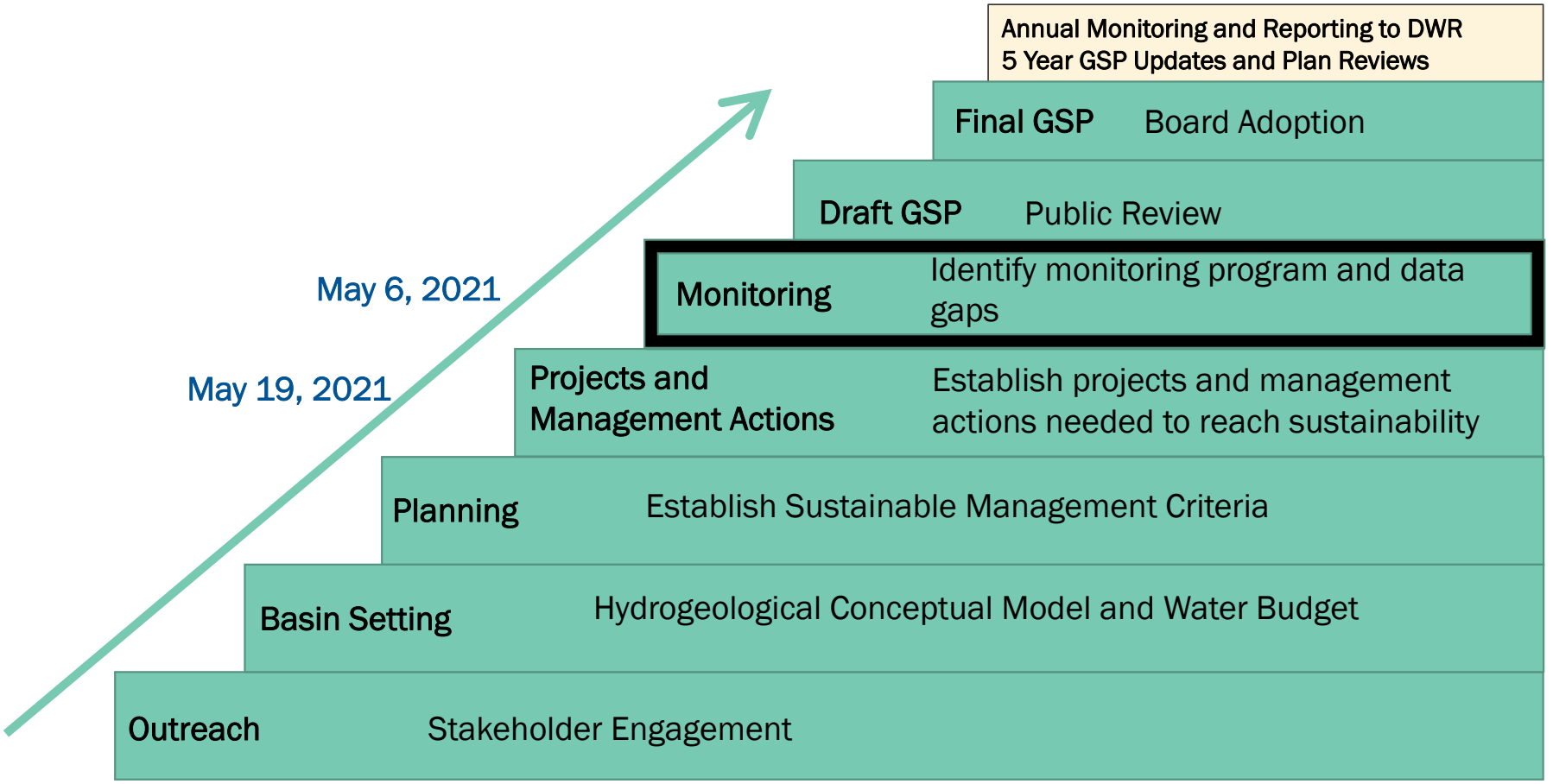
May 6, 2021

MEMBER AGENCIES

Today's Meeting Topics

- Review GSP development process
- Description of Monitoring Plan
- Examples of Monitoring Plan use
- Discussion

Activities Leading to an Accepted GSP



Monitoring Plan

- Purpose: Evaluate basin conditions over time in order to demonstrate progress in meeting Sustainable Management Criteria.

Monitoring Plan

- Important information is considered and made part of plan
  - Review of existing monitoring plans
  - Monitoring Protocols
  - Data Gaps- what, where, and approach to fill data gap
  - Selection of best monitoring locations
  - Description of data collection methods

Monitoring Plan Considers Sustainability Criteria

- Designed to collect information in order to understand basin conditions and recognize if undesirable results are anticipated or occurring

- As a quick review- The approach to quantify Undesirable Results is spelled out in the Sustainable Management Criteria previously reviewed with your committee
  - Minimum Thresholds exceeded in x% of wells
  - GDE Evaluation Program initiated if Triggers (or Early Action Triggers) reached
  - Water Quality exceedances
  - Land Subsidence

Examples of Monitoring Plan Use

- Chronic Lowering of Water Levels
  - Data collected from wells X,Y, Z at Frequency A
    - Some considerations about collecting this data under the monitoring plan include:
  - Data input into DMS
    - Allows for creation of required annual report and for custom data queries
    - DMS has logic programmed into it to identify potential undesirable results

Examples of Monitoring Plan Use

- GDE Monitoring
  - Data collected from wells X,Y, Z at Frequency A
    - Some considerations about collecting this data under the monitoring plan include:
  - Data input into DMS
    - Allows for creation of required annual report and for custom data queries
    - DMS has logic programmed into it to identify potential undesirable results

Special Upland GDE Monitoring Added to Plan

- Based on input and questions from Stakeholders and the Board of Directors, we are now recommending monitoring of upland GDEs.
  - Recall that upland GDEs are mapped in Placerita and Sand Canyons.
    - We do not believe these GDEs are likely to be affected by downstream groundwater extraction

Special Upland GDE Monitoring Added to Plan

- Monitoring program includes a habitat survey and report, repeated during dryer periods.
  1. Exact repeat interval not yet set but may be when precipitation is less than 50%(?) of annual average.

Would like to hear your committee's input on this today

Examples of Monitoring Plan Use

- Degradation of Water Quality
  - Data collected from wells X,Y, Z at Frequency A
    - Some considerations about collecting this data under the monitoring plan include:
  - Data input into DMS
    - Allows for creation of required annual report and for custom data queries
    - DMS has logic programmed into it to identify potential undesirable results

How the Monitoring Program helps the GSA recognize undesirable results

- For each sustainability indicator- data collected an input into the Data Management System
  - Data Management System computes trends toward sustainability or undesirable results*
  - GSA Technical Team review all monitoring data
  - *GDE Evaluations cannot be computed by the Data Management System since review of field conditions are needed.
    - GDE Evaluation Reports prepared instead

Continued How the Monitoring Program helps the GSA recognize undesirable results

- Per Monitoring Program
  - GSA Board of Directors is advised monitoring results quarterly or more frequently if necessary
  - If there is a concern about undesirable results the GSA Board of Directors would consider role of Projects and Management Actions

Monitoring Program and Sustainable Management Criteria Work Together

- Inform GSA, Stakeholders, and Department of Water Resources if undesirable results are avoided and on track to meet Sustainability Goal
- Over time (with monitoring and other analyses) the GSA
  - Will better understand if minimum thresholds and GDE triggers are set at the right level
    - Changes in monitoring, thresholds, and GDE triggers may be proposed to DWR

Example Monitoring Program and Sustainable Management Criteria Working Together

- After X seasons of monitoring GDE triggers, including drought, one or more GDE Evaluations will be completed
  - Understanding of habitat sensitivity to triggers is improved.
  - Additional monitoring wells and study can be undertaken.
  - GSA may consider raising or lowering triggers.
  - Any changes proposed to DWR for review.

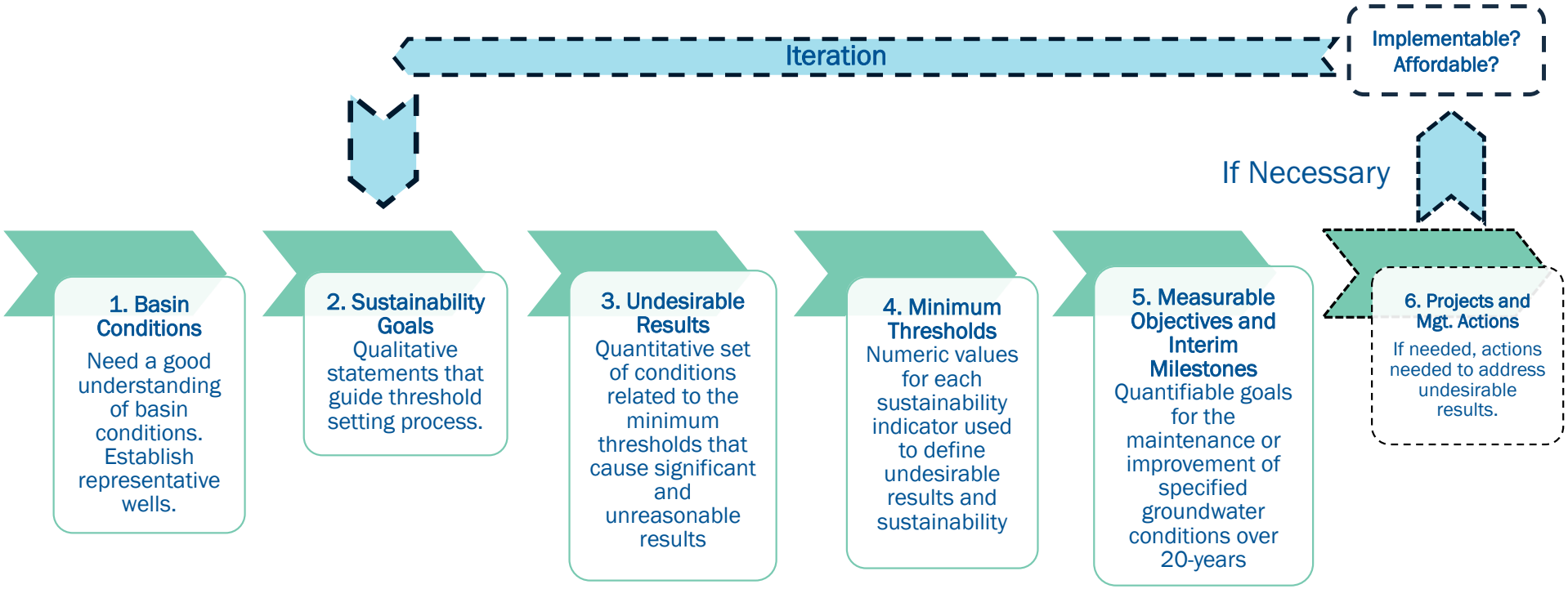
  - Big Picture- Over time the monitoring and SMC become better at identifying sustainability and concerns

Summary

- Monitoring program is carefully crafted to work alongside Sustainable Management Criteria.
- Refinement over time
- We seek your committee's input on the draft monitoring program approach.

Indicator	Monitoring Locations	Relevant Minimum Thresholds (MT)	Data to be collected	Frequency	Response if MT or Trigger Exceeded
Groundwater Levels	Representative Monitoring Wells in Alluvial Aquifer and Saugus Formation	Predicted Future Low Water Level with CC	Static groundwater levels	Quarterly. More frequently if needed	1. Assess conditions and causes. 2. Consider alternatives including: a) Redistribute pumping away from the affected area b) Reduce pumping in nearby wells c) Conduct additional releases from Castaic Lake if there is a benefit of doing so d) Bring in additional State Water Project water or other imported banked water e) Implement tiered water conservation measures for the basin f) Reduce pumping in most affected aquifer
Interconnected Surface Water and GDEs	Existing and Planned GDE Monitoring Wells. Old Road Bridge guage	Historical Low Water Level. Trigger level 2 feet above historical low. At I-5 Bridge, maintain surface water flow in the river.	Static groundwater levels. River flow at Old Road Bridge. Data loggers also in use	Monthly. More frequent if needed.	1. Assess conditions and causes. 2. Consider alternatives including: a) Redistribute pumping away from the affected area b) Reduce pumping in nearby wells c) Conduct additional releases from Castaic Lake if there is a benefit of doing so d) Bring in additional State Water Project water or other imported banked water e) Implement tiered water conservation measures for the basin f) Reduce pumping in most affected aquifer g) determine if the trigger needs adjustment based on GDE Evaluation Report
Groundwater Quality	Representative Monitoring Wells in Alluvial Aquifer and Saugus Formation. Selected voluntary domestic wells.	Contaminants - State agencies set standards. Salts and Nutients - Basin Plan water quality obectives in SNMP.	Municipal wells continue to monitor for DDW consistuents, salts, and nutrients. Selected domestic wells sampled as part of a voluntary program.	Frequecy varies as prescribed by regualtory agencies.	1. Assess conditions and causes. Coordinate with State Regulatory agencies. 2. Consider alternatives including: a) Review alternatives for improving groundwater quality in the affected area, b) Work with affected groundwater users to maintain supply and/or deploy well head treatment systems, c) Shift pumping to other locations, and/or d) Reduce or stop pumping near the affected area.

Sustainable Management Criteria (SMC) Development Process



SMC Summary for Each Sustainability Indicator

How are Undesirable Results Defined?

- There must be significant and unreasonable effects caused by pumping to:
  - Long term/sustainable groundwater production
  - Other beneficial uses, including GDEs, and threatened or endangered species
- Results in exceedance of a minimum threshold in specified numbers of representative wells.
- These criteria may be refined based on monitoring data and analysis.

Chronic Groundwater Water Level Decline in Alluvial Aquifer

- Example Undesirable Results
  - Groundwater elevation levels drop below minimum thresholds in 25% of representative wells over a two-year* period.
  - Magnitude or rate of decline is greater than simulated future drought conditions in 25% of representative wells over a two-year period.
  - Potential impacts to GDEs will be considered.

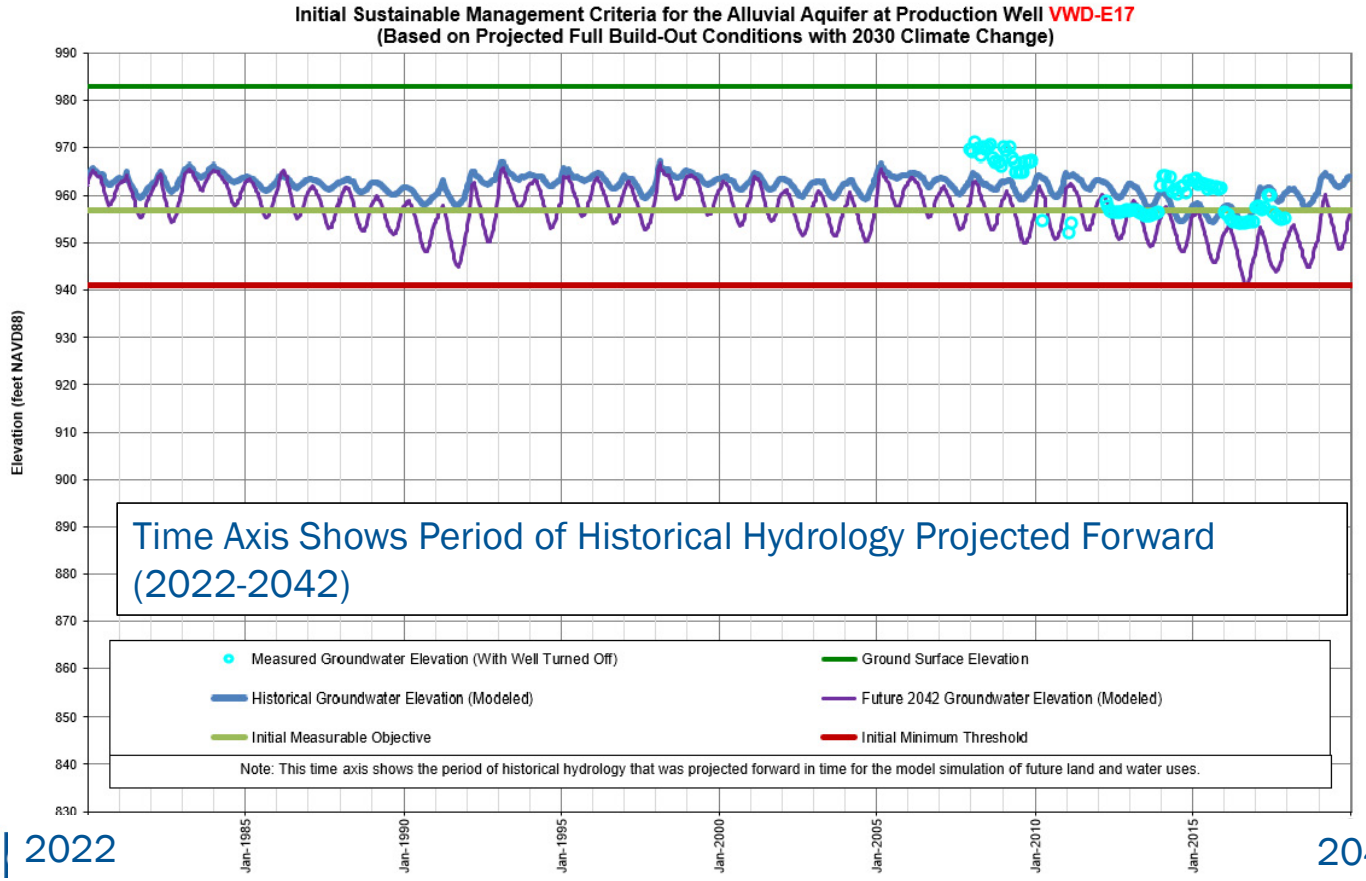
Chronic Groundwater Water Level Decline in Alluvial Aquifer

- Proposed Minimum Thresholds
  - Lowest predicted 2042 future water level at representative well sites.
  - Note: Water levels that go below historical water levels in the alluvial aquifer as a result of groundwater pumping trigger an evaluation of the cause and may include management actions that avoid impacts to GDEs.
- Proposed Measurable Objectives
  - Water level that provides access to groundwater consistent with the operating plan over historic dry hydrologic periods.

    For example, the dry period from 2006 through 2016.

SMCs at an Existing Alluvial Observation Well

Between Castaic Creek and the Santa Clara River



MO represents average predicted water level
MO = 957' NAVD88

MT = 941' NAVD88
MT represents lowest predicted water level

Chronic lowering of groundwater levels in the Saugus Formation

- Example Undesirable Results
  - Groundwater elevations have dropped below the minimum threshold in 3 consecutive years.
  - For the Alluvial Aquifer and Saugus Formation together, reduction of groundwater in storage results in an inability to meet demand during a multi-year drought.

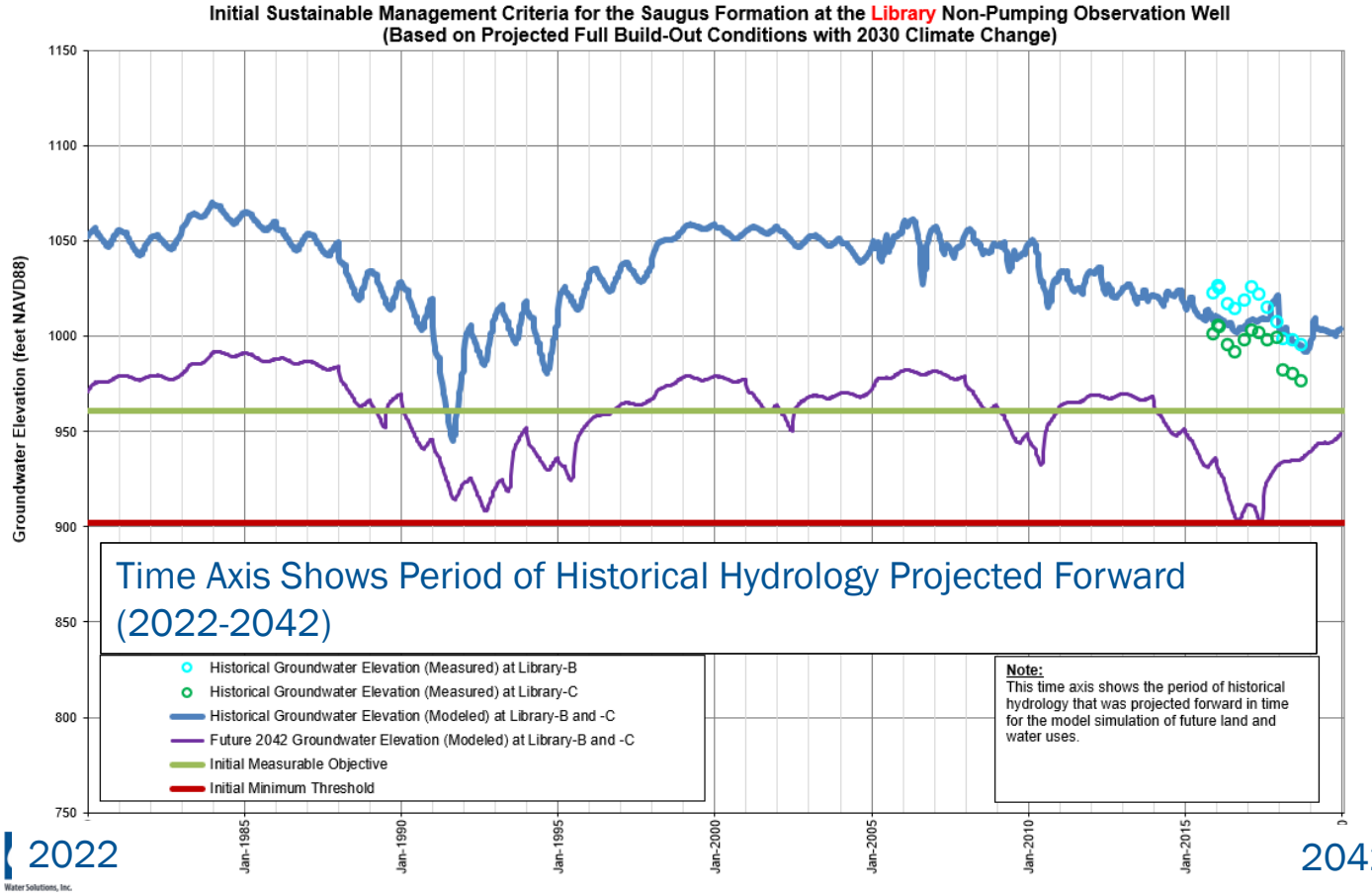
Chronic lowering of groundwater levels in the Saugus Formation

- Proposed Minimum Thresholds
  - Lowest predicted groundwater level estimated to occur at each representative monitoring site.

- Proposed Measurable Objectives
  - Long-term average future predicted groundwater levels estimated to occur at representative monitoring sites.

SMCs at an Existing Saugus Observation Well

Along the South Fork Santa Clara River



MO represents average predicted water level

MO = 961' NAVD88

MT = 902' NAVD88

MT represents lowest predicted water level

Chronic Reduction in Storage
(Dark blue boxes most common public input*)

East End recharge	Sustainability Goal
Projects and management actions and their economic considerations	Sustainable Management Criteria applicability to all pumpers
Past die-off of cottonwood and oaks	Monitoring locations (and data gaps)
GDEs, GDE Evaluation areas and trigger Levels	Minimum Thresholds
Understanding role of pumping in groundwater elevation changes	Subsidence
Whether the basin has demonstrated chronic water level decline in the past, or could in the future	Groundwater contamination and emerging contaminants

*** Other than minor clarifications, graphics, etc.**

Chronic reduction of groundwater storage in Alluvial Aquifer

- Example Undesirable Results
  - Water level declines caused by pumping in 25% of wells over a two-year* period, reducing the volume of groundwater in storage such that there is insufficient supply to support pumping during extended drought.

Chronic reduction of groundwater in storage in the Saugus Formation

- Example Undesirable Results
  - Groundwater elevations have dropped below the minimum threshold in 3 consecutive years.
  - For the Alluvial Aquifer and Saugus Formation together, reduction of groundwater in storage results in an inability to meet demand during a multi-year drought.

Chronic Reduction of Groundwater in Storage (Alluvial and Saugus Aquifers)

- Proposed Minimum Thresholds
  - Addressed by Minimum Thresholds and Measurable Objectives for water level decline indicator.
  - Provides an adequate amount of groundwater in storage to get through extended drought periods.
  - For the Saugus Formation, the minimum threshold is considered interim and subject to change because it may be possible to pump the Saugus more to provide resiliency during drought without causing undesirable results.
- Proposed Measurable Objectives
  - Addressed by Minimum Thresholds and Measurable Objectives for water level decline indicator.

Degradation of Groundwater Quality (Dark blue boxes most common public input*)

East End recharge	Sustainability Goal
Projects and management actions and their economic considerations	Sustainable Management Criteria applicability to all pumpers
Past die-off of cottonwood and oaks	Monitoring locations (and data gaps)
GDEs, GDE Evaluation areas and trigger Levels	Minimum Thresholds
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*** Other than minor clarifications, graphics, etc..**

Degradation of Groundwater Quality

- Example Undesirable Results
  - Water management actions interfere with existing groundwater remediation efforts creating permanent loss of groundwater supply.
  - Concentrations of regulated contaminants in untreated groundwater from private domestic or agricultural wells exceed regulatory thresholds.
  - Significant and unreasonable loss of municipal groundwater supply due to migration of contaminant plume and inability to pump and treat groundwater water or reasonably secure an alternative water supply.
  - Groundwater pumping strategies cause concentrations of total dissolved solids (TDS), chloride, nitrate, and sulfate to exceed Water Quality Objectives and basin-wide assimilative capacity described in the Salt and Nutrient Management Plan to the extent new State permits for distribution of recycled water are put at risk.

Degradation of Groundwater Quality

- Proposed Minimum Thresholds for Contaminants
  - Contaminants including perchlorate, VOCs, and PFAS have been detected over many years in the Basin and pre-date enactment of SGMA in January of 2015.
  - Responsibility for characterization, monitoring, and remediation is being handled by the State Regional Water Quality Control Board, California Department of Toxic Substances Control, and other agencies.
  - SCV Water has proactively collaborated with regulatory agencies, monitored the contamination, and installed wellhead treatment when contamination approaching regulatory thresholds has been detected.
  - Because the GSA has no authority or responsibility for managing the contamination, no minimum thresholds for the regulated contaminants are proposed.

Degradation of Groundwater Quality (continued)

- Proposed Measurable Objectives for Contaminants
  - Maintain municipal pumping for beneficial uses consistent with volumes quantified in the applicable Urban Water Management Plan for wet, normal, dry, and multiple dry years.
  - Maintain non-municipal pumping (agriculture, golf courses, Pitchess Detention Center, Whittaker contaminant remediation, and small-scale domestic) consistent with volumes quantified in the applicable Urban Water Management Plan for wet, normal, dry, and multiple dry years.
  - Groundwater quality from private wells will meet or be better than Basin Plan objectives as verified by a groundwater monitoring program.

Degradation of Groundwater Quality (continued)

- **Proposed Minimum Thresholds for Salts and Nutrients**
  - Concentrations of total dissolved solids (TDS), chloride, nitrate, and sulfate measured in 20% of wells in a management zone that exceed Water Quality Objectives and basin-wide assimilative capacity described in the Salt and Nutrient Management Plan.

Degradation of Groundwater Quality (continued)

- Proposed Measurable Objectives for Salts and Nutrients
  - Concentrations of total dissolved solids (TDS), chloride, nitrate, and sulfate meet Water Quality Objectives and basin-wide assimilative capacity as described in the Salt and Nutrient Management Plan.

Land Subsidence
(Dark blue boxes most common public input*)

East End recharge	Sustainability Goal
Projects and management actions and their economic considerations	Sustainable Management Criteria applicability to all pumpers
Past die-off of cottonwood and oaks	Monitoring locations (and data gaps)
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*** Other than minor clarifications, graphics, etc.**

Land subsidence

- Example Undesirable Results
  - Land surface deformation causing broken pipelines and damaged roads.
  - Pumping results in land subsidence greater than thresholds at 10% of monitoring locations.

Land Subsidence

- Proposed Minimum Thresholds
  - Established based on geotechnical evaluation of soils/geology and expected future changes in groundwater levels
  - Maximum amount of subsidence allowable at critical infrastructure without causing damage
- Proposed Measurable Objectives
  - No long-term reduction in elevation at monitoring locations

Depletion of Interconnected Surface Water (Dark blue boxes most common public input*)

East End recharge	Sustainability Goal
Projects and management actions and their economic considerations	Sustainable Management Criteria applicability to all pumpers
Past die-off of cottonwood and oaks	Monitoring locations (and data gaps)
GDEs, GDE Evaluation areas and trigger Levels	Minimum Thresholds
Understanding role of pumping in groundwater elevation changes	Subsidence
Whether the basin has demonstrated chronic water level decline in the past, or could in the future	Groundwater contamination and emerging contaminants

*** Other than minor clarifications, graphics, etc.**

Depletion of Interconnected Surface Water (Background)

- Avoiding adverse impacts on beneficial uses of interconnected surface water in the Subbasin, namely groundwater dependent ecosystems (GDEs) and associated sensitive aquatic species, is the focus of this sustainability indicator.
- To avoid significant and unreasonable impacts to GDEs, groundwater trigger levels are identified that will result in active monitoring and timely evaluations to inform management actions to avoid permanent loss of habitat or acute impacts to aquatic species.

Depletion of Interconnected Surface Water

- Considering adding detail to the Sustainable Management Criteria to include
  - Using the groundwater model to predict future flows in the river at certain locations and use groundwater elevations as a surrogate for surface water depletion
  - Additional monitoring in highest priority areas
  - Additional criteria will make this criteria more straight forward for DWR review.

Depletion of Interconnected Surface Water

- Example Undesirable Results
  - Permanent loss or significant degradation of existing native riparian or aquatic habitat due to lowered groundwater levels caused by pumping
  - Temporary acute loss of aquatic habitat in specific locations critical to sensitive aquatic species due to lowered groundwater levels caused by pumping

Criteria for Avoiding Impacts to Groundwater Dependent Ecosystems (GDEs)

Action Trigger Levels

- Groundwater levels within GDE areas at lowest historic low levels (within previous 40 years).
- In sensitive habitat areas (e.g., I-5 Bridge), an initial trigger at 2 feet above historic lows (or adjusted depending on characteristic seasonal fluctuations) would ensure that evaluation and management actions are implemented in a timely manner.

Measurable Objective

- Average future groundwater levels that do not result in permanent loss of habitat at monitoring locations within the GDE area.
- Maintain flow in the Santa Clara River where UTS are present (e.g., I-5 Bridge area) to sustain aquatic habitat. Utilize groundwater level data as a surrogate for measuring surface water flow if a stream gage is not present.

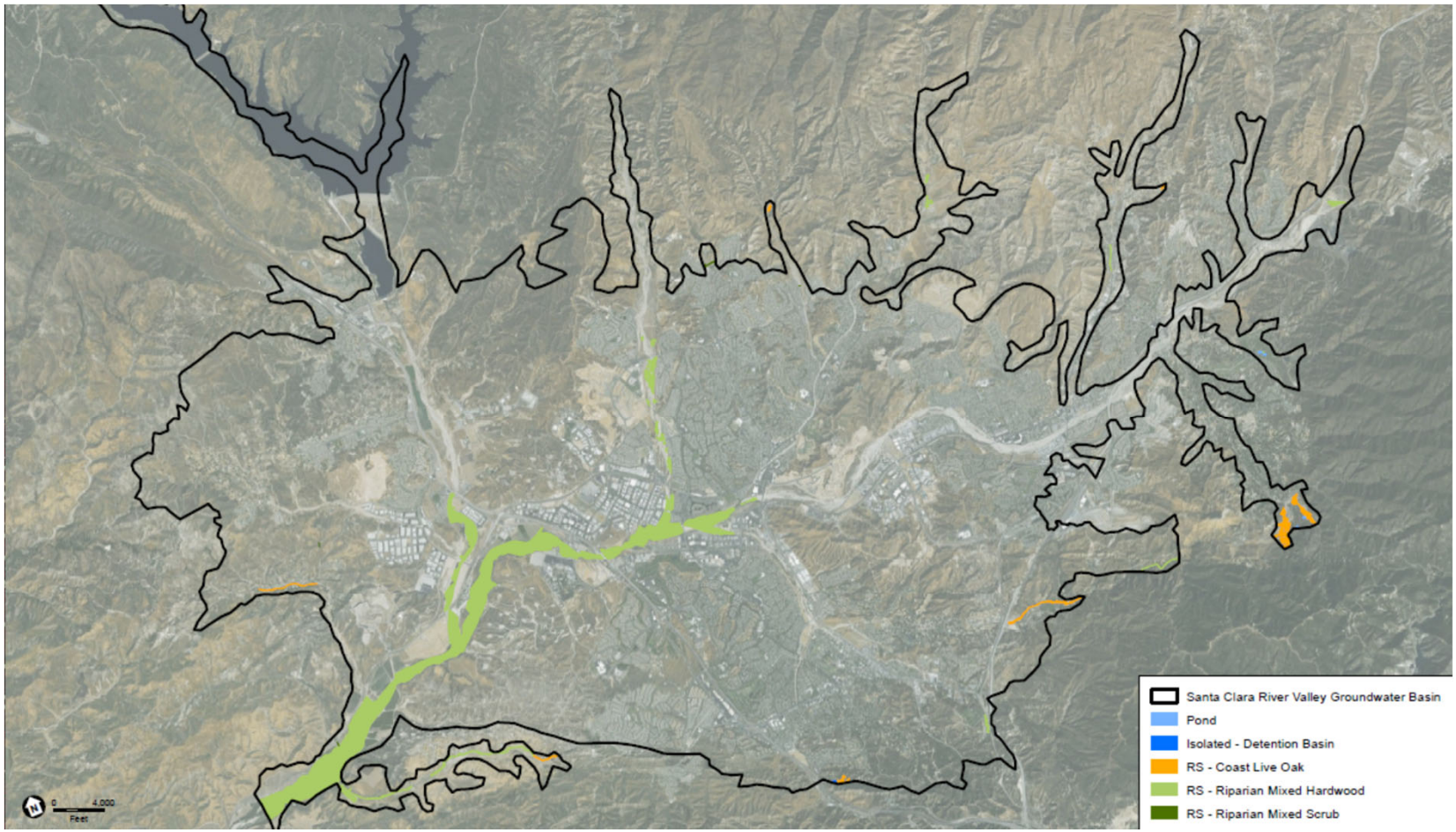
Considerations When Triggers are Reached

- Is the affected river segment supported by surface flow from WRP discharges?
- Is the historic low groundwater level already below the tree/shrub root depths?
- Will the vegetation and sensitive species survive the temporary loss of access to groundwater?
- Has the Management Action Trigger been reached often in recent years, and have water levels recovered quickly?
- Are the declines in groundwater levels resulting from pumping?
- Has new information been obtained that can be used to refine the trigger level?

Timely management actions would be implemented including redistributing or reducing pumping, if necessary, to protect GDEs

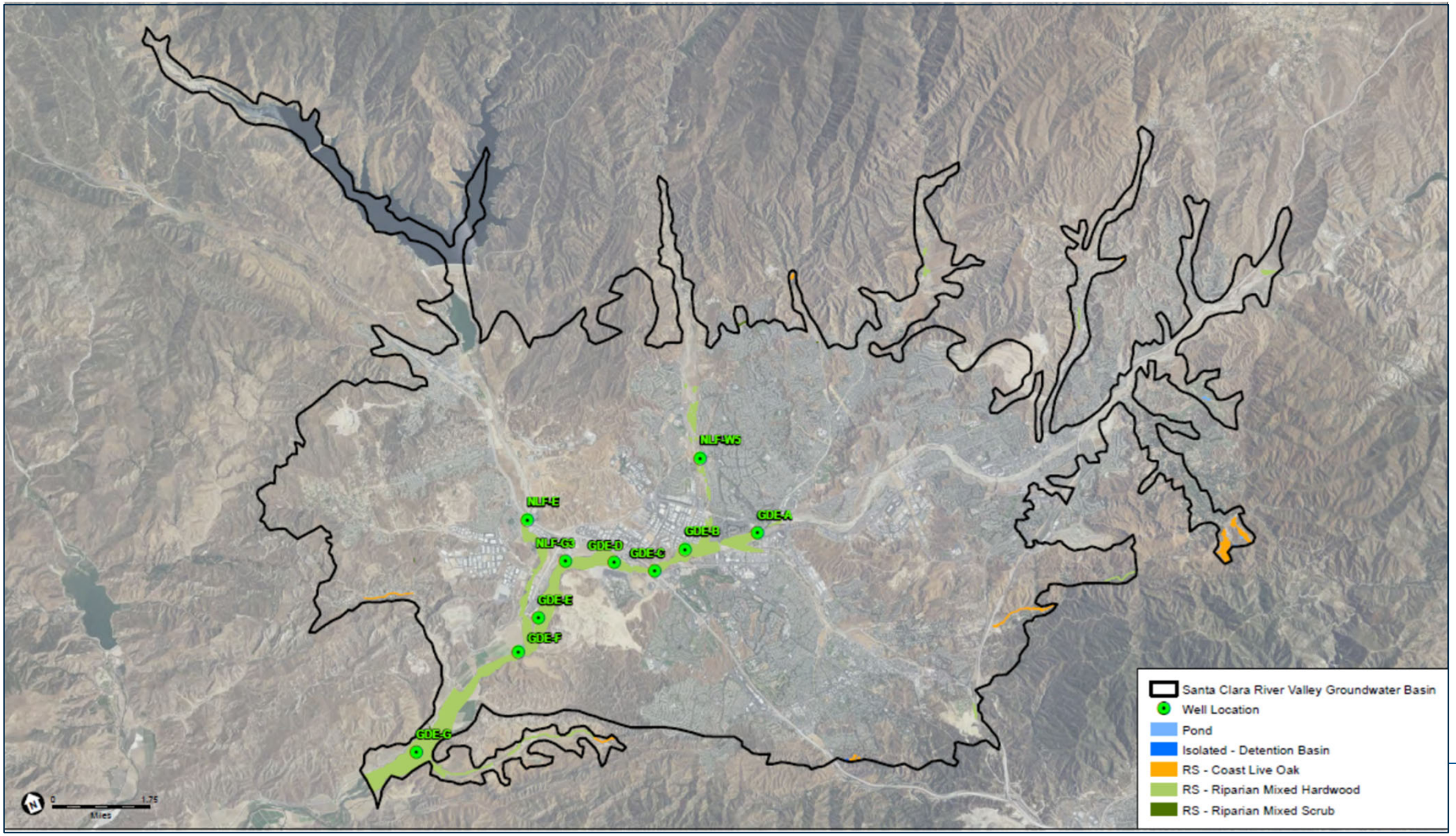
Identified GDEs

where groundwater is within 30 feet below ground surface (Sept 2011)



Proposed GDE Monitoring Locations

GU9

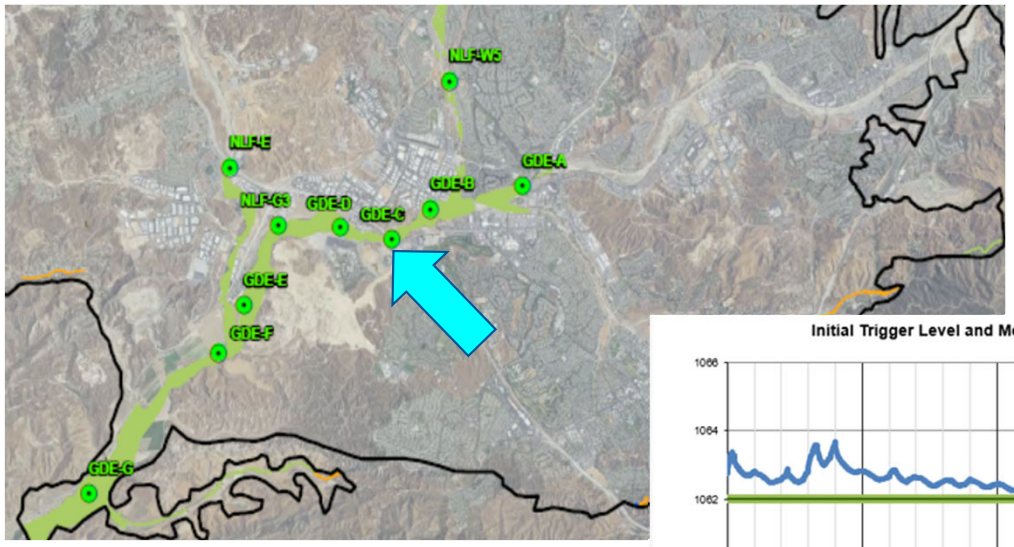


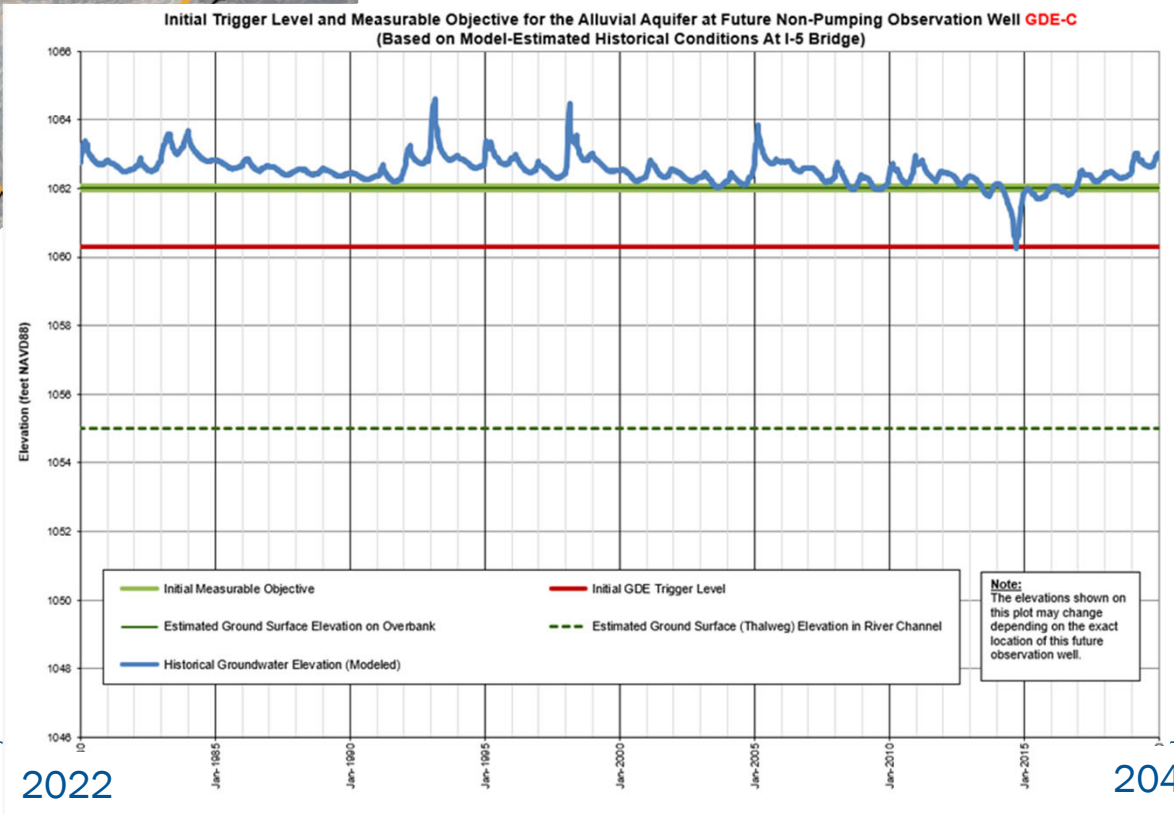
Slide 47

GU9 Note that in accordance with DWR and TNC guidance, we are focusing on areas where groundwater is within 30 feet of ground surface in areas where we have identified habitat that could be supported by groundwater

Guest User, 3/19/2021

I-5 Bridge (GDE-C)



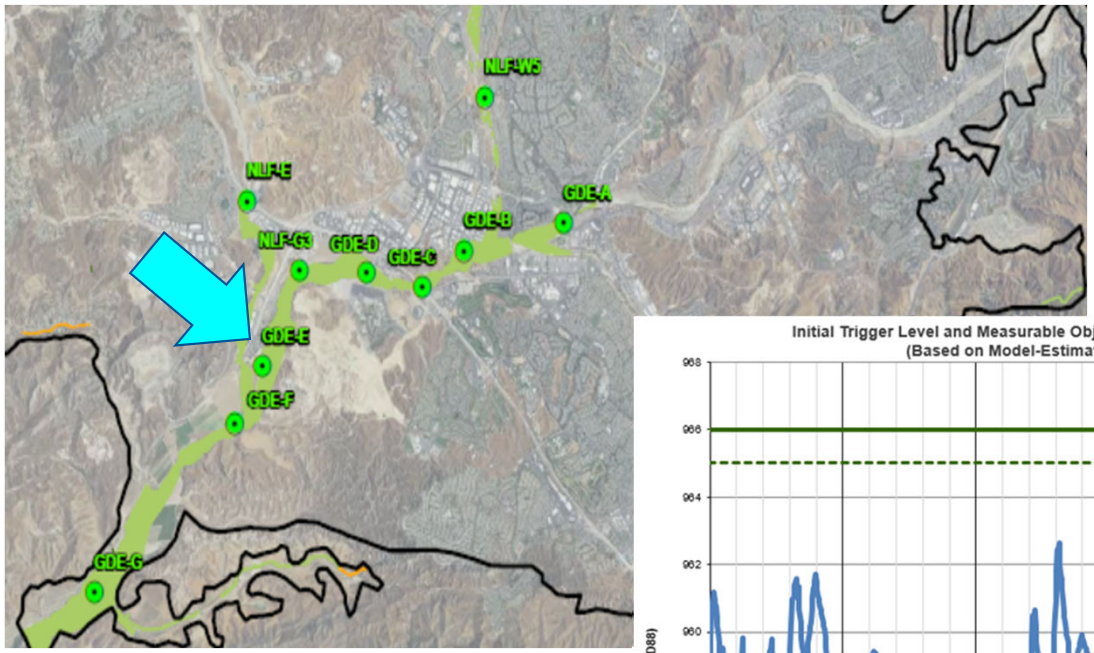


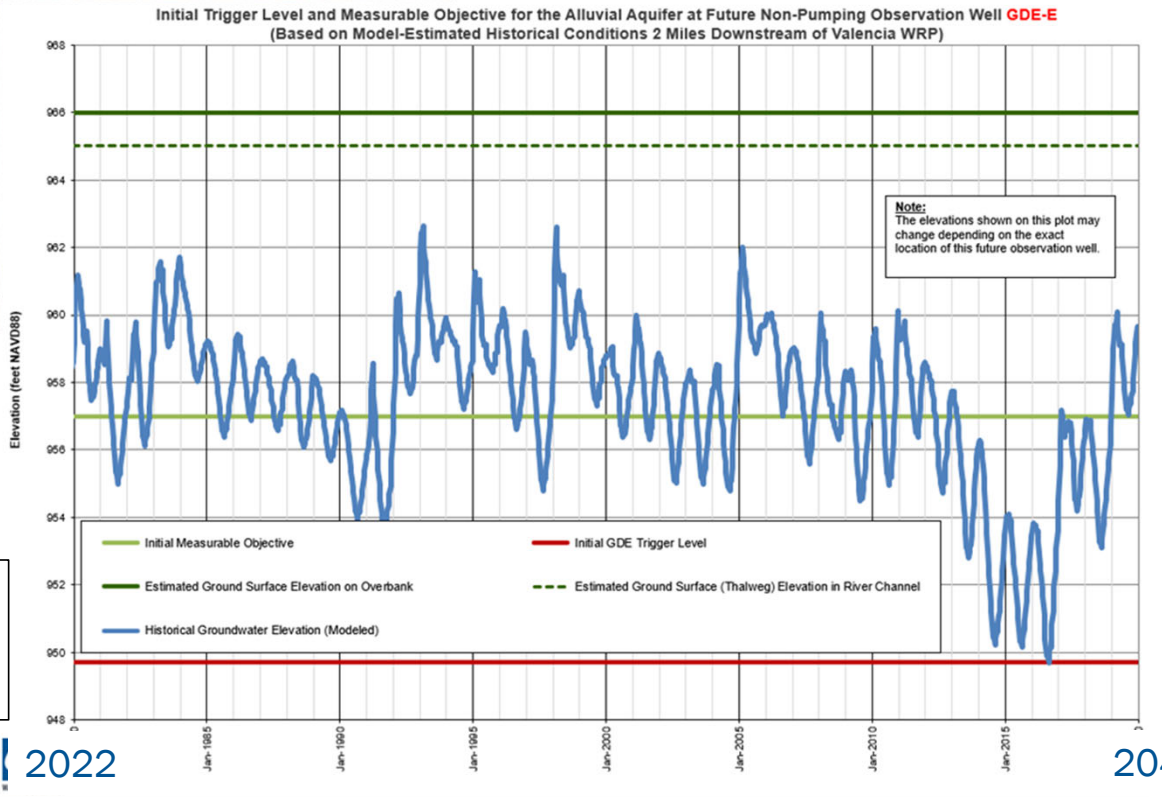
2022

2042

Time Axis Shows Period of Historical Hydrology Projected Forward (2022-2042)

Two miles Downstream of VWRP (GDE-E)





Time Axis Shows Period of Historical Hydrology Projected Forward (2002-2042)

2022 2042

Conclusion

- Continue to have good input from SAC and others in the process
- A next step includes a special meeting in June to consider potential Projects and Management Actions
- Appreciate opportunity to brief your Board today and to hear your input on today's topic

SCV GSA

MEMBER AGENCIES

SCV WATER

CITY OF SANTA CLARITA

LOS ANGELES COUNTY DEPARTMENT of REGIONAL PLANNING

LACWD

Discussion and Questions

Jeff Barry/GSI Water Solutions

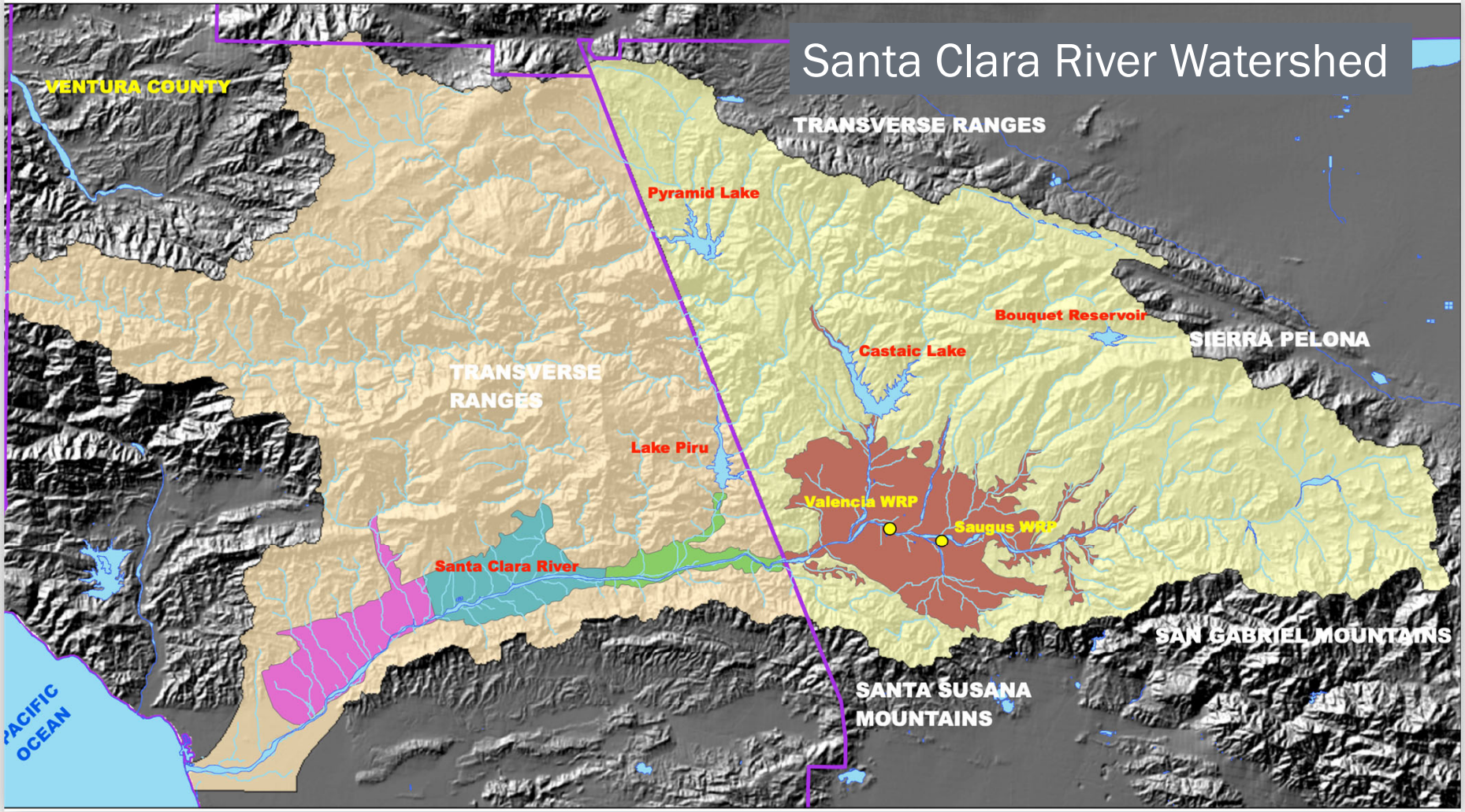
Rick Viergutz/SCV Water

March 25, 2021

Brief Watershed Overview

- Santa Clara River Watershed: 1,600 square miles
  - Includes largest natural river remaining in Southern California
  - Los Angeles and Ventura Counties

- LA County portion of Watershed 650 square miles
  - Many communities
  - Stakeholder involvement
  - Recreation areas
  - Habitat
  - In the southwest portion, the 100-square-mile Upper Santa Clara River Subbasin


Santa Clara River Watershed
VENTURA COUNTY
TRANSVERSE RANGES
Pyramid Lake
Bouquet Reservoir
SIERRA PELONA
Castaic Lake
TRANSVERSE RANGES
Lake Piru
Valencia WRP
Saugus WRP
Santa Clara River
SAN GABRIEL MOUNTAINS
SANTA SUSANA MOUNTAINS
PACIFIC OCEAN

Brief Watershed Overview

- Upper Santa Clara River Groundwater Subbasin.
  - Natural river and creeks- Santa Clara River and Tributaries
  - Developed areas
  - Water Supply
    - Roughly 50:50 groundwater and imported water

- State-Required Groundwater Sustainability Plan
  - Sustainability Goal, along with locally developed ways to measure progress toward sustainability (called Sustainable Management Criteria).

Stakeholder Input to date

- Questions on slide formats and graphics
- East End recharge
- Past die-off of cottonwood and oaks
- Understanding role of pumping versus other factors
- Projects and management actions and their economic considerations
- Groundwater contamination and emerging contaminants
- Do the Sustainable Management Criteria apply to all pumpers?
- What do we know about subsidence?

Stakeholder Input to date

- Whether the basin has demonstrated chronic water level decline in the past, or could in the future
- Monitoring locations (and data gaps)
- Minimum Thresholds
- Triggers
- Sustainability Goal

Stakeholder Input to date

- Questions on slide formats and graphics
  - Handle as questions come up to improve future presentations

Stakeholder Input to date

- East End Recharge
  - Eastern tributary areas are at higher and steeper topography
  - Groundwater naturally drains out of these areas more readily than downstream and this can increase drought stress
  - Some stakeholders express interest in projects to increase recharge in east (recycled water, stormwater) to reduce drought stress
    - *Such projects not clearly required per GSP*
    - *Discuss during projects and management actions*

Stakeholder Input to date

- Will the GSP address past die-off of cottonwood and oaks during drought?
    - In certain areas higher in the alluvial system, groundwater elevations are more controlled by gravity drainage and drought, than pumping
    - *The GSP is not required to address such drought-caused die off*
    - Some post drought recovery of trees has occurred

Stakeholder Input to date

- Understanding role of pumping versus other factors
  - A stakeholder asked if water conservation programs could reduce dry weather runoff sufficiently to cause impacts to GDEs? If so, what is the GSA's responsibility?
  - Other stakeholders wondered if tree stress, or even die-off, during a future drought requires the GSA to initiate action(s).
  - *For certain higher elevation/steeper parts of the watershed, drought stress combined with natural gravity drainage is considered the key factor to drought stress, not groundwater pumping.*
  - *Lower in the watershed the role of drought stress versus pumping on habitat is more complex because there are more variables. Following GSP adoption, ongoing monitoring/new monitoring wells/Evaluation of GDE trigger levels, and review of minimum thresholds will take place. A GSP update will address new information.*

Stakeholder Input to date

- Projects and management actions and associated economic considerations
  - A public process will take place to review projects and management actions needed to maintain or achieve sustainability during the 20-year implementation period.
  - Economics are one important consideration
  - At this time, some stakeholders have expressed interest in a project or projects to bring water (recycled water and/or stormwater recharge) to the east end
    - *Current thinking of GSA Team is the east end conditions are longstanding and largely controlled by gravity drainage and drought, and therefore such projects are likely beyond what GSP regulations require. Economics of such projects are important.*

Stakeholder Input to date

- Groundwater contamination and emerging contaminants
  - Will the criteria address emerging contaminants?
  - The proposed criteria recognizes that State regulatory agencies are responsible for groundwater contamination investigations including for emerging contaminants.

Stakeholder Input to date

- Are the sustainable management criteria designed to apply to all pumpers?
  - The criteria do apply to all pumpers.
  - .....

Stakeholder Input to date

- What do we know about subsidence in this groundwater basin
  - .....

Stakeholder Input to date

- What do we know about chronic water level decline?
  - .....

Stakeholder Input to date

- Monitoring locations (and data gaps)
  - Monitoring plan based on empirical data and groundwater model
    - Best available information
    - Over time, as data gaps are filled, thresholds will be reviewed and refined
    - Annual monitoring reports provided to DWR
    - SCV-GSA may recommend revisions to the Sustainable Management Criteria as appropriate
    - A DWR-led GSP review will take place 5 years after GSP approval

Stakeholder Input to date

- Minimum Thresholds
  - Some stakeholders expressed concern over 2016/17 cottonwood and oak tree die-off, and whether the Minimum Thresholds are set to address this condition.
    - Eastern area experiences larger and more natural drought stress than western area.
    - Habitat returns in wetter periods
    - *Because groundwater pumping does not cause this drought stress, we believe minimum thresholds are appropriately set.*

Stakeholder Input to date

- Triggers for GDE evaluations
  - A stakeholder asked if the triggers were set high enough to allow sufficient time to evaluating pumping effects on GDEs
  - *Some trigger levels were raised in critical areas in response to evaluating this inquiry. May modify further to ensure sufficient time to evaluate pumping effects upon GDEs.*

Stakeholder Input to date

- Sustainability Goal
  - Some stakeholders suggest the draft goal could be improved by identifying unique features of our basin
  - Suggested review as part of projects and management actions
  - Ultimately it should include more specifics about the basin
  - *We will revisit the sustainability goal*