Approach for Developing Undesirable Results for Degraded Groundwater Quality and Proposed Minimum Thresholds and Measurable Objectives for Chronic Lowering of Groundwater Levels

Presented by Georgina King, Montgomery & Associates

Santa Margarita Groundwater Agency

August 27, 2020

1

Objectives

- Understand different approaches for developing Undesirable Results for Degraded Groundwater Quality; indicate preferred approach
- Review proposed Minimum Thresholds and Measurable Objectives for Chronic Lowering of Groundwater Levels
- Provide direction for developing Undesirable Results for Chronic Lowering of Groundwater Levels

Proposed Undesirable Results

Degraded Groundwater Quality

3

Suggested Reading for Sustainable Management Criteria

Sustainable Management Criteria Best Management Practices

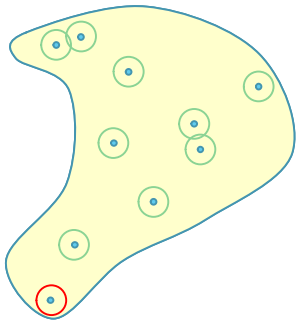
- https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-6-Sustainable-Management-Criteria-DRAFT_ay_19.pdf
  - Pg. 4-11: Setting Sustainable Management Criteria
  - Pg. 14-15: Degraded Groundwater Quality Minimum Threshold
  - Pg. 20: Undesirable Results
  - Pg. 27: Measurable Objectives

4

These are Best Management Practices that has DWR has provided to help guide Sustainable Management Criteria development

Undesirable Results are a Combination of Minimum Thresholds

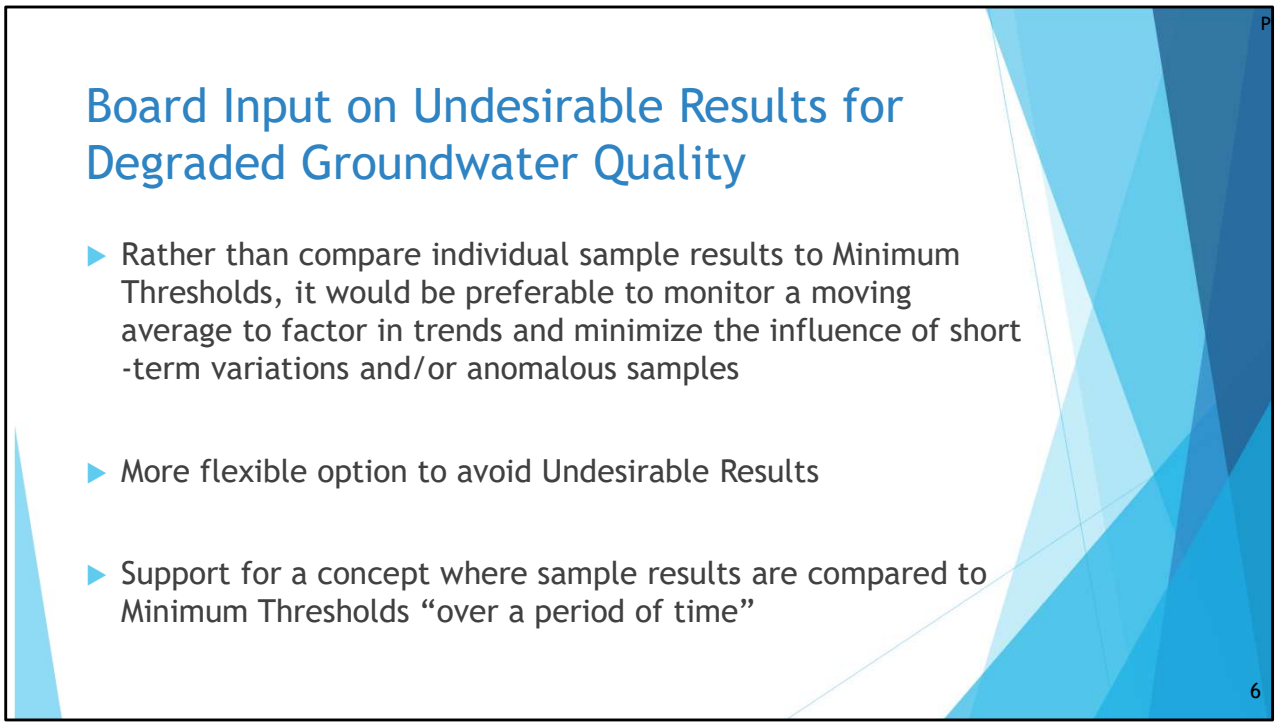
Example: An undesirable result occurs when 20% of groundwater elevations, measured at Representative Monitoring Points, drop below their respective Minimum Thresholds



How you define Undesirable Results is how you can accommodate flexibility

5

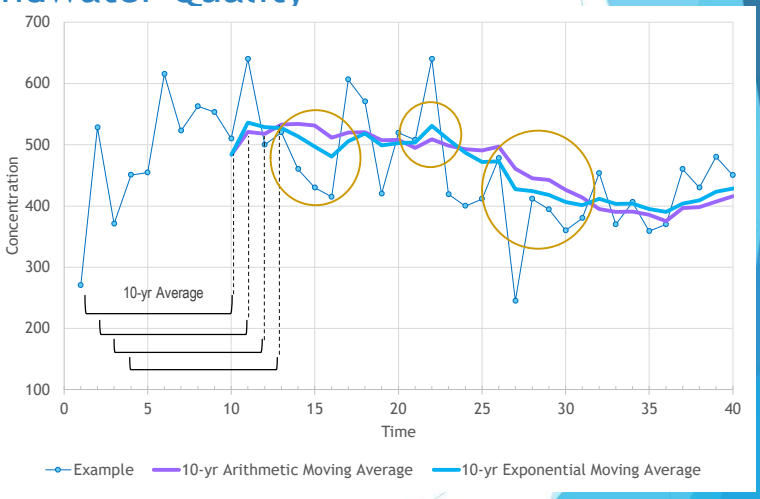
Refresher slide of what Undesirable Results are



These are considerations discussed at previous Board meetings or provided in emails after the June Board meeting. These have been used to guide development of the degraded groundwater quality undesirable results.

Proposed Approaches for Undesirable Results for Degraded Groundwater Quality

1. 10-year Arithmetic Moving Average
2. 10-year Exponential Moving Average - places a greater weight and significance on the most recent data points

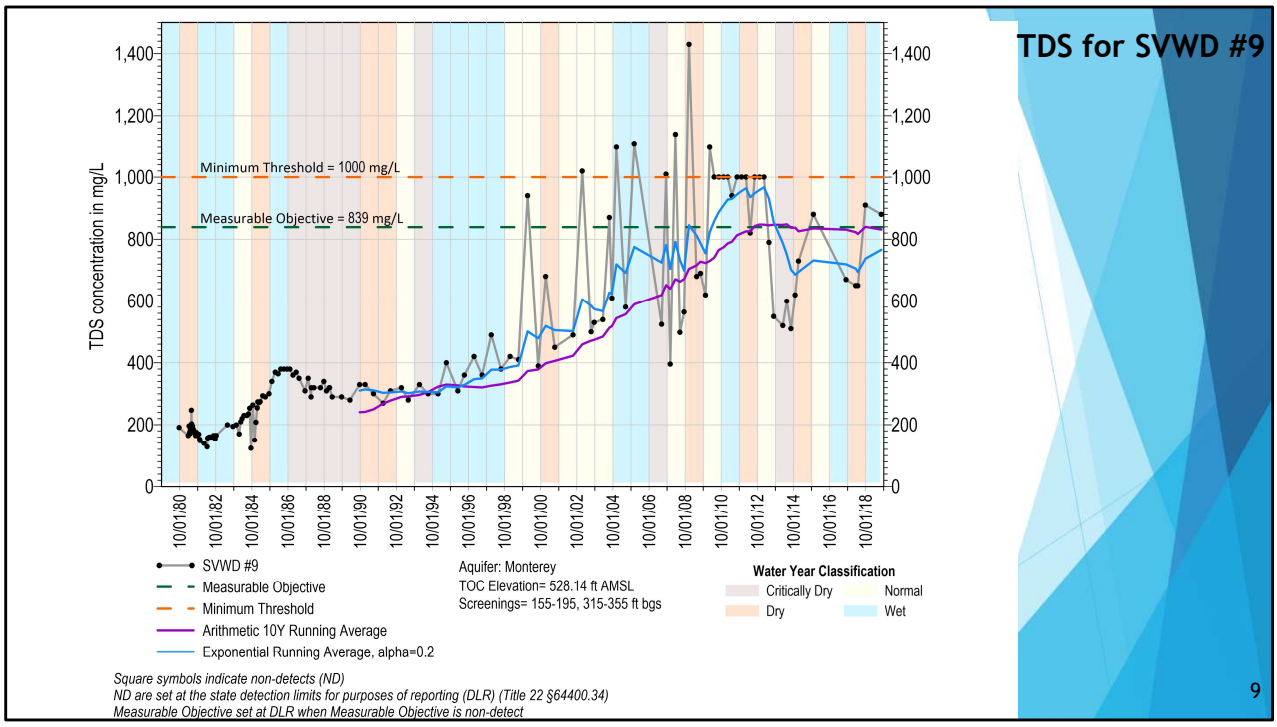


7

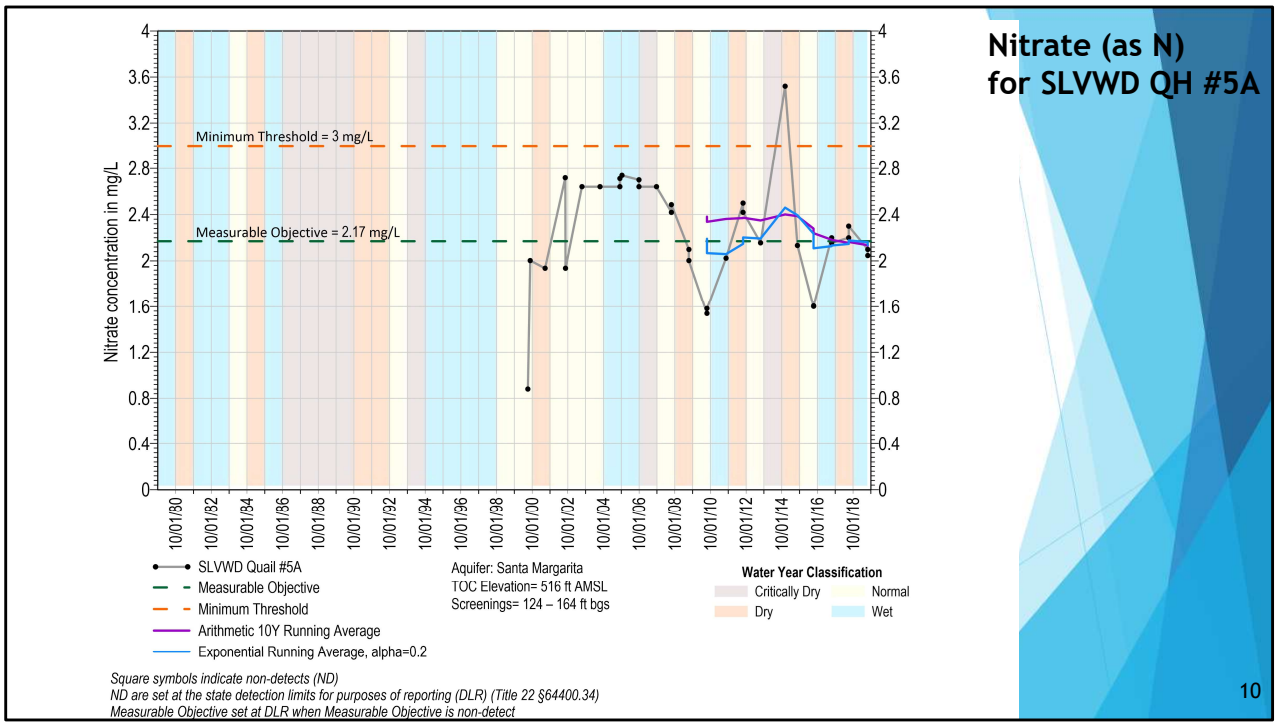
A moving average allows for 1) more flexibility than just using single point exceedances of MT to define undesirable results, and 2) has the over time concept by using 10 years Two options: arithmetic and exponential. This slide shows the difference between the two options. Exponential moving average gives the most recent data points a higher weight in the average which results is less smoothing out than the arthmetric moving average. A 10-year average causes a lot more smoothing out than a shorter averaging period. The 10-yr average was selected because some of the water quality data are only collected every 10 years.

Basin Examples comparing Arithmetic and Exponential Moving Averages

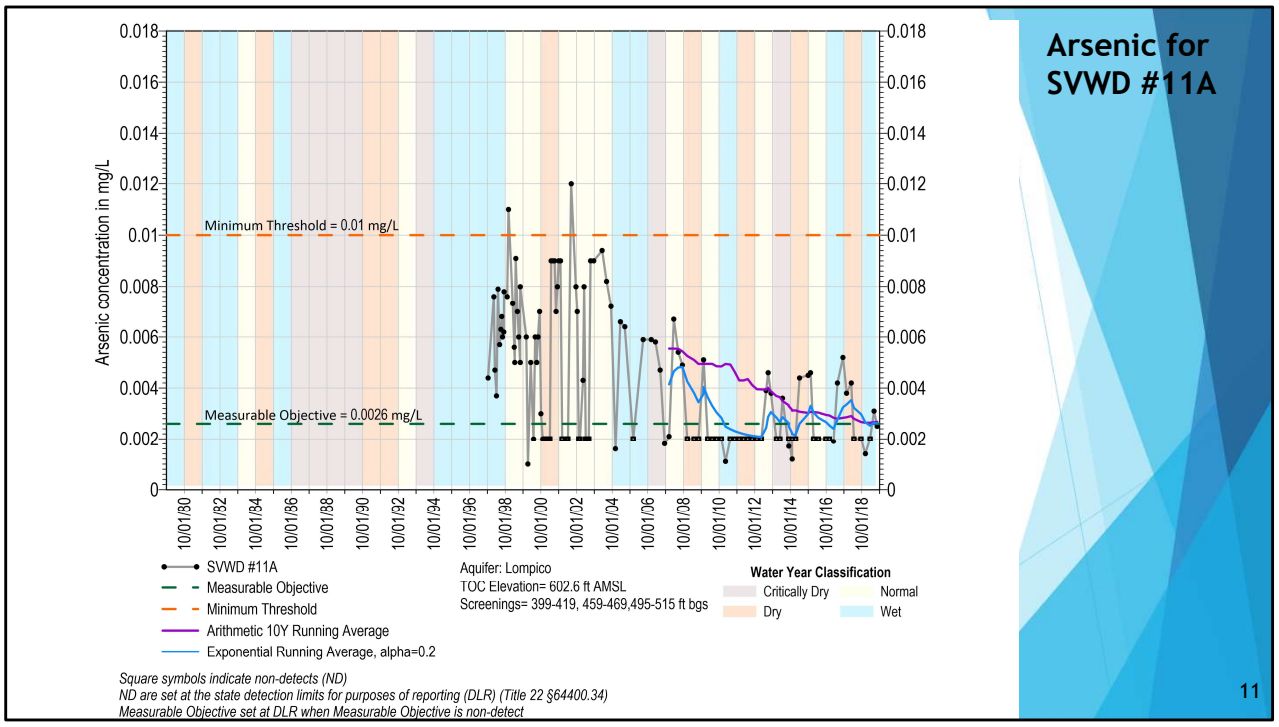
8



The exponential moving average is truer to the data with less smoothing than the arthmetric moving average.



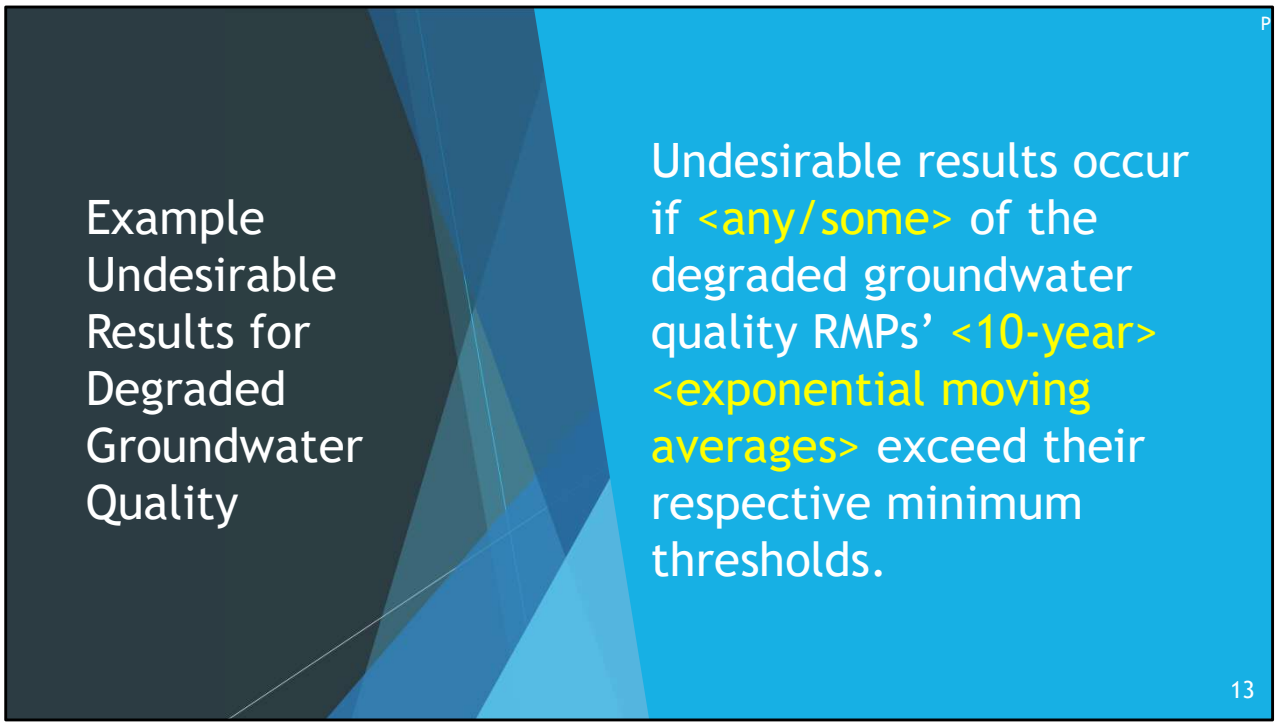
Nitrate in this well has fluctuated over the years. The results in this example are fairly similar even though there is greater weight placed on the recent data for the exponential moving average.



The exponential moving average more quickly responds to the non-detects (square symbols) but also the spikes because it places more weight on the recent data

Which Approach Do You Prefer?

1. Arithmetic Moving Average
2. Exponential Moving Average



This is an example of what undesirable results for degraded groundwater quality could look like. The variables in < > can be changed to reflect more or less flexiability in avoiding undesirable results. At this point we'd like to hear Board input on what they'd like to see defining undesirable results for degraded groundwater quality.

Degraded Groundwater Quality Undesirable Results

- Final Board Questions/Comments
- Public Comment

- Staff will take Board comments, during this meeting and by email after the meeting, into account and present recommendations at a future Board meeting

Proposed Preliminary Minimum Thresholds and Measurable Objectives

Chronic Lowering of Groundwater Levels

15

Preliminary Minimum Threshold & Measurable Objective Methodology

Minimum Threshold
minimum groundwater elevation

Measurable Objective
10-year average or higher elevation in areas needing recovery

Path to Finalizing Minimum Thresholds and Measurable Objectives

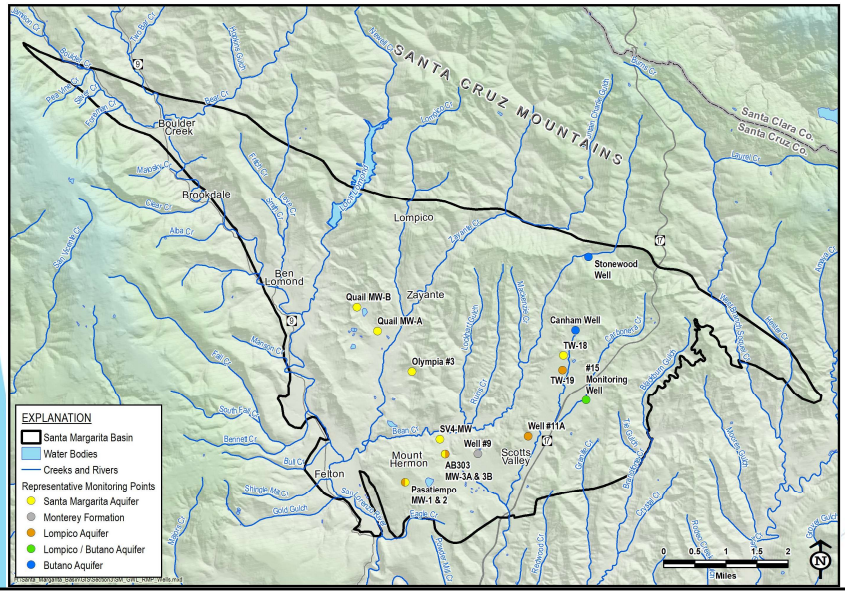
- Preliminary Minimum Thresholds
- Run predictive model with projects and management actions to determine if there are any conflicts with Minimum Thresholds that prevent other Minimum Thresholds from being met

- Preliminary Measurable Objectives for RMPs that use recent groundwater levels
- Run predictive model with projects and management actions to 1) develop preliminary Measurable Objectives that reflect improved groundwater levels in areas that need some recovery, and 2) determine if all preliminary Measurable Objectives are achievable

- Revise and finalize Minimum Thresholds and Measurable Objectives

17

Representative Monitoring Points for Chronic Lowering of Groundwater Levels

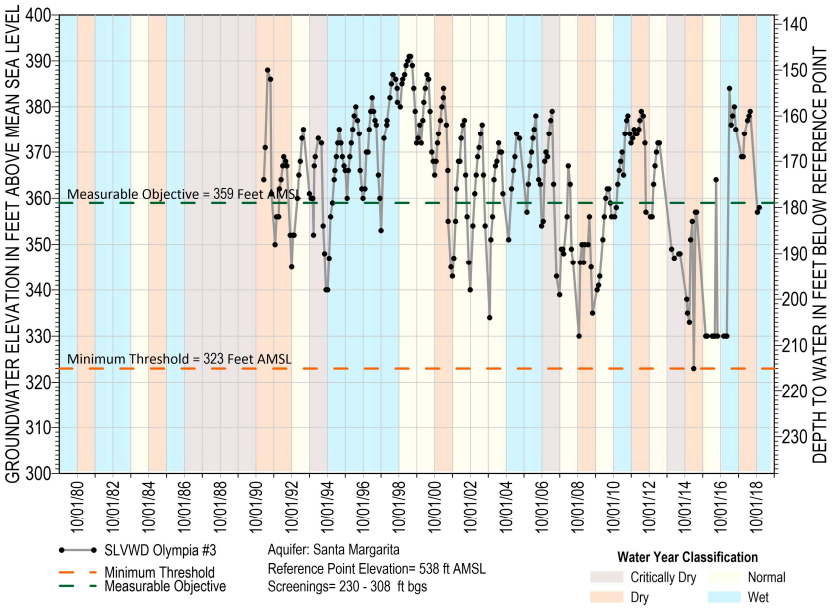


- Full list of Representative Monitoring Points in packet with hydrographs showing proposed Minimum Thresholds

18

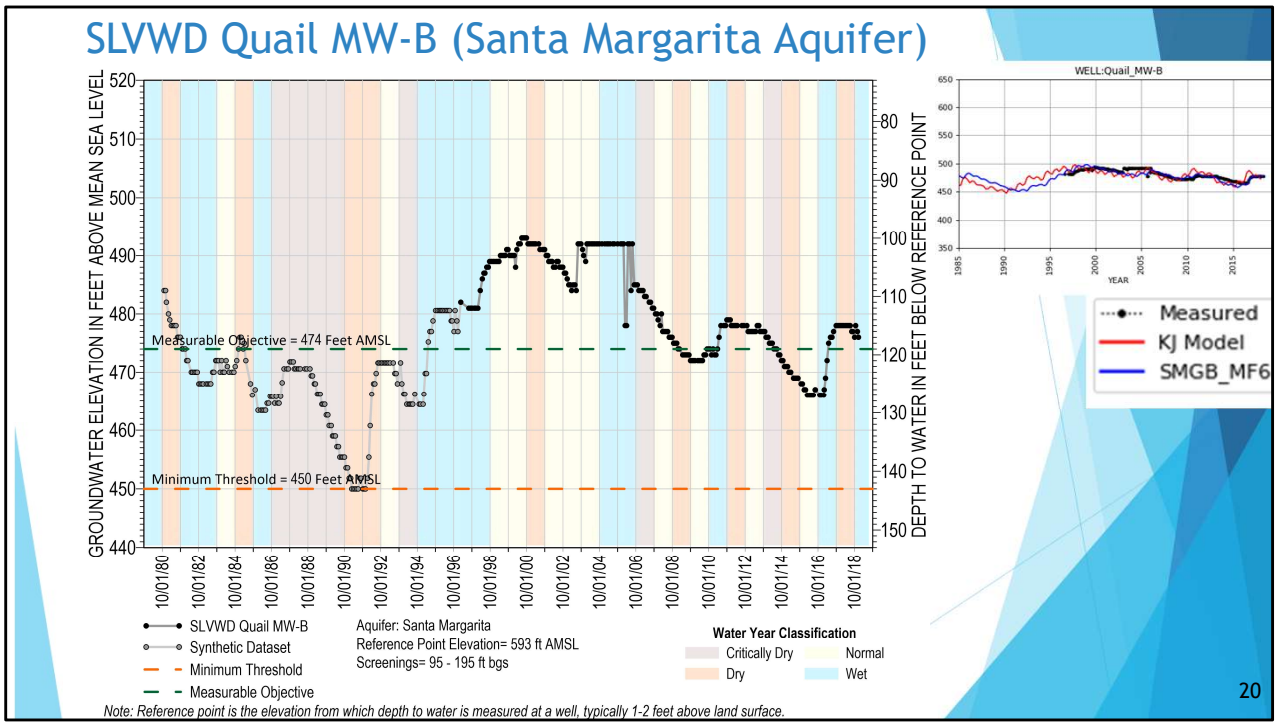
Representative monitoring wells (RMPs) selected based on: 1) representative of nearby wells screened in the same aquifer, 2) preferable to be dedicated monitoring wells, and 3) long-term record.

SLVWD Olympia #3 (Santa Margarita Aquifer)

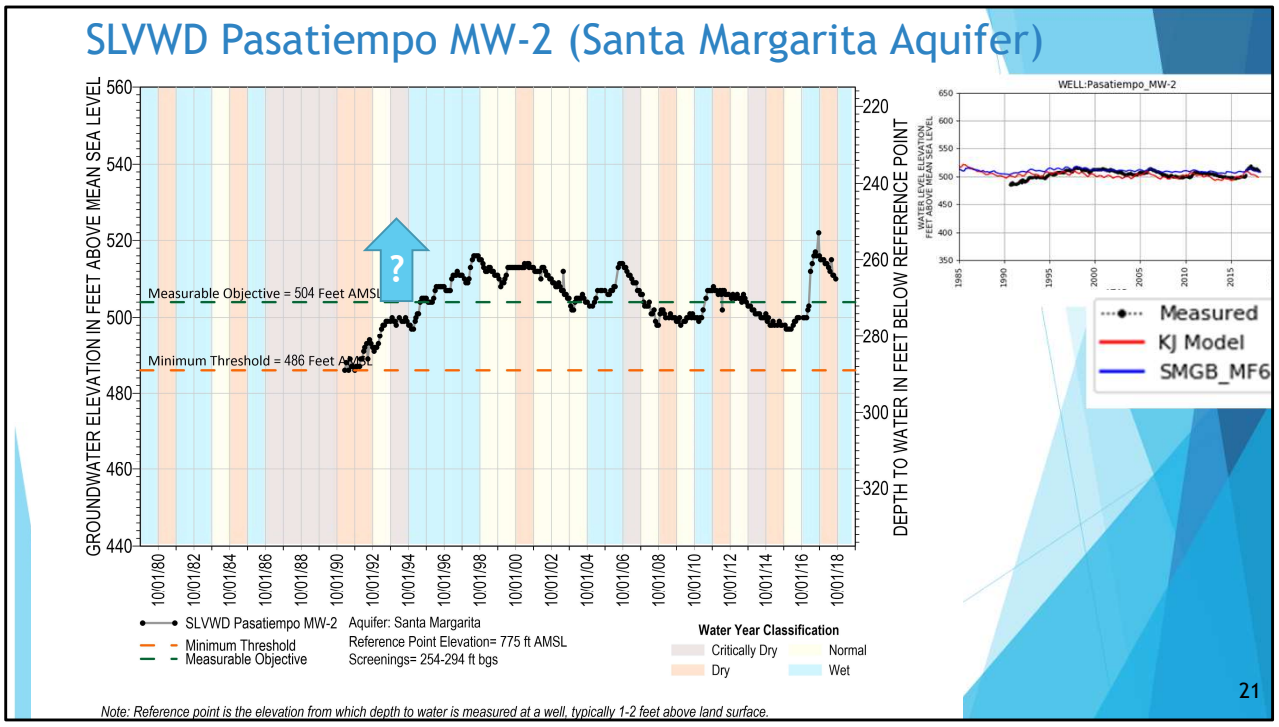


Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

19

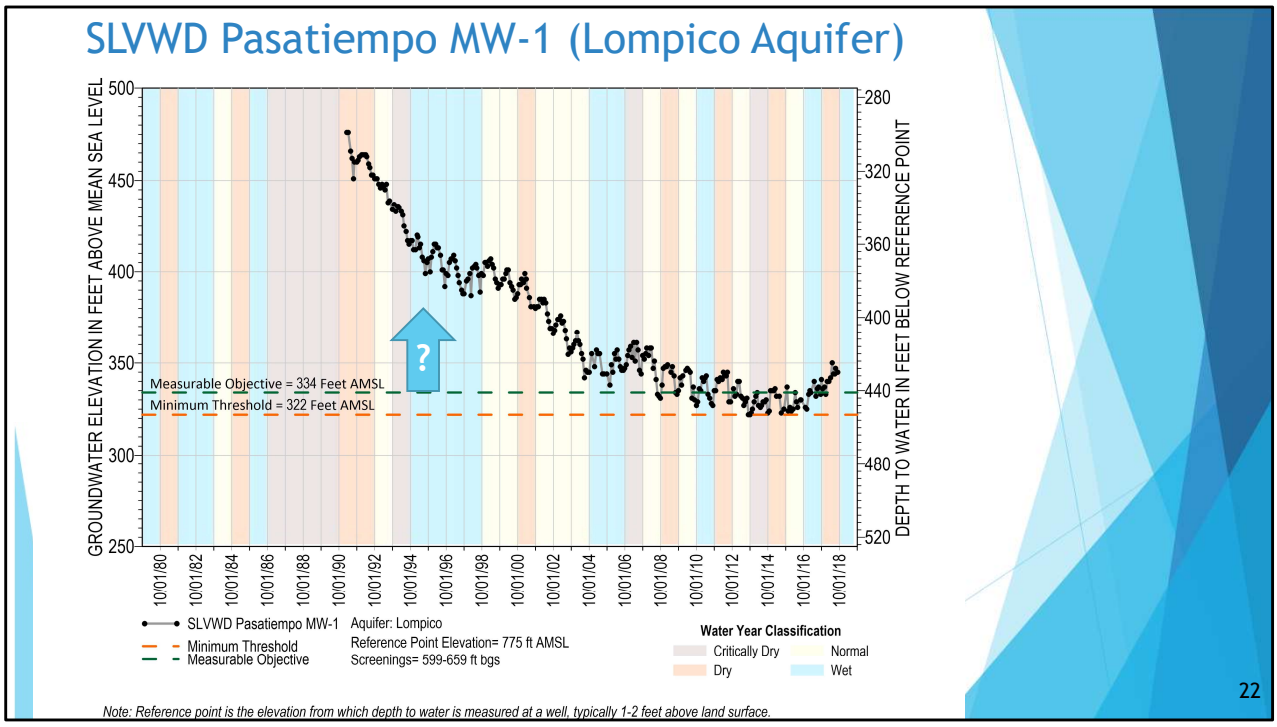


The hydrograph in the top right is at a different vertical scale as the main hydrograph. It shows that the minimum groundwater level in this area corresponds to the synthetic data shown in the main hydrograph and so supports the minimum level to be used as a minimum threshold. Measurable objective is the 10-year average elevation.

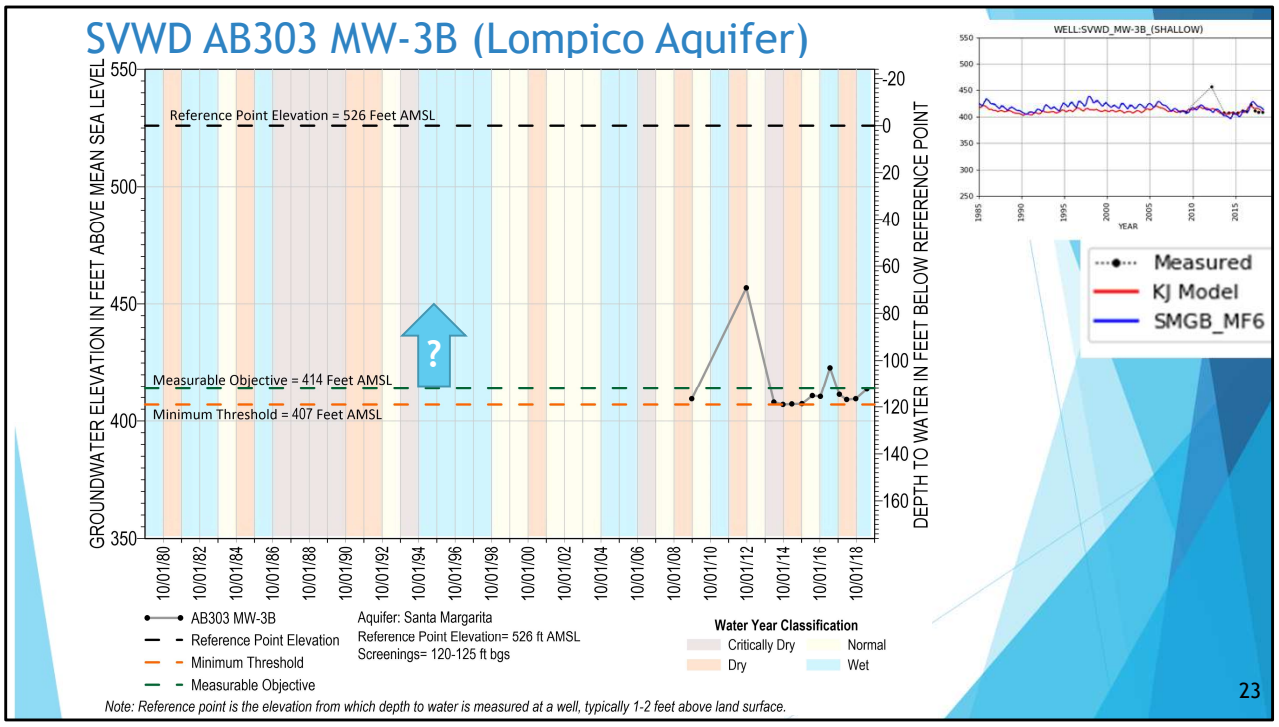


The hydrograph in the top right is at a different vertical scale as the main hydrograph. It shows that the minimum groundwater level in this area is likely captured in the measured data. For wells with more recent starting data and no nearby wells from which to determine synthetic data, the model can be used to estimate historical minimum levels.

This is an area where some recovery of Santa Margarita and Lompico aquifers is needed. Measurable Objective line is average of past 10 years but it may need to be higher. Will need to run the model to make sure recovery in this area is possible given potential projects and management actions and will not flood the quarry.

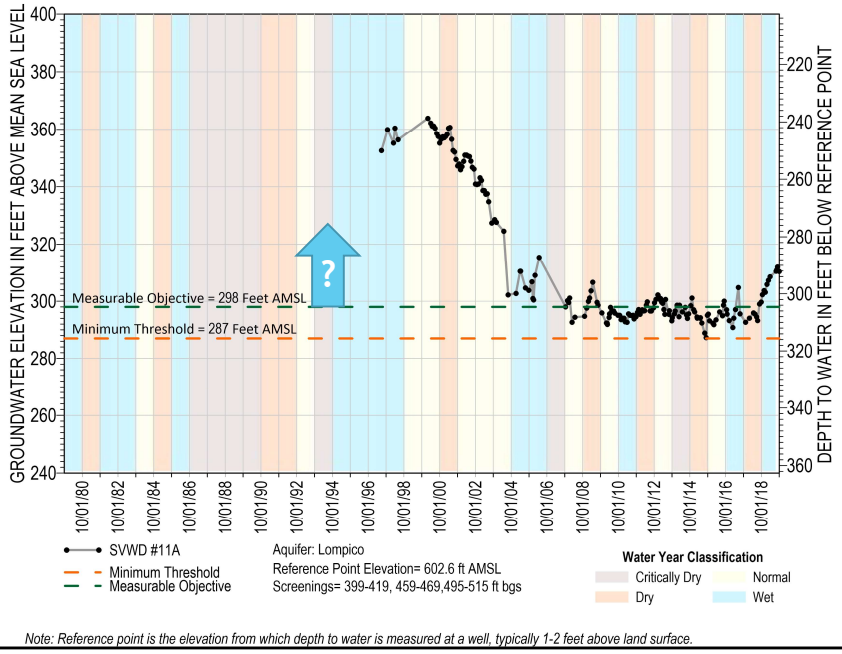


This is an area where some recovery of Santa Margarita and Lompico aquifers is needed. Measurable Objective line is average of past 10 years but needs to be higher. Will need to run the model to determine how much recovery in this area is possible given potential projects and management actions and will not flood the quarry.



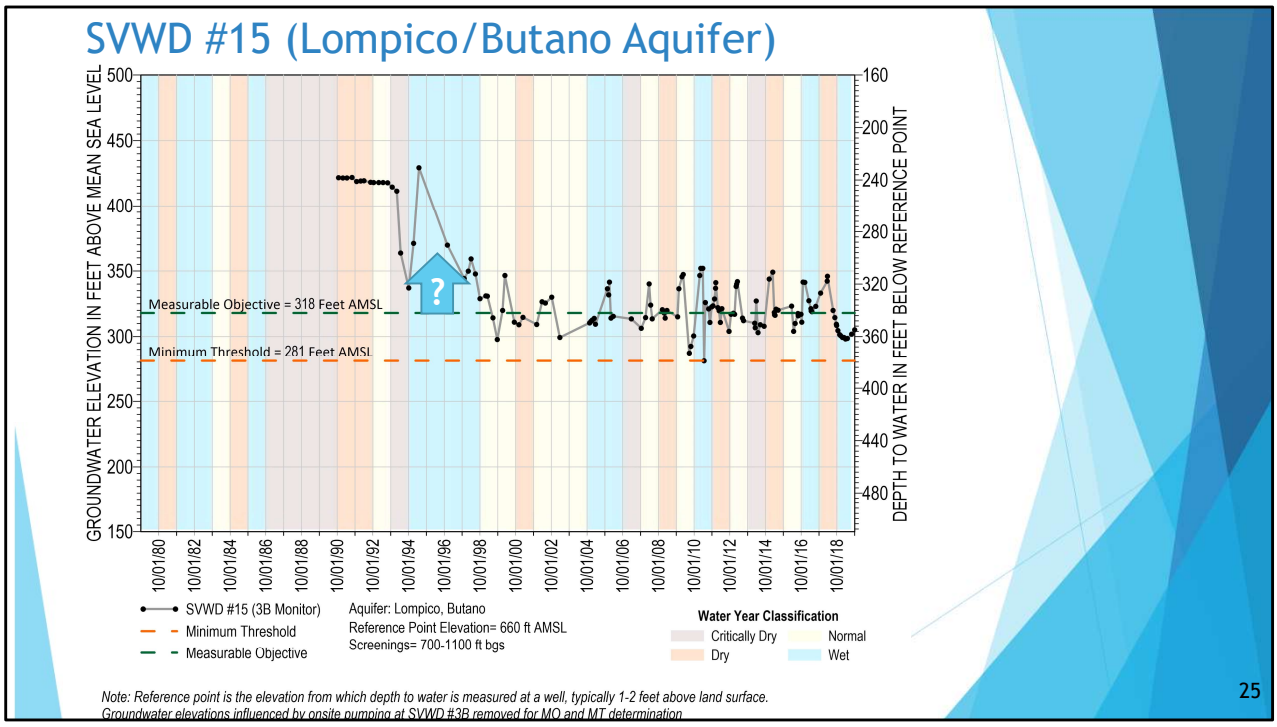
Upper right hydrograph has modeled levels in blue. It shows that the minimum groundwater level in this area is likely captured in the measured data.

SVWD #11A (Lompico Aquifer)



Note: Reference point is the elevation from which depth to water is measured at a well, typically 1-2 feet above land surface.

24



This is not an ideal well to be a RMP because it is screened in two aquifers, however, it is the only monitoring well in the area near municipal pumping wells. This will be replaced with two new monitoring wells, each screened in an individual aquifer (Lompico and Butano)

Proposed Preliminary Minimum Thresholds and Measurable Objectives for Chronic Lowering of Groundwater Levels

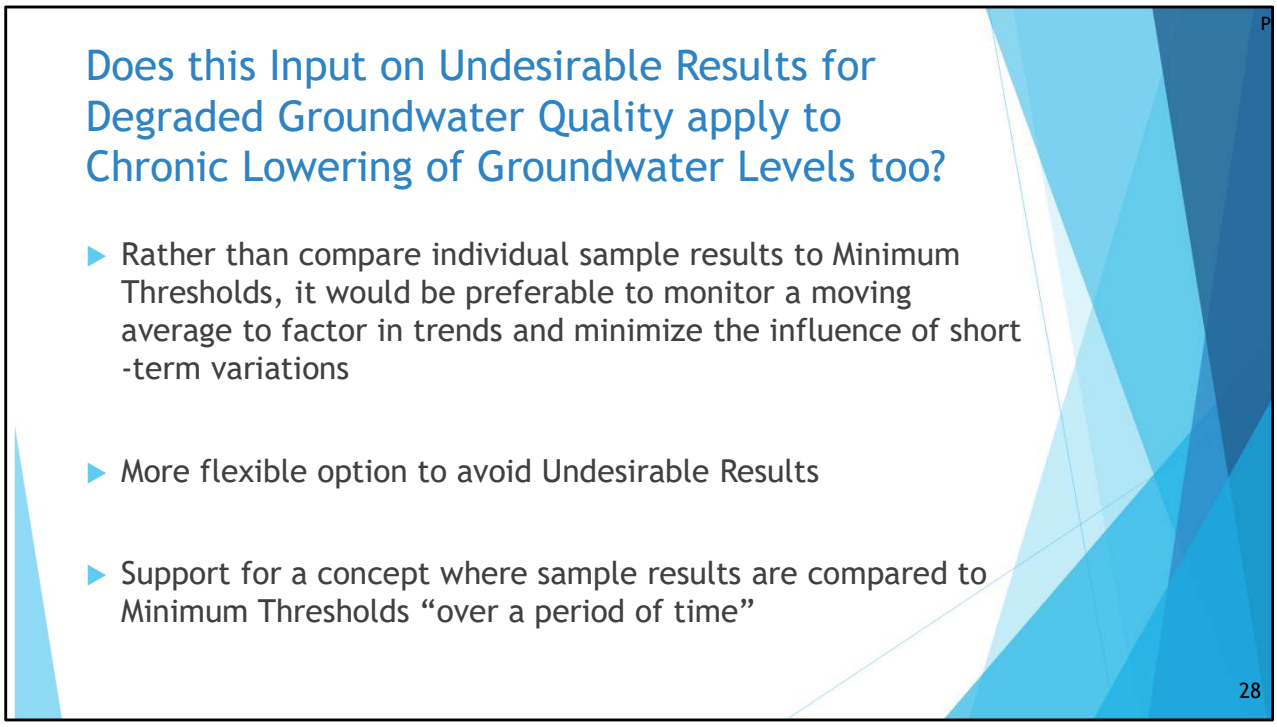
- Final Board Questions/Comments
- Public Comment

- Staff will take Board comments, during this meeting and by email after the meeting, into account and present recommendations at a future Board meeting

Proposed Undesirable Results

Chronic Lowering of Groundwater Levels

27



These are considerations discussed at previous Board meetings or provided in emails after the June Board meeting. These have been used to guide development of the degraded groundwater quality undesirable results.

Thank you for your participation!