Sustainable Management Criteria Definitions, Examples, and Ideas

SVBGSA Langley Subbasin Committee Meeting

July 10, 2020

MONTGOMERY & ASSOCIATES

Process Concepts

- July 28 web meeting on SMC terminology and concepts
  - Setting minimum thresholds, measurable objectives, and undesirable results is not a linear process
  - Setting criteria is clearer if you understand the entire process

Opinions/guidance will be included in boxes

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

- 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
- Sea Water Intrusion

- 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	Change in land surface elevation at each measuring point • One minimum threshold and one measurable objective per measuring point • Option to use groundwater level as a proxy for ground surface elevation

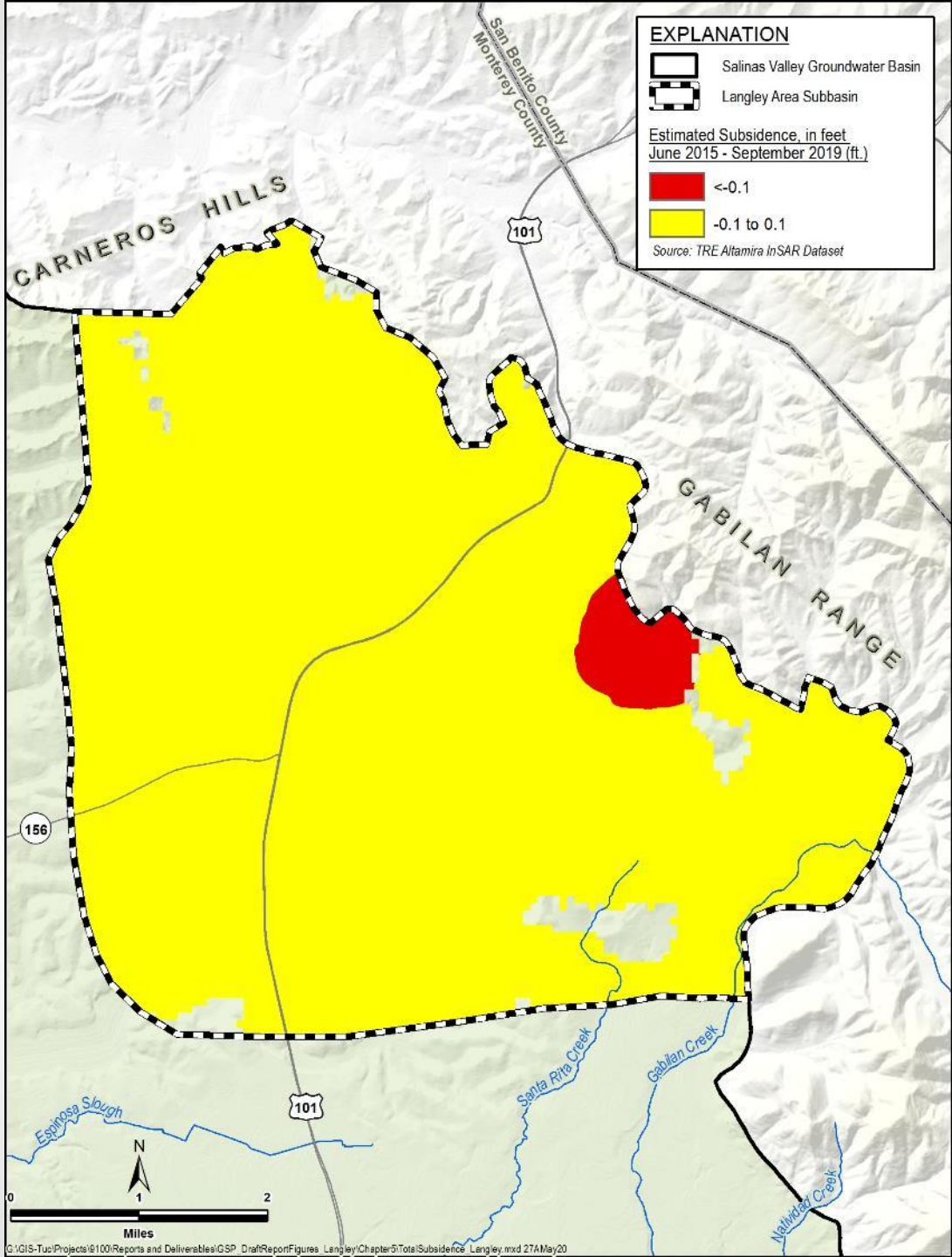
Example Subsidence Data – InSAR (From DWR)

Subsidence is not a significant problem in this subbasin.

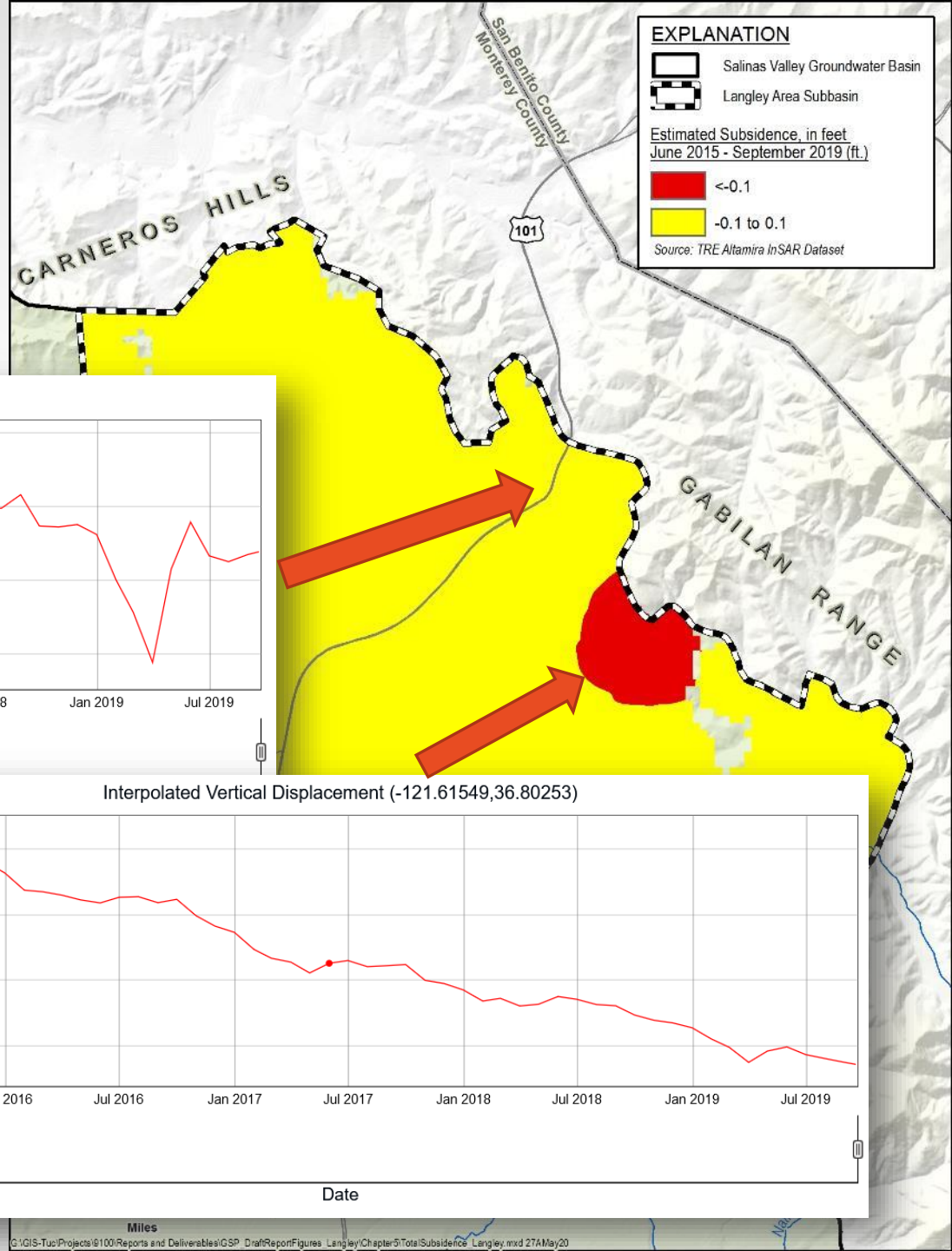
This map shows four years of subsidence, not annual subsidence

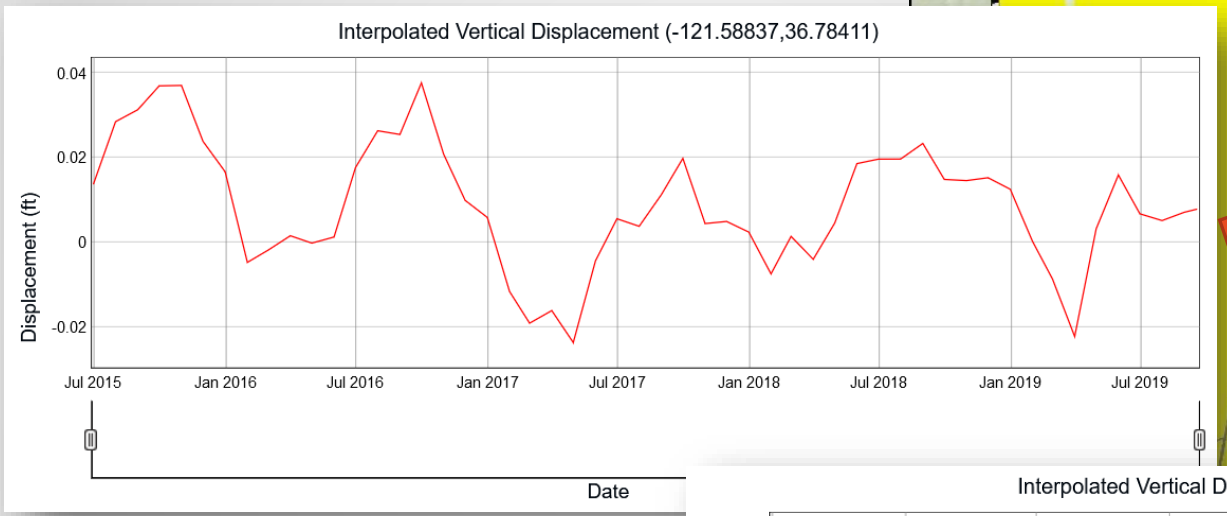
Location of subsidence is at interface with Gabilan Range where there is limited aquifer space and limited water resources.

Subsidence may not be related to groundwater management



Example Subsidence Data – InSAR (From DWR)





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]

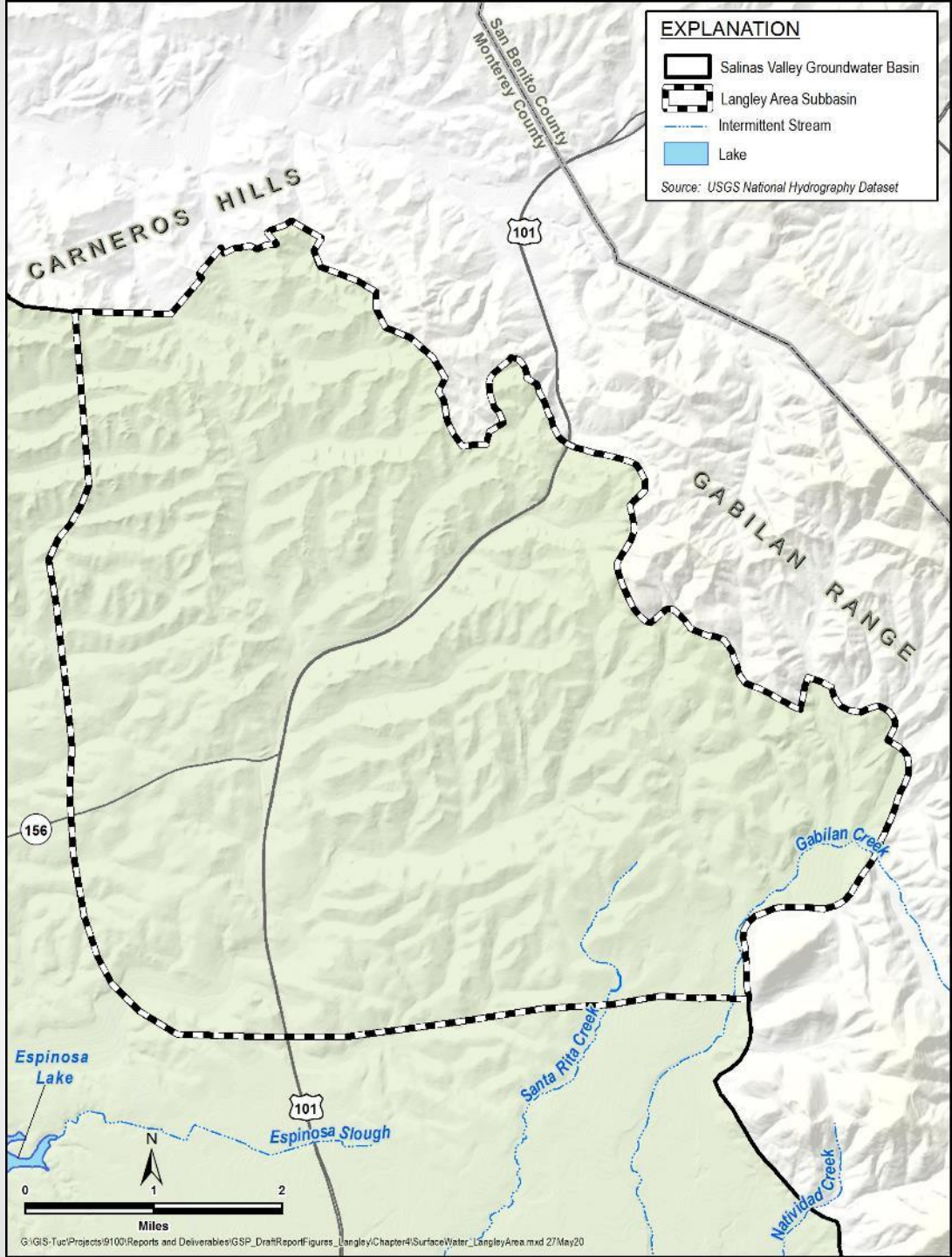
- Use InSAR data, not groundwater level proxy
- To account for measurement error in InSAR data, the minimum threshold for subsidence is 0.1 feet/year
- Option to address long term, slow subsidence

Measuring Thresholds & Objectives (354.28(c))

Sustainability Indicator	Metric
Depletion of Interconnected surface water	A rate or volume of surface water depletion. Set one minimum threshold and one measurable objective per surface water body. (per reach?) • Option 1. Estimate depletions with a model • Option 2. Use groundwater elevations as a proxy

Potential Interconnected Surface Waters

- Not many, and ephemeral surface water bodies
  - Santa Rita Creek
  - Gabilan Creek
- Currently unsure of level of interconnection
- Is this a driving concern/issue in the Langley Subbasin?



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
     - Less simulated depletion, or
     - Higher shallow groundwater levels
   - Measurable objectives
     - Less simulated depletion, or
     - 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
     - Less than today's simulated depletion, or
     - Higher shallow groundwater levels
   - Measurable objectives
     - Less simulated depletion, or
     - 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 simulated depletion, or
     - Equal to today's shallow groundwater levels
   - Measurable objectives
     - Equal to today's simulated depletion, or
     - 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
     - More than today's simulated depletion, or
     - Lower shallow groundwater levels
   - Measurable objectives
     - More than today's simulated depletion, or
     - 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]

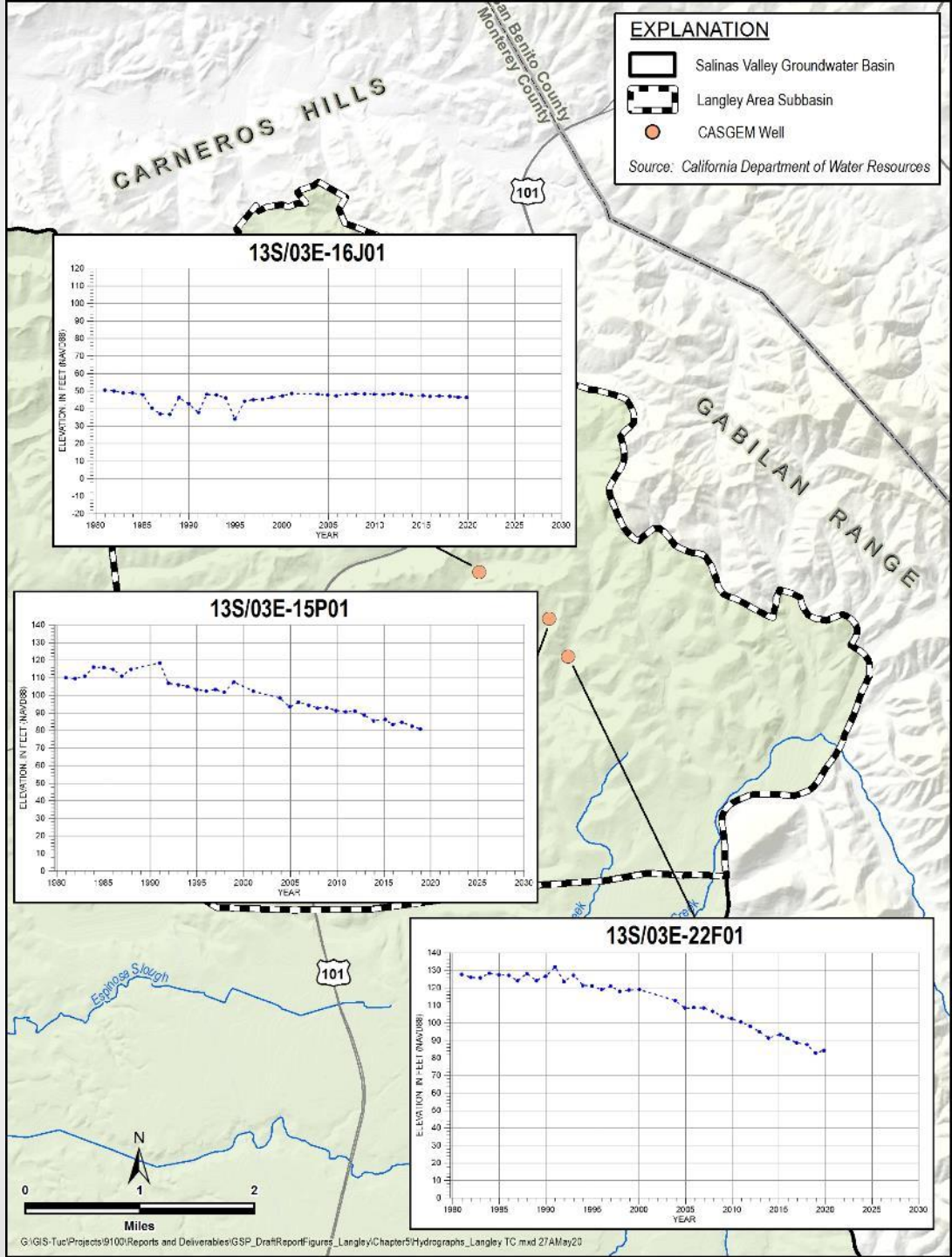
- Using simulated depletions, but might change to shallow groundwater levels
- We will not increase depletion rates (lower shallow groundwater levels) in the future

Measuring Thresholds & Objectives (354.28(c))

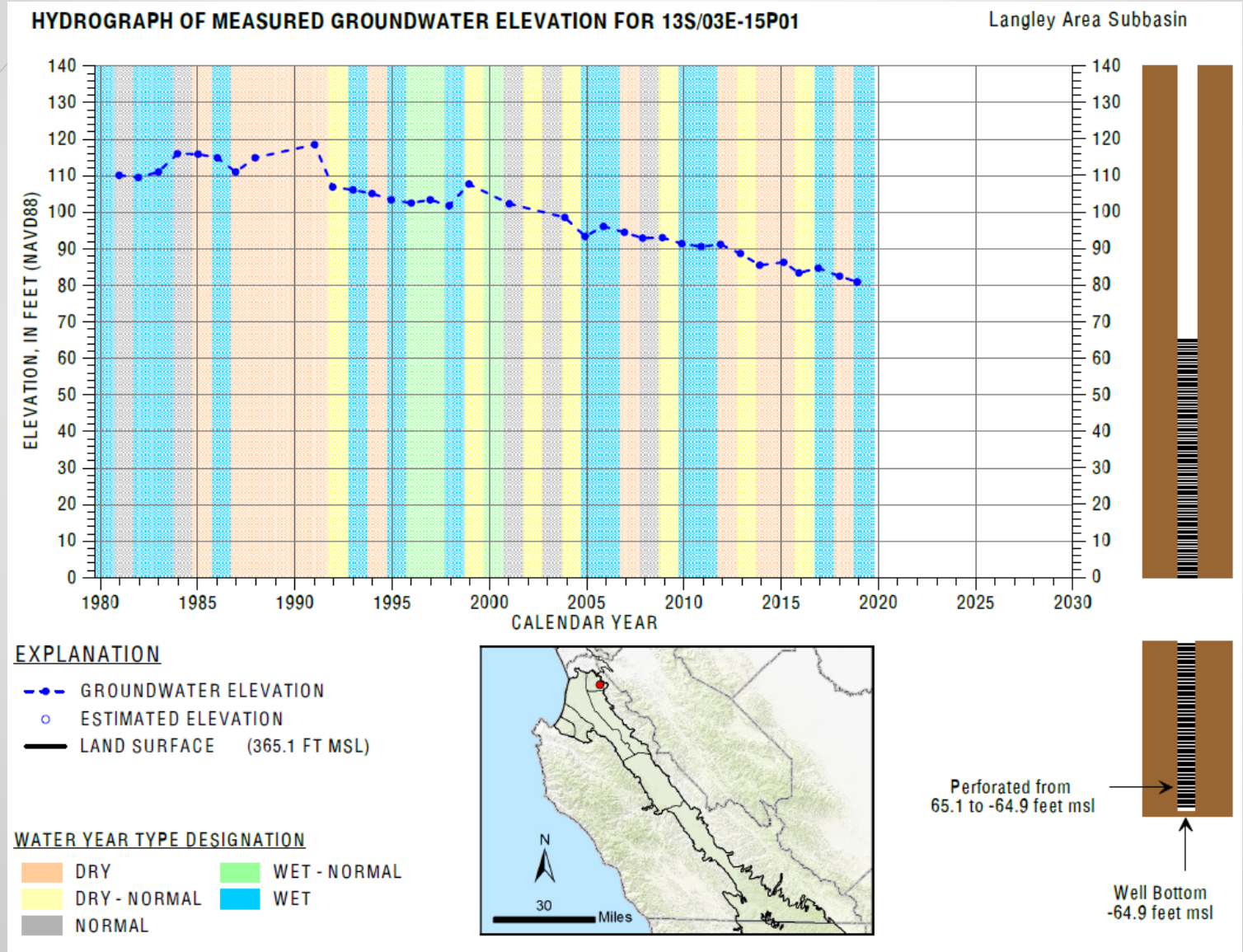
Sustainability Indicator	Metric
Groundwater elevations	Groundwater levels measured in representative monitoring wells • One minimum threshold and one measurable objective per well

Example Groundwater Level Data

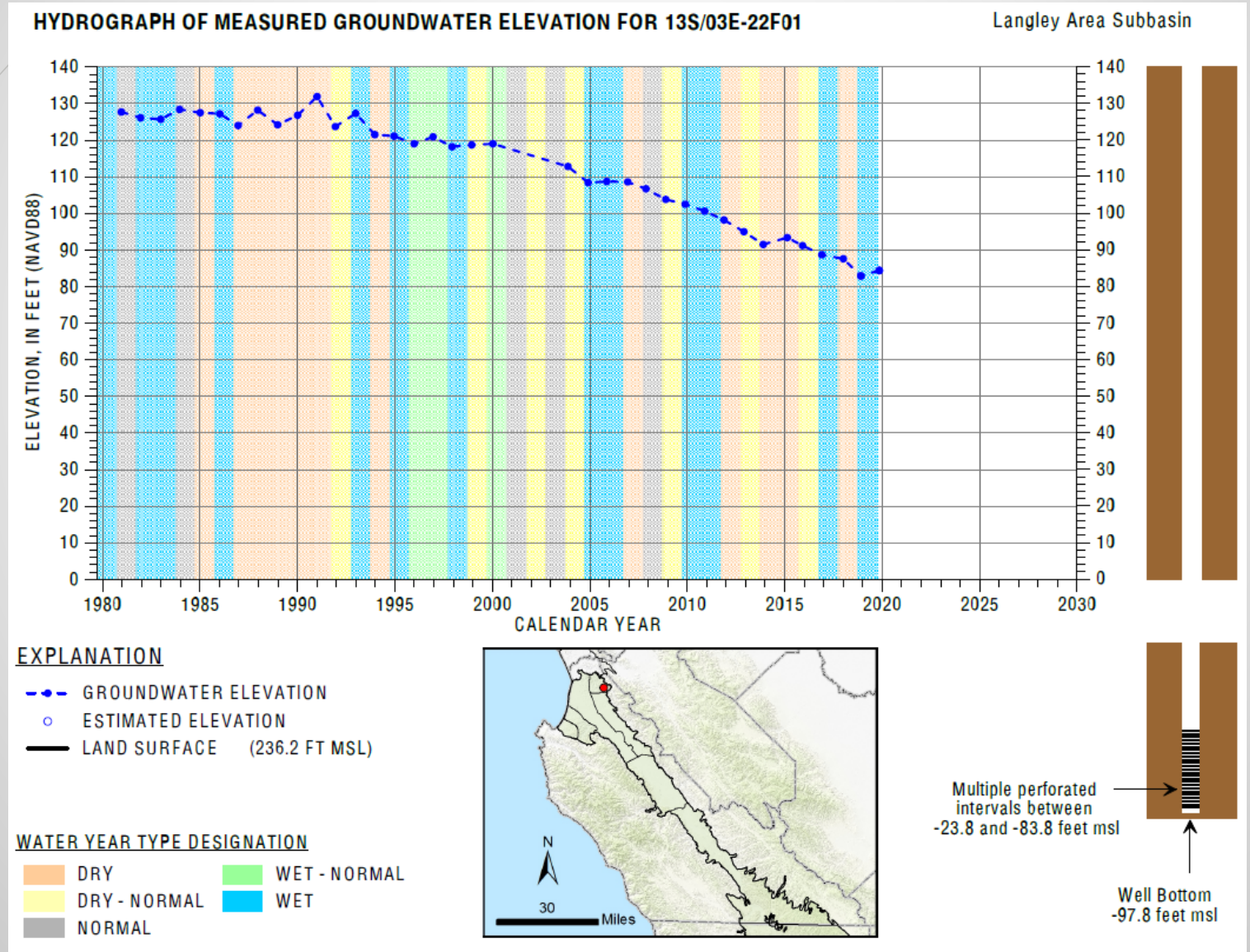
- Only 3 CASGEM wells
- Is this a driving concern/issue in the Langley Subbasin?



Example Groundwater Level Data



Example Groundwater Level Data



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 level goal you would like to achieve, then set a minimum threshold that allows groundwater levels to drop during a drought.
   - Need a way to set your groundwater level 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

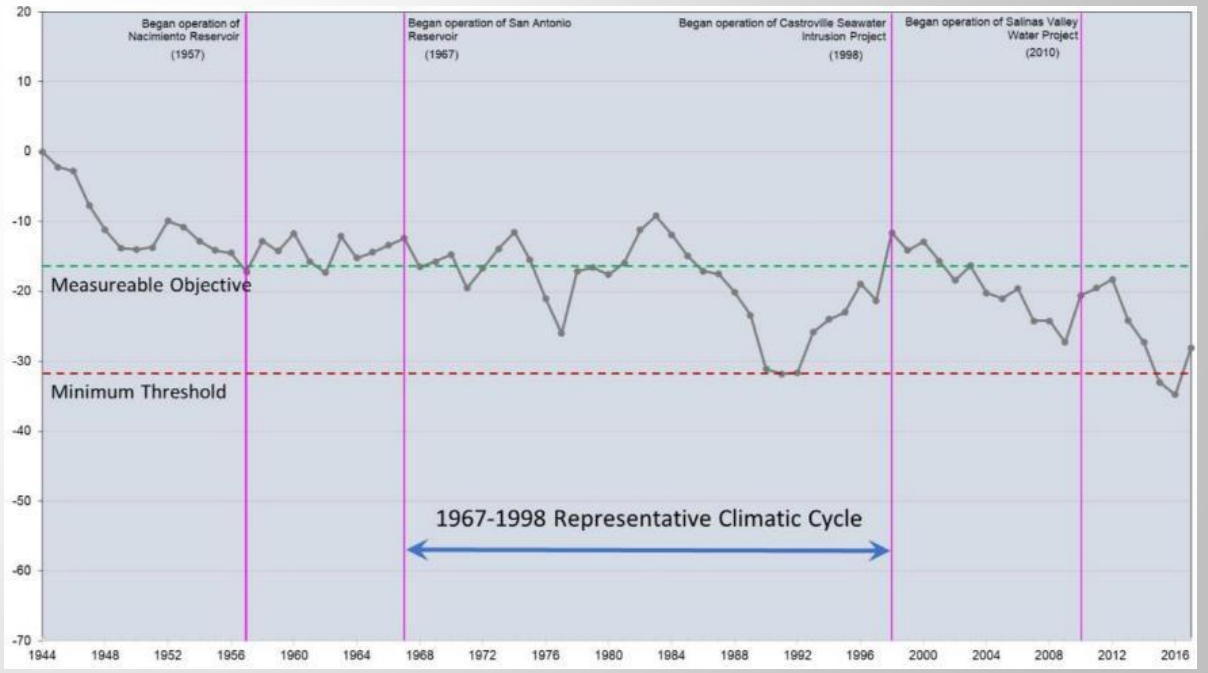
Groundwater Elevation Minimum Threshold Examples

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 levels 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]



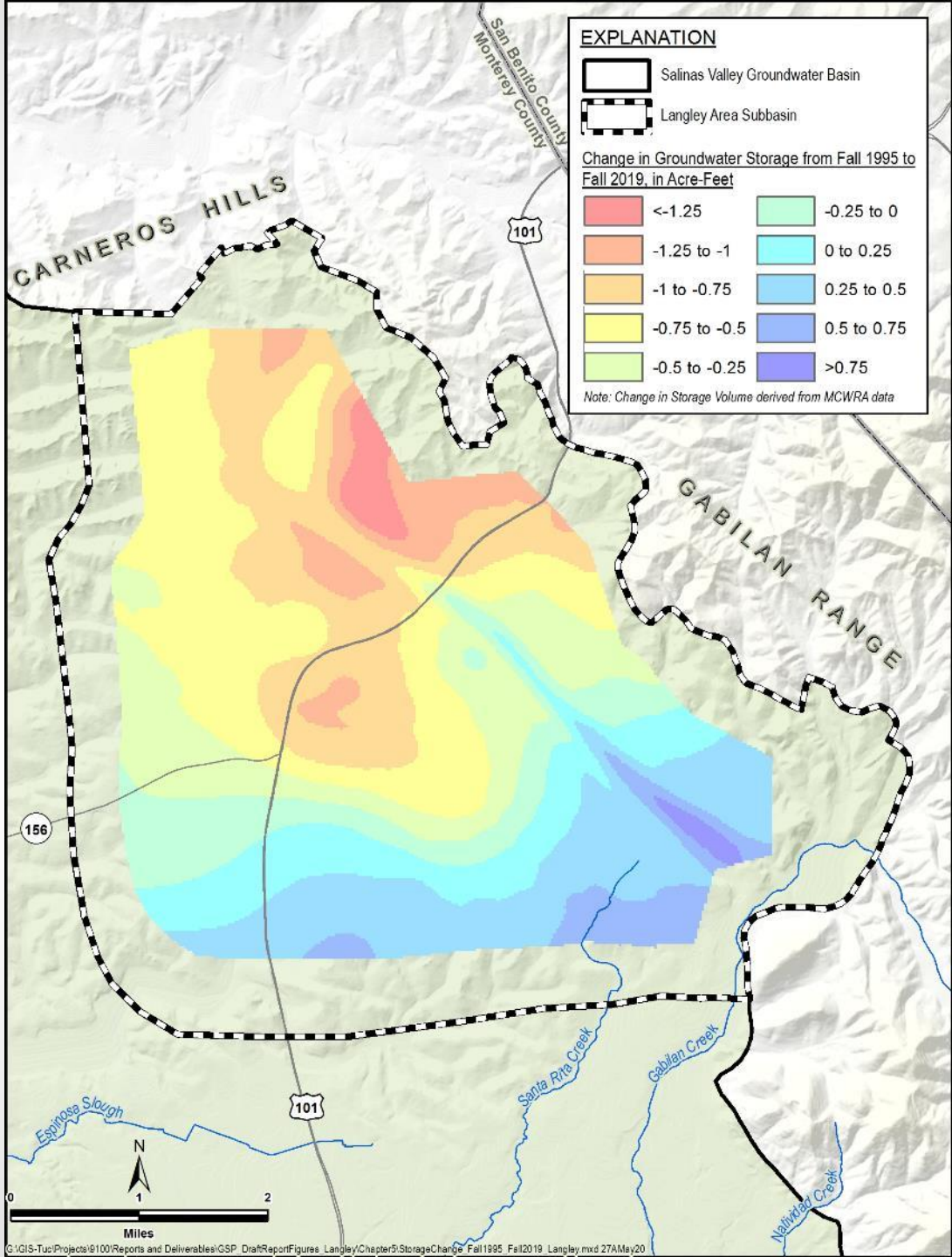
Measuring Thresholds & Objectives (354.28(c))

Sustainability Indicator	Metric
Groundwater storage	Total extractions (pumping) • One minimum threshold and one measurable objective for the entire subbasin • Many GSPs have opted to calculate storage from groundwater levels as a proxy for extractions

Example Change in Storage Data

- Slightly different story than the initial groundwater modeling

Estimated from MCWRA groundwater level data



Example Change in Storage Data – Initial Estimates

	2030	2070
Estimated Extractions (Acre-Feet/Year)	771	795
Estimated Overdraft (Acre-Feet/Year)	1,492 (no overdraft)	1,774 (no overdraft)
Percent Pumping Reduction	0.0%	0.0%

Is this a significant concern for the Langley Subbasin?

Dropping groundwater levels may still limit production

- Provided for generalized guidance only
- Estimates will be updated with new GW model
- Pumping reduction likely depends on reservoir operations
- Pumping reductions not necessarily equally distributed in the Subbasin

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.

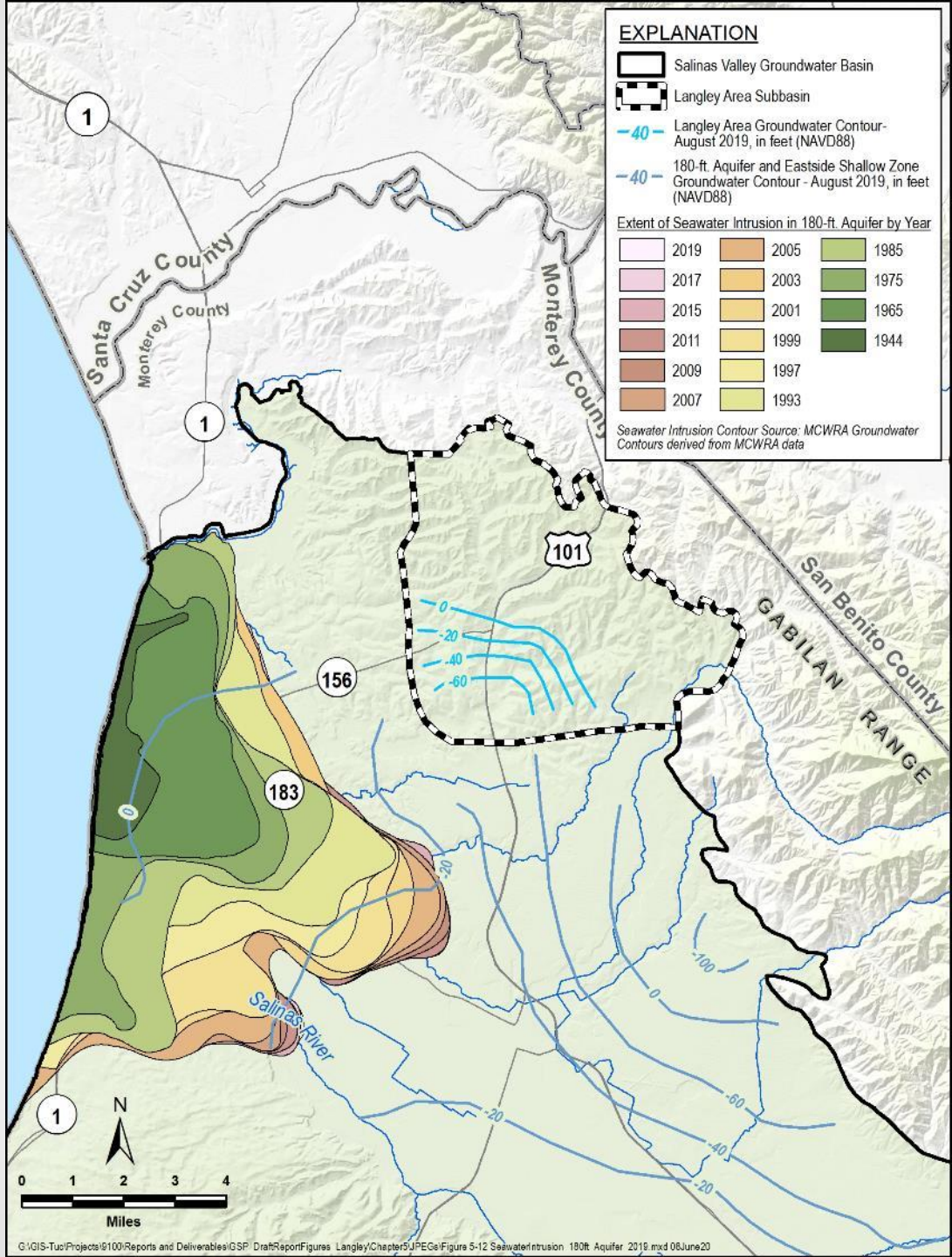
It may be difficult to justify a minimum threshold of pumping more than the sustainable yield, or allowing a loss of groundwater storage

Measuring Thresholds & Objectives (354.28(c))

Sustainability Indicator	Metric
Seawater Intrusion	Location of a chloride isocontour line Option: groundwater elevations that are protective of seawater intrusion

Sea Water Intrusion – 180-Foot Aquifer

- Must address seawater intrusion unless we say it is, “not likely to occur” in the Subbasin
- Is this a driving concern/issue in the Langley Subbasin?



Sea Water Intrusion SMC Options

1. Any seawater intrusion in the Subbasin is significant and unreasonable
   - Minimum threshold = a chloride isocontour at the Subbasin boundary
   - Measurable objective = same as minimum threshold

Seawater Intrusion SMC Options

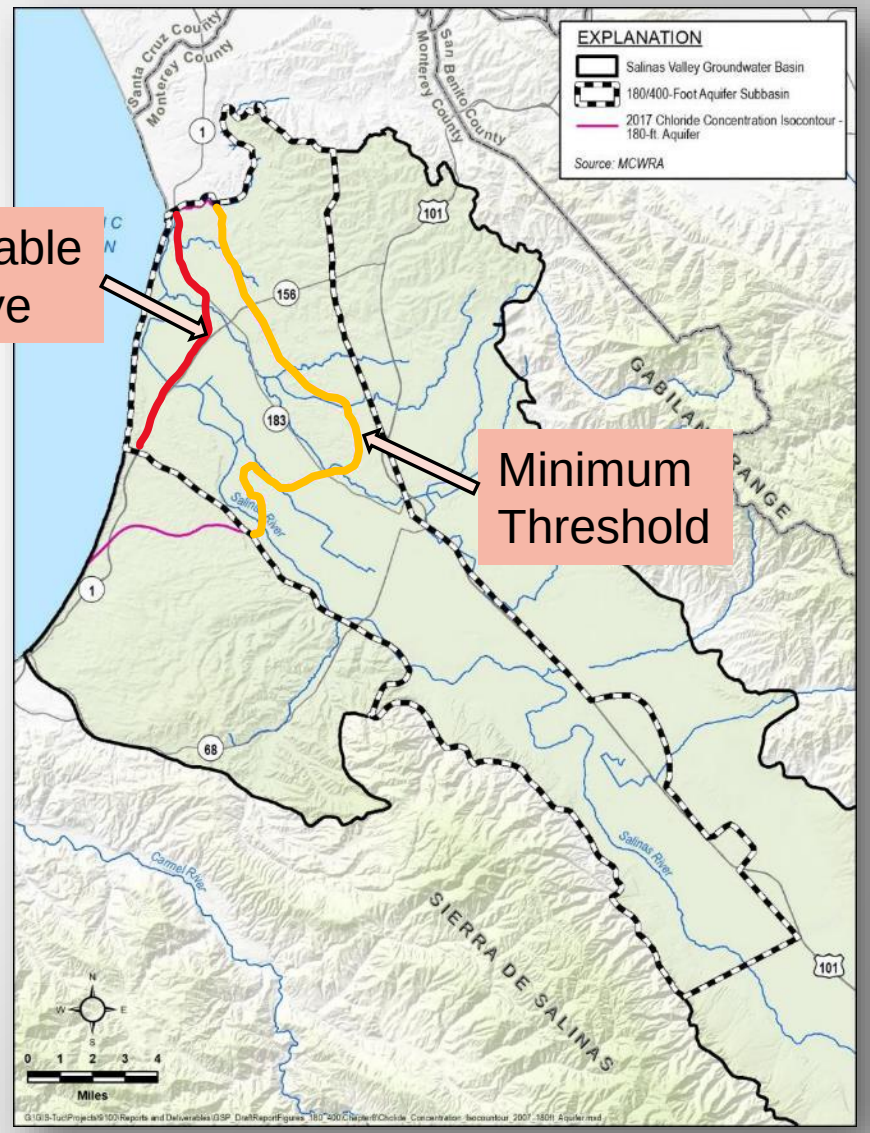
2. Additional SWI is neither significant nor unreasonable. Seawater intrusion can advance farther inland.
   - Minimum threshold = a chloride isocontour inland of the Subbasin boundary
   - Measurable objective = same as minimum threshold

Sea Water Intrusion Minimum Threshold Examples from 180/400-Foot Subbasin

Minimum Threshold set to the 2017 chloride isocontour

Measurable objective set to a line closer to the coast.

[option 2]



Measuring Thresholds & Objectives (354.28(c))

Sustainability Indicator	Metric
Degraded water quality	Three options in the regulations. 1. A volume of impacted groundwater. Annually contour and calculate the volume of impacted groundwater 2. The location of an isocontour. Annually contour concentrations 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, but SVBGSA chooses not to improve existing groundwater quality
   - Minimum threshold = improve groundwater quality impacts
   - Measurable objective = same as minimum threshold
   - We are not required to meet the minimum thresholds in this example

Groundwater Quality Minimum SMC Options

3. 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

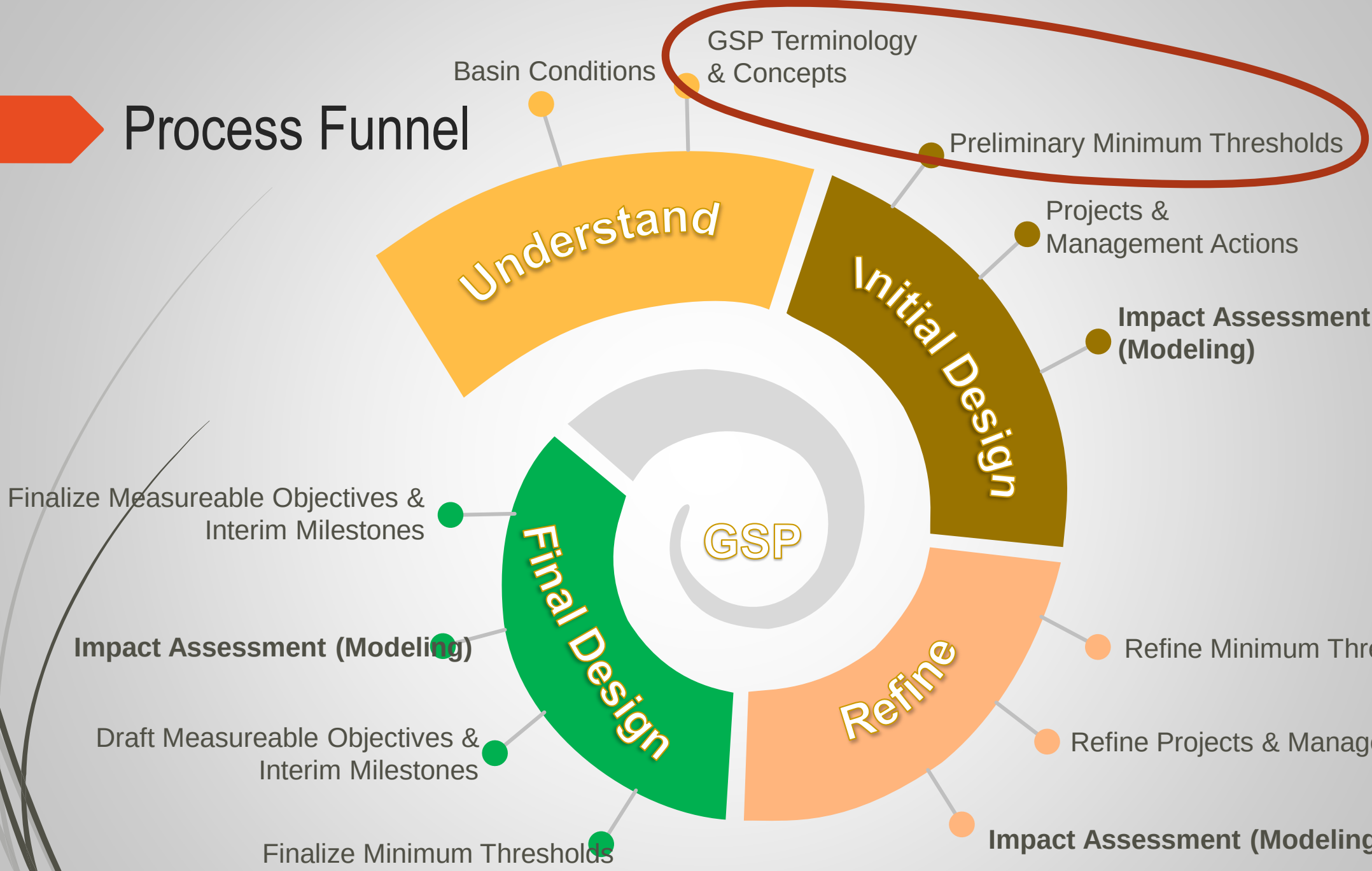
Be cautious adopting responsibilities and authorities already held by other agencies such as CCRWQB, or County of Monterey

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