

Sustainable Management Criteria Definitions, Examples, and Ideas

**SVBGSA Upper Valley Subbasin
Committee Meeting**

August 3, 2020





Process Concepts

- ▶ Build on July 28 web meeting on SMC terminology and concepts
- ▶ Provide Subbasin specific information
- ▶ Additional data to follow
- ▶ Survey before next committee meeting

Opinions/guidance will be included in boxes

Each of the Six Sustainability Indicators have Four Sustainability Management Criteria Terms



Lowering
GW Levels



Reduction
of Storage



Seawater
Intrusion



Degraded
Quality

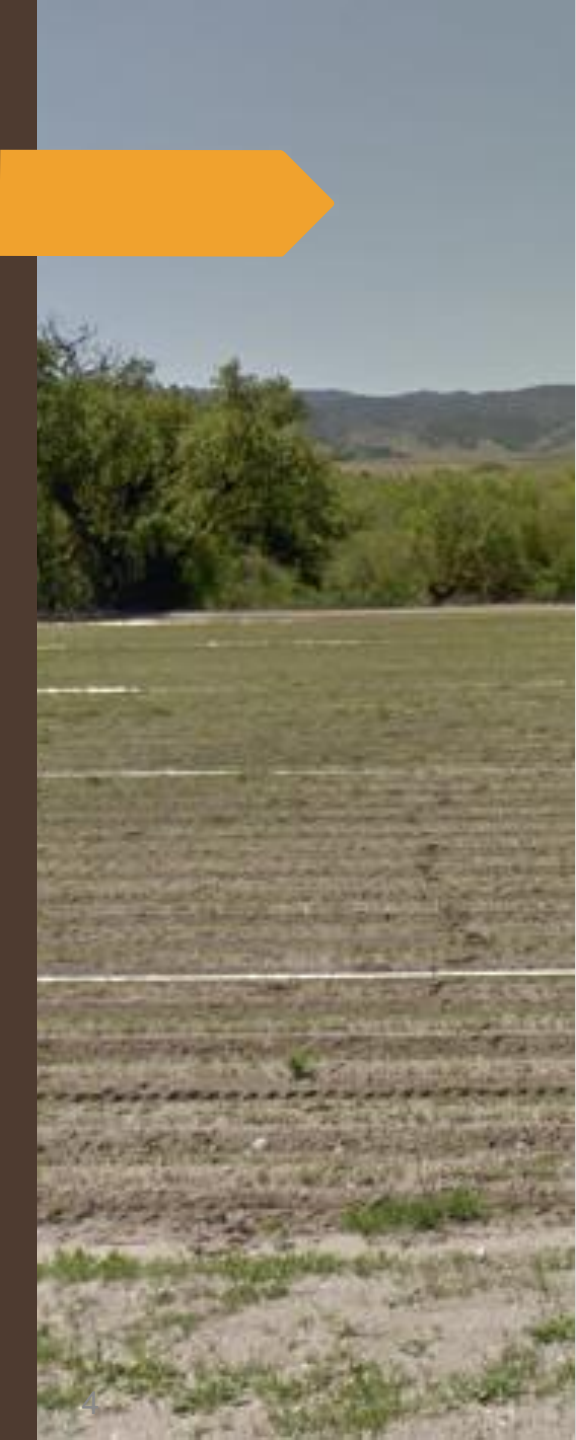


Land
Subsidence



Surface Water
Depletion

- Significant and Unreasonable – Qualitative Statements
- Minimum Thresholds – Quantitative Measurement
- Measurable Objectives – Quantitative Goal
- Undesirable Results – Combination of Minimum Thresholds



Sustainability Criteria – Ease of Developing SMC

- Subsidence
 - Interconnected surface water
 - Groundwater levels
 - Groundwater storage
-

- Groundwater quality

Will cover the following for each Sustainability Indicator:

- Metrics
- Data
- Present Options
- Example the 180/400-foot Aquifer



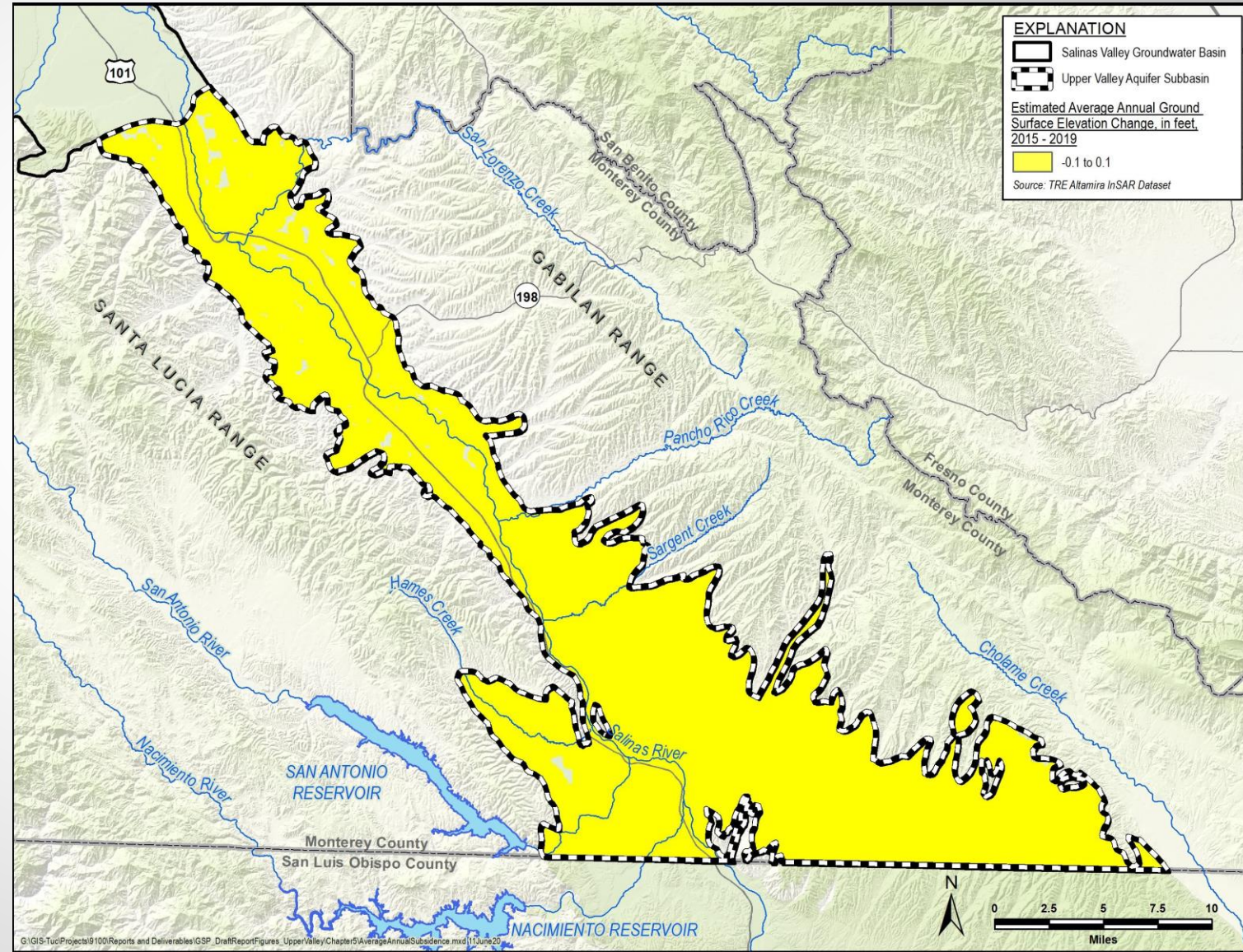
Thresholds & Objectives (354.28(c))

| Sustainability Indicator | Metric |
|--------------------------|--|
| Land subsidence | <p>Change in land surface elevation at each measuring point</p> <ul style="list-style-type: none">• One minimum threshold and one measurable objective per measuring point• Option to use groundwater level as a proxy for ground surface elevation |



Example Subsidence Data – InSAR (From DWR)

Subsidence is not a significant problem in this subbasin





Subsidence SMC Options

1. Any subsidence anywhere in the Subbasin is significant and unreasonable
 - ▶ Minimum threshold = 0 subsidence
 - ▶ Measurable Objective = 0 subsidence
2. Any subsidence may impact infrastructure in the Subbasin is significant and unreasonable
 - ▶ Map infrastructure locations
 - ▶ Minimum threshold = 0 in mapped locations
 - ▶ Minimum threshold = ? outside of mapped locations
 - ▶ Measurable objective = 0 everywhere



Subsidence SMC Options

3. Some level of subsidence is acceptable.
 - ▶ Minimum threshold = ? subsidence everywhere
 - ▶ Measurable Objective = 0 subsidence everywhere



Subsidence Example from the 180/400-Foot Subbasin

Any subsidence anywhere in the Subbasin is significant and unreasonable [option 1]

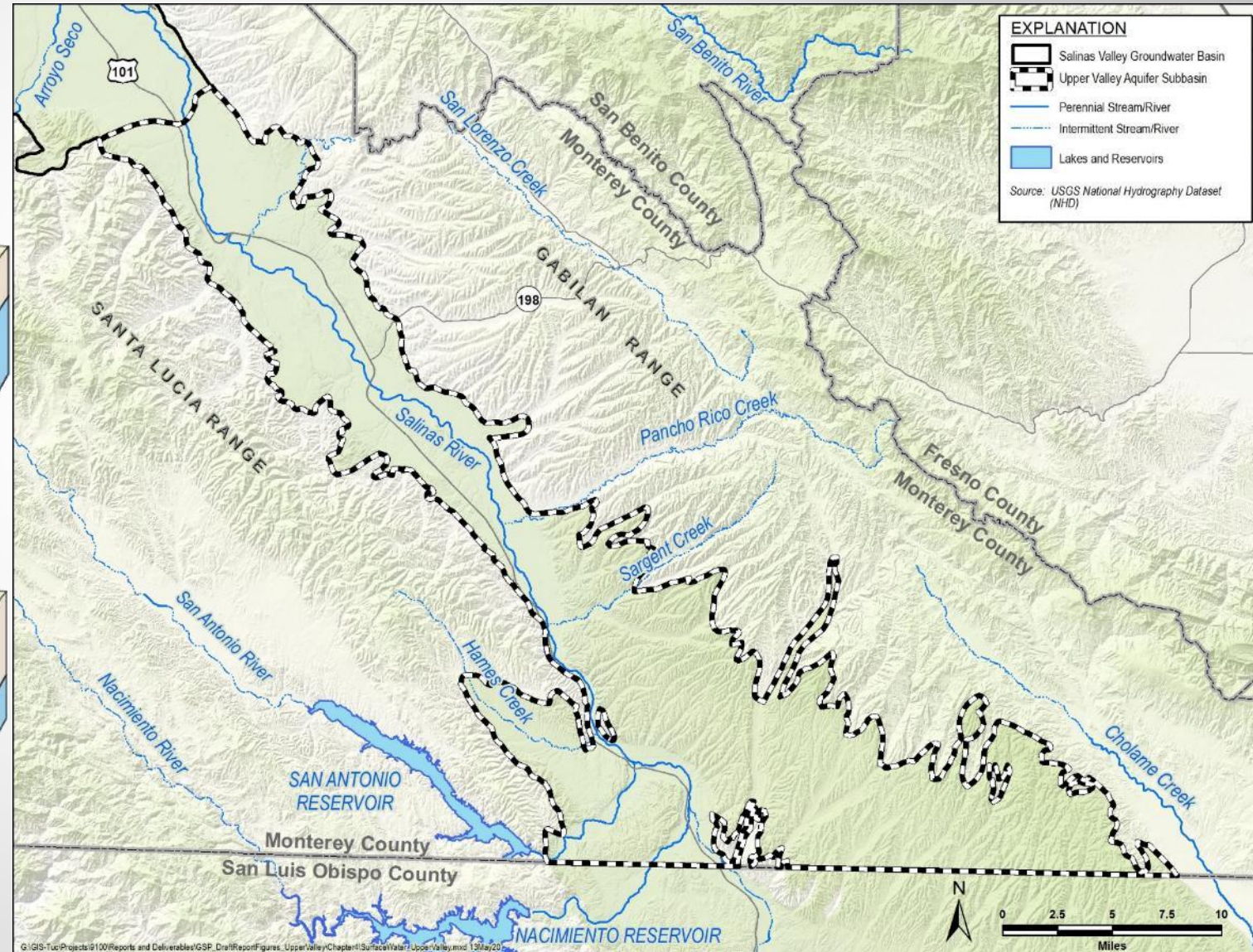
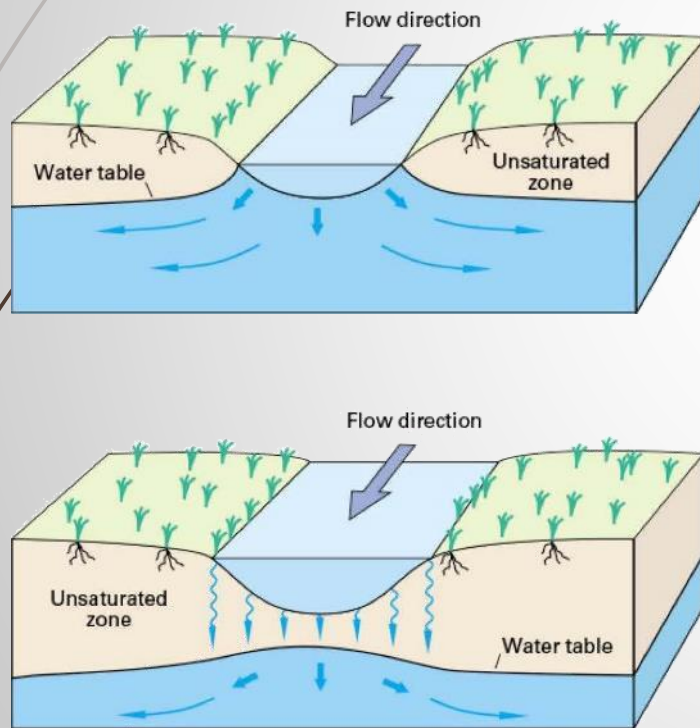
- Use InSAR data, not groundwater level proxy
- To account for measurement error in InSAR data, the minimum threshold for subsidence is 0.1 feet/year
- Option to address long term, slow subsidence

Measuring Thresholds & Objectives (354.28(c))

| Sustainability Indicator | Metric |
|---|--|
| Depletion of Interconnected surface water | <p>A rate or volume of surface water depletion. Set one minimum threshold and one measurable objective per surface water body. (per reach?)</p> <ul style="list-style-type: none">• Option 1. Estimate depletions with a model• Option 2. Use groundwater elevations as a proxy |



Potential Interconnected Surface Waters





Interconnected Surface Water SMC Options

1. The current rate of surface water depletion is significant and unreasonable, and we choose to reduce the rate of depletion (leave more water in surface water bodies)

- ▶ Minimum threshold

- ▶ Higher shallow groundwater levels

- ▶ Measurable objectives

- ▶ Higher shallow groundwater levels



Interconnected Surface Water SMC Options

2. The current rate of surface water depletion is significant and unreasonable, but SVBGSA chooses not to reduce the rate of depletion
 - Minimum threshold
 - Higher shallow groundwater levels
 - Measurable objectives
 - Higher shallow groundwater levels
 - We are not required to meet the minimum thresholds in this example



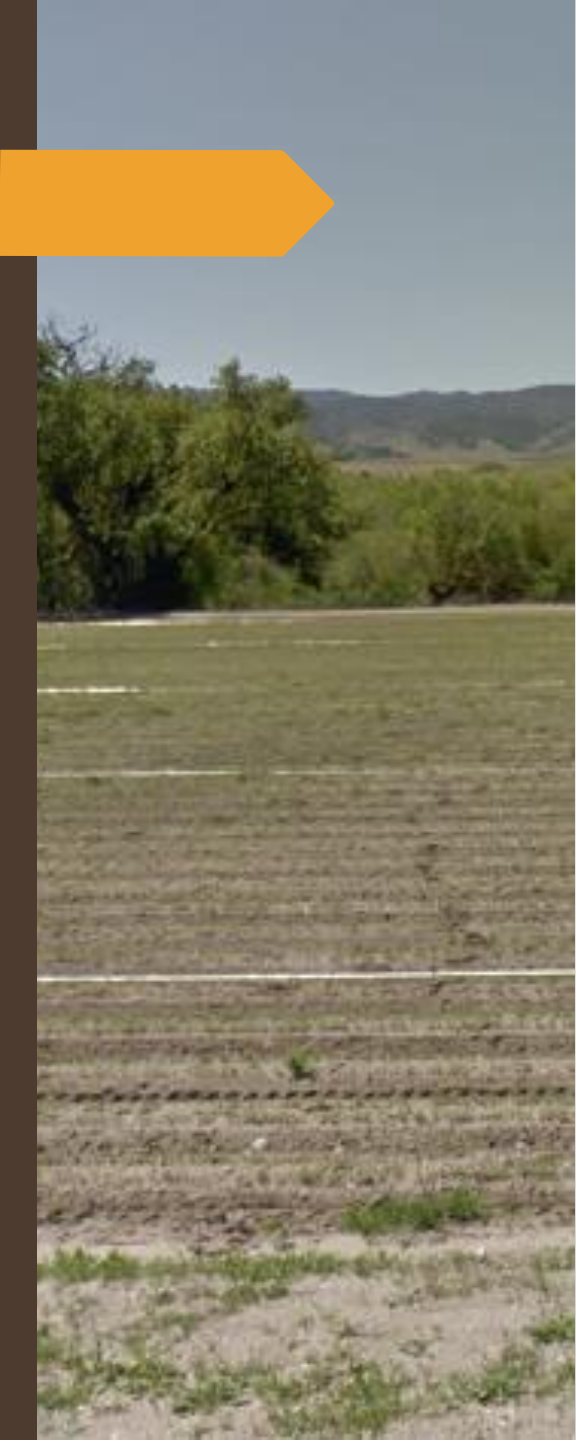
Interconnected Surface Water SMC Options

3. The current rate of surface water depletion is not unreasonable (although it may be significant)
 - ▶ Minimum threshold
 - ▶ Equal to today's shallow groundwater levels
 - ▶ Measurable objectives
 - ▶ Equal to today's shallow groundwater levels



Interconnected Surface Water SMC Options

4. Additional surface water depletion is neither significant nor unreasonable (take more water out of surface water bodies)
 - Minimum threshold
 - Lower shallow groundwater levels
 - Measurable objectives
 - Lower shallow groundwater levels



Surface Water Depletion Example from the 180/400-Foot Subbasin

Current depletion rates are not unreasonable (although possibly significant) [option 3]

- ▶ Using simulated depletions, but might change to shallow groundwater levels
- ▶ We will not increase depletion rates (lower shallow groundwater levels) in the future



Measuring Thresholds & Objectives (354.28(c))

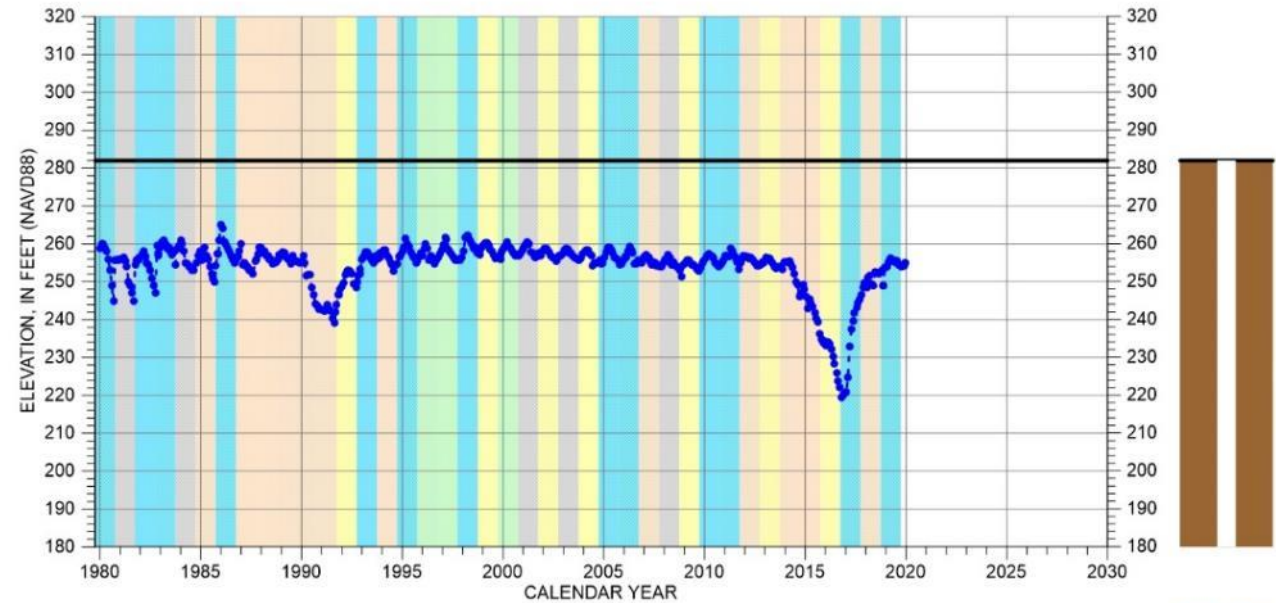
| Sustainability Indicator | Metric |
|--------------------------|--|
| Groundwater elevations | Groundwater elevations measured in representative monitoring wells <ul style="list-style-type: none">• One minimum threshold and one measurable objective per well |



Example Groundwater Elevation Data

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 19S/08E-19K03

Upper Valley Aquifer Subbasin

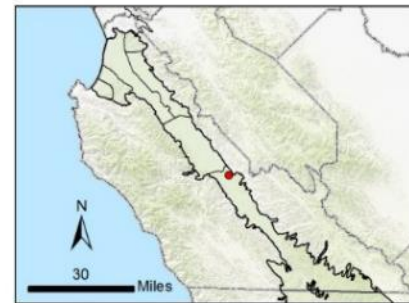


EXPLANATION

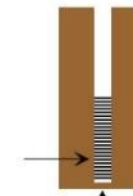
- GROUNDWATER ELEVATION
- ESTIMATED ELEVATION
- LAND SURFACE

WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



Perforated from 152 to 104 feet msl



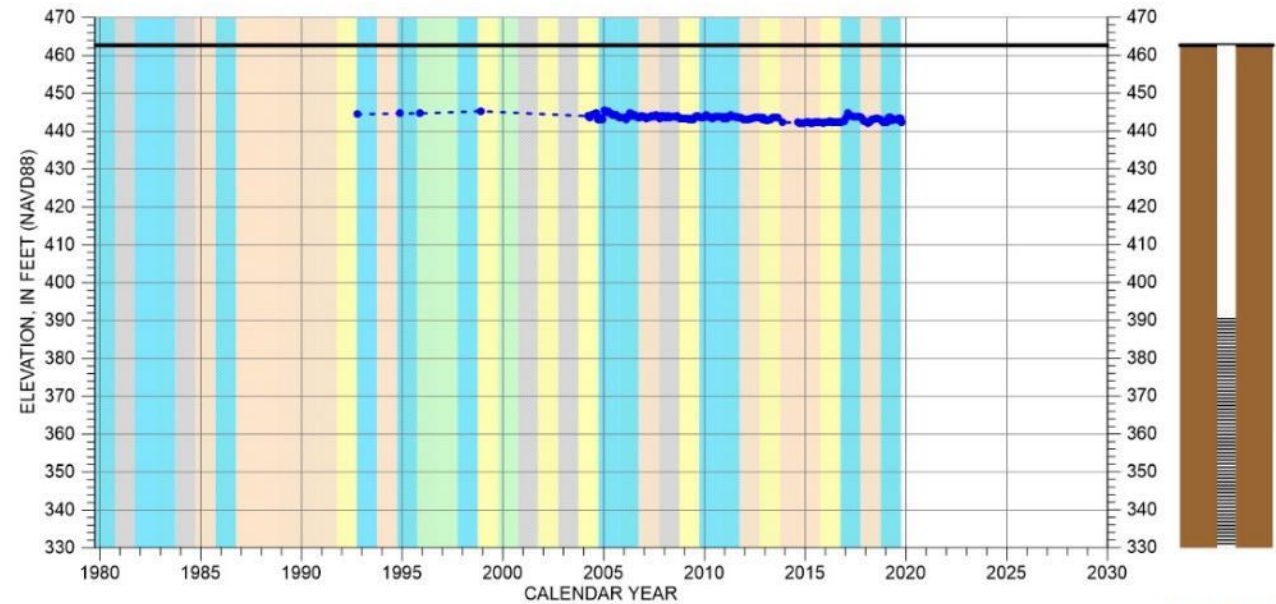
Well Bottom 70 feet msl

S:\projects\19180_Salinas_GSP\gva\valley_upper_valley\hydrograph\GRF\19S_08E_19K03.grf

Example Groundwater Elevation Data

HYDROGRAPH OF MEASURED GROUNDWATER ELEVATION FOR 23S/10E-14D01

Upper Valley Aquifer Subbasin

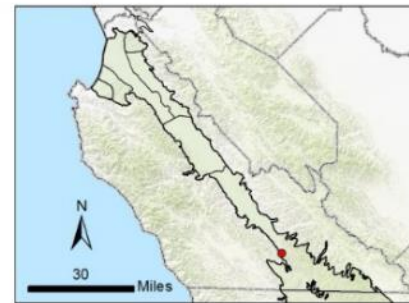


EXPLANATION

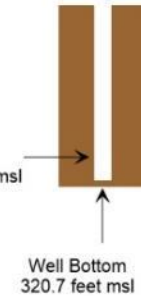
- GROUNDWATER ELEVATION
- ESTIMATED ELEVATION
- LAND SURFACE

WATER YEAR TYPE DESIGNATION

- DRY
- DRY - NORMAL
- NORMAL
- WET - NORMAL
- WET



Perforated from 390.7 to 330.7 feet msl



Well Bottom 320.7 feet msl

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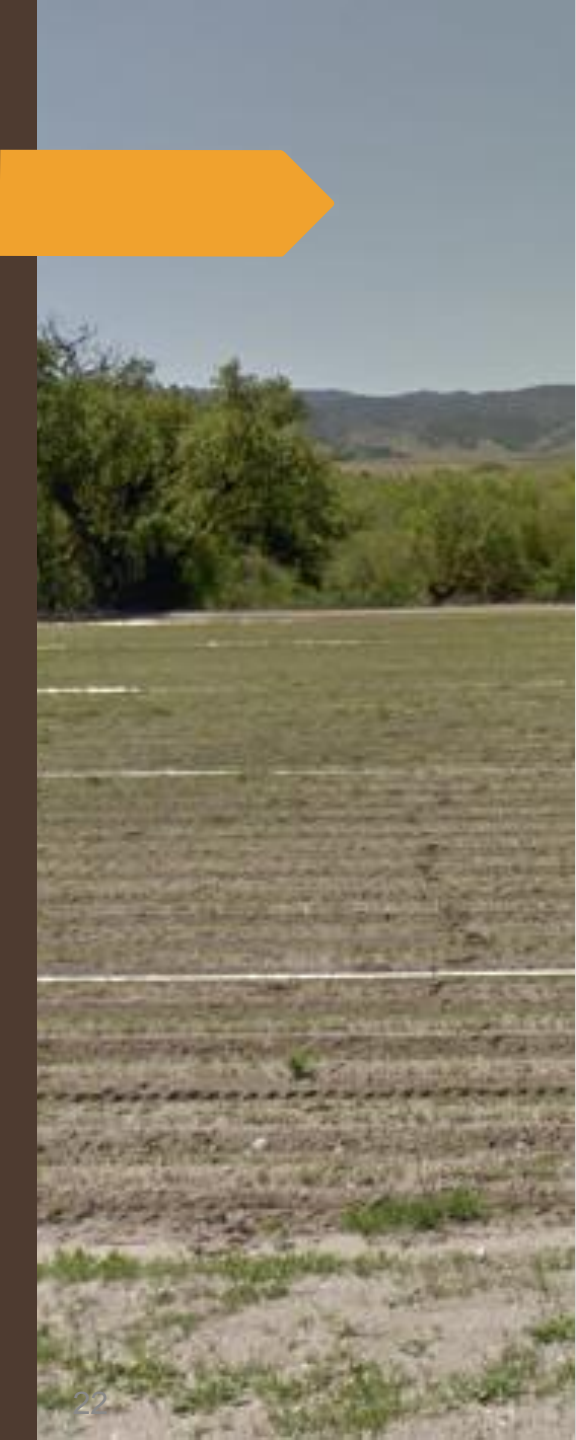
Groundwater Elevation SMC Options

1. Groundwater elevations in a certain year were significant and unreasonable
 - Set minimum thresholds above whatever was recorded in the year in question
2. Groundwater elevation Minimum Thresholds will be set a depth below the measurable objective at each well
 - Set the groundwater elevation goal you would like to achieve, then set a minimum threshold that allows groundwater elevations to drop during a drought.
 - Need a way to set your groundwater elevation goal. Maybe current conditions?



Groundwater Elevation SMC Options

3. Groundwater elevations minimum thresholds are set at the lowest point predicted by models if current practices continue
 - ▶ Extend the current rate of groundwater decline out 20 years. Set the minimum thresholds there.
 - ▶ Option is to set minimum thresholds after 5,10, or 15 years of declines at current rates
4. Impacting shallow, domestic wells is significant and unreasonable
 - ▶ Minimum thresholds are set to ensure **most** shallow domestic wells have adequate water for operation
 - ▶ Option: set minimum thresholds excluding the very shallowest domestic wells
 - ▶ Option: use this as a check on the reasonableness of minimum thresholds



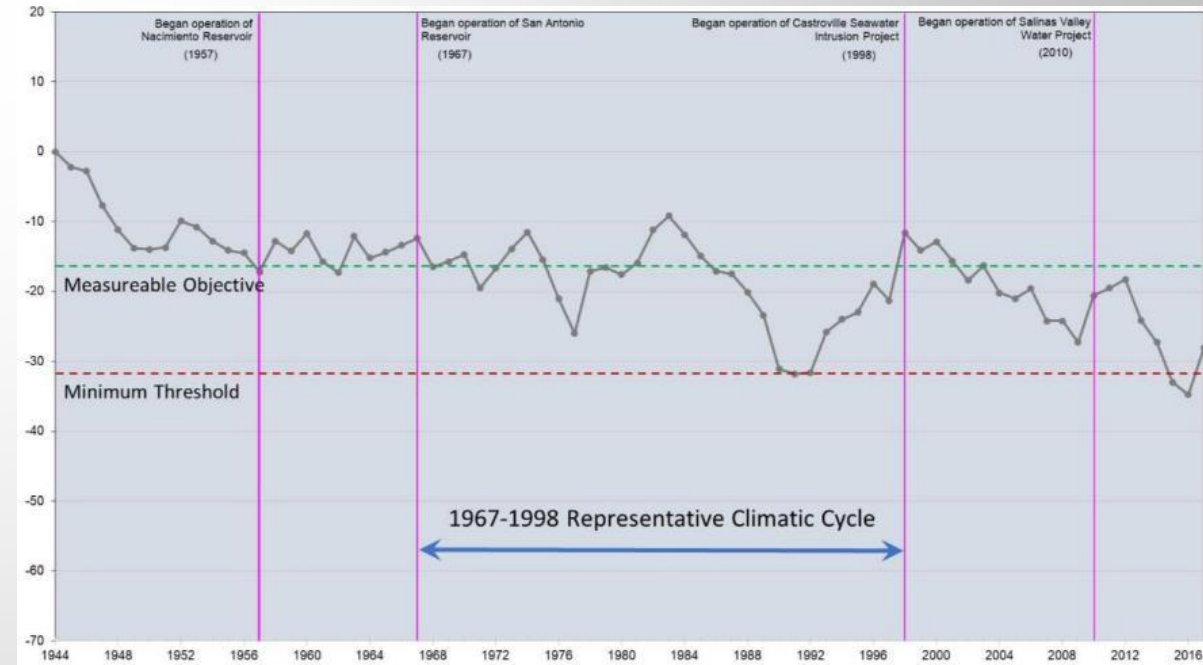
Groundwater Elevation Minimum Threshold Examples

5. Lowering groundwater elevations below the root zone of all (or selected) GDEs is significant and unreasonable
 - ▶ Minimum thresholds based on an assumed rooting depth of plants in a GDE
 - ▶ Measurable Objectives are above this depth to account for droughts
6. Lowering groundwater elevations to where wells pump poor quality groundwater is significant and unreasonable
 - ▶ Requires data on groundwater quality with depth.
 - ▶ Used for naturally occurring constituents such as Arsenic etc.

Groundwater Elevation Minimum Threshold Examples from 180/400-Foot Subbasin

Groundwater elevations will be maintained 1 foot above measured 2015 elevations. [option 1]

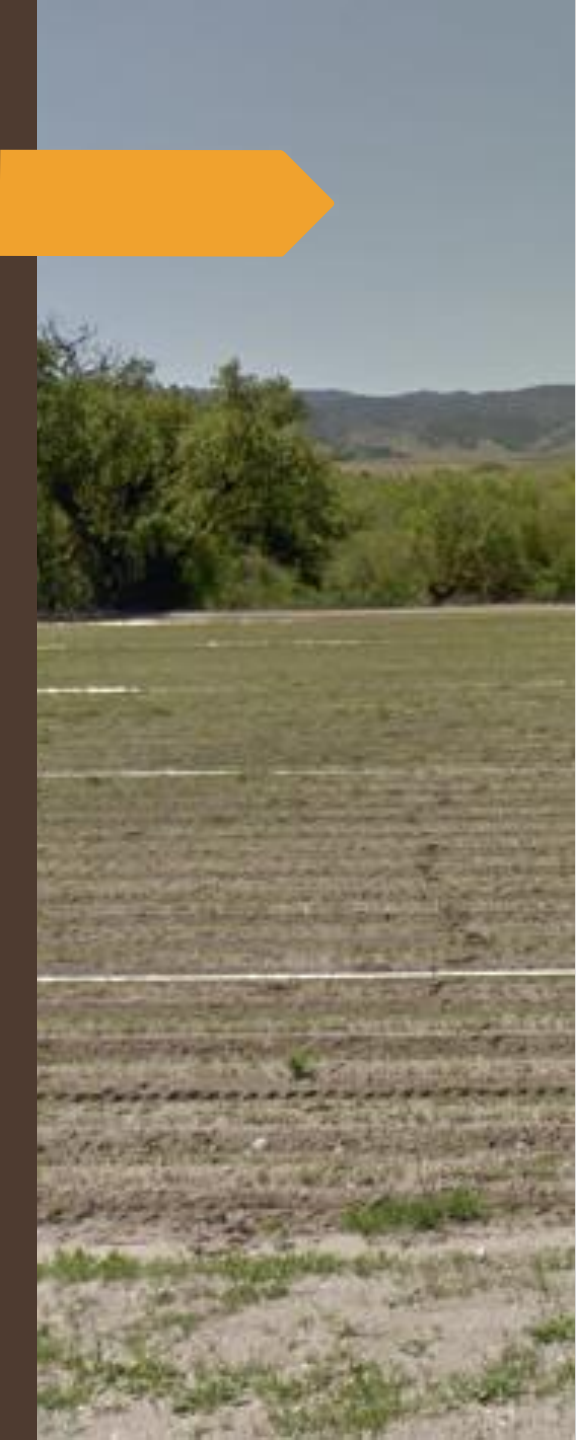
- The GSP statistically assessed impacts on domestic wells [option 4]



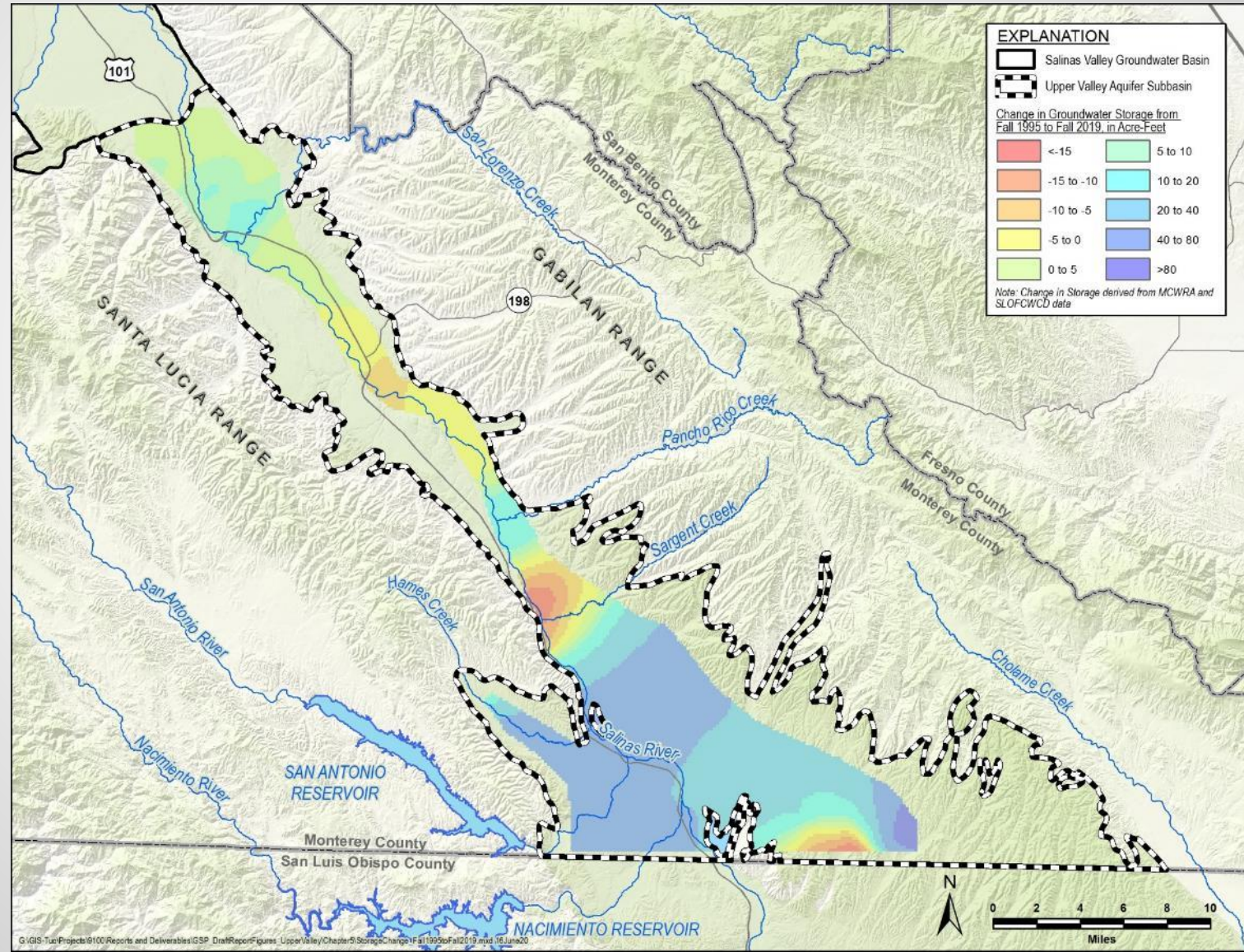


Measuring Thresholds & Objectives (354.28(c))

| Sustainability Indicator | Metric |
|--------------------------|--|
| Groundwater storage | <p>Total extractions (pumping)</p> <ul style="list-style-type: none"><li>• One minimum threshold and one measurable objective for the entire subbasin<li>• Many GSPs have opted to calculate storage from groundwater levels as a proxy for extractions |



Example Change in Storage Data



Example Change in Storage Data – Initial Estimates

| | 2030 | 2070 |
|---|---------|----------------------------------|
| Estimated Extractions (Acre-Feet/Year) | 124,570 | 128,440 |
| Estimated Overdraft (Acre-Feet/Year) | 170 | 60 |
| Percent Pumping Reduction | 0.1% | 0.05% (1/20 th of 1%) |

Pumping reduction is within margin of error

Because this is a balanced basin, yield may be underestimated

- Provided for generalized guidance only
- Estimates will be updated with new GW model
- Pumping changes likely depends on reservoir operations



Groundwater Storage Minimum Threshold SMC Options

1. Pumping in excess of the sustainable yield leads to significant and unreasonable impacts
 - ▶ Minimum threshold = pump within the sustainable yield. Provide an estimate of the sustainable yield, acknowledging it will be refined with better data
 - ▶ Measurable objective = pump at, or less than the sustainable yield.

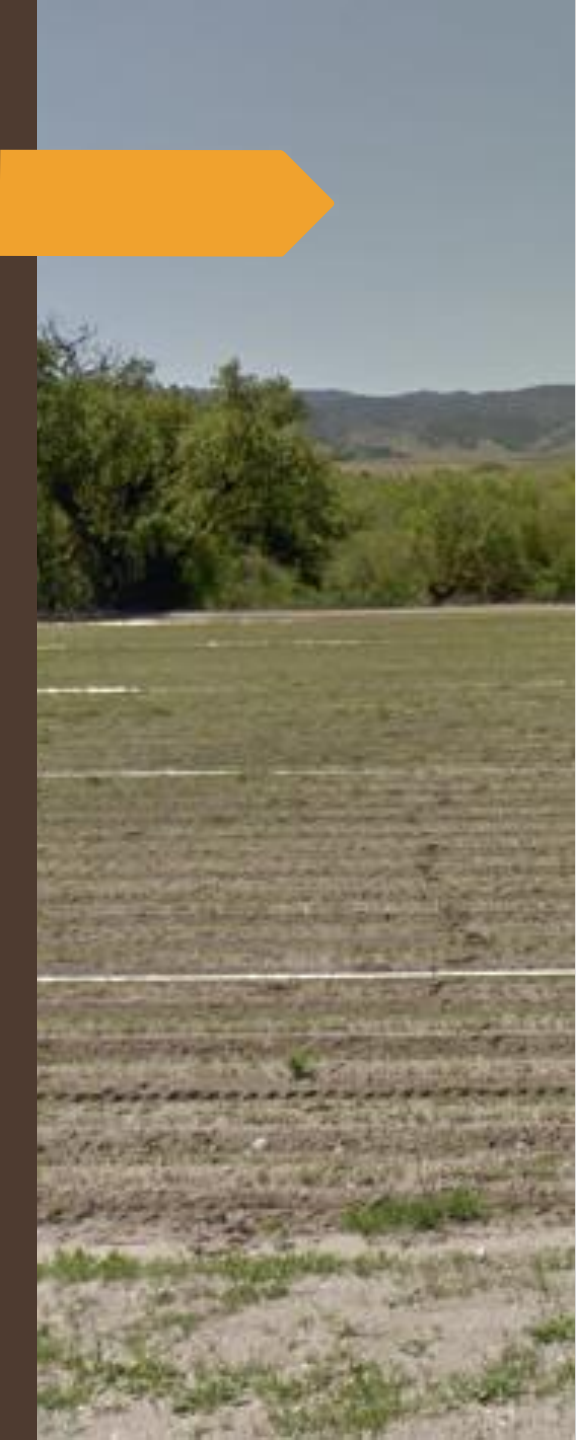


Groundwater Storage Minimum Threshold SMC

Options: Groundwater levels as a proxy

2. Net change in groundwater storage, based on groundwater elevations is zero
 - Minimum threshold = no long-term change in storage based on calculations using groundwater elevation data
 - Measurable objective = long-term stability, or increase in storage based on calculations using groundwater elevation data

It is unclear how using groundwater levels as a proxy strictly meet SGMA regulations



Groundwater Storage Minimum Threshold Example from 180/400-Foot Subbasin

Minimum threshold is set to the estimated long-term future sustainable yield of 180/400-Foot Aquifer Subbasin [option 1]

- Initially set to 112,000 AF/yr. This will be refined with better data.

It may be difficult to justify a minimum threshold of pumping more than the sustainable yield, or allowing a loss of groundwater storage



Measuring Thresholds & Objectives (354.28(c))

| Sustainability Indicator | Metric |
|--------------------------|---|
| Degraded water quality | <p>Three options in the regulations.</p> <ol style="list-style-type: none"><li>1. A volume of impacted groundwater. Annually contour and calculate the volume of impacted groundwater<li>2. The location of an isocontour. Annually contour concentrations<li>3. A number of supply wells. Review drinking water and irrigation water quality data |



Groundwater Quality Minimum SMC Options

1. Degraded groundwater quality resulting from direct GSA actions is significant and unreasonable
 - ▶ Minimum threshold = maintain current groundwater quality impacts
 - ▶ Measurable objective = same as minimum threshold



Groundwater Quality Minimum SMC Options

2. Existing groundwater quality conditions are significant and unreasonable, and SVBGSA chooses to improve existing groundwater quality
 - Minimum threshold = improve groundwater quality impacts
 - Measurable objective = same as minimum threshold

Be cautious adopting responsibilities and authorities already held by other agencies such as CCRWQB, or County of Monterey

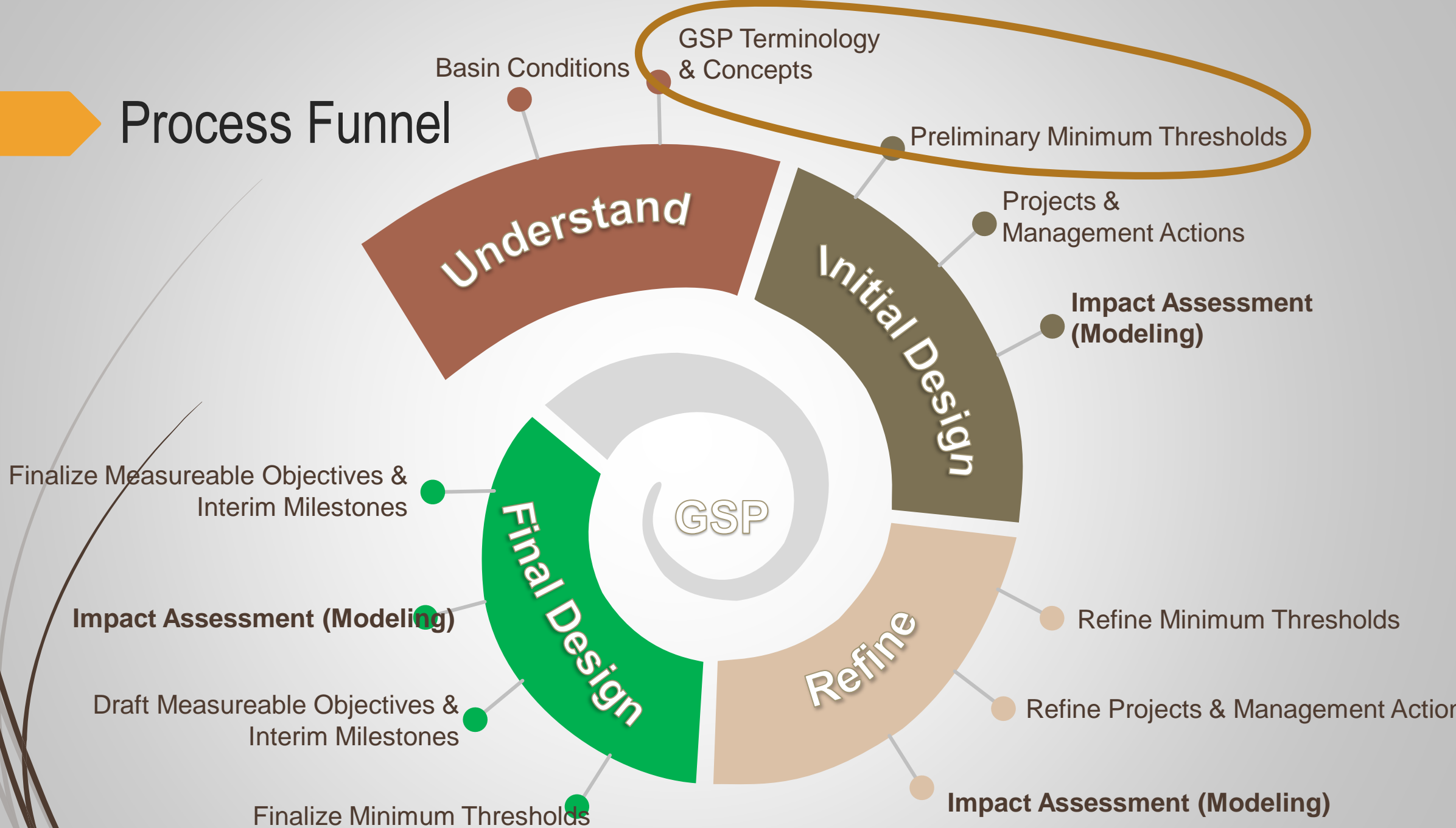


Groundwater Quality Minimum Threshold 180/400-Foot Subbasin Example

Minimum threshold is zero additional exceedances of groundwater quality constituents of concern known to exist in the Subbasin [option 1]

- ▶ Based on the idea that it is significant and unreasonable for the GSA to take an action that financially impacts a well owner.
 - ▶ Well owner has to treat water
 - ▶ Well owner has to abandon a well
 - ▶ Reduced crop production due to water quality

Process Funnel





Questions

