

Sustainable Management Criteria

IWVGA TAC Meeting: 09/05/19

Agenda Item 3bii



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Overview

- Sustainable Management Criteria Review
- Approach for Setting Sustainable Management Criteria
- Undesirable Results
- Minimum Thresholds
- Measurable Objectives



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Sustainable Management Criteria Review

- 6 Sustainability Indicators:
 - Reduction of Groundwater Storage
 - Chronic Lowering of Groundwater Levels
 - Seawater Intrusion
 - Degraded Water Quality
 - Land Subsidence
 - Depletion of Interconnected Surface Water



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Sustainable Management Criteria Review

- Sustainable Management Criteria
 - Undesirable Results: Occurs when any of the 6 Sustainability Indicators become “significant and unreasonable”
 - Minimum Thresholds: Quantitative limit where exceedances produce undesirable results
 - Interim Milestones: Quantitative goals set in five-year increments at each representative monitoring site
 - Measurable Objectives: Quantitative goals that reflect the basin’s desired groundwater conditions
 - Sustainability Goal: Qualitative description of how Undesirable Results are avoided and the basin is operated within its sustainable yield



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Approach for Setting Criteria

- Available water in storage is a significant consideration influencing project/management actions and sustainable management criteria
- Things to consider when defining a “significant and unreasonable” loss of storage
 - Groundwater resources are deemed the primary encroachment concern/issue for the NAWS China Lake
 - Costs to mitigate secondary impacts related to loss of storage (shallow wells going dry, relocation of wells due to water quality issues, etc)
 - Beneficial uses
 - Uncertainties
 - General Basin and Model Uncertainties
 - Future Expansion of Navy Mission (potential major conflict)
 - Climate Change Impacts
 - Imported Water Availability and Timeline (Model Runs currently assume Imported Water is available in year 2035)
 - Impacts to Groundwater Dependent Ecosystems



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Undesirable Results

- Reduction of Groundwater Storage
 - Criteria to establish when undesirable results occur:
 - Depletion of reserve of useable groundwater
 - Amount of shallow wells predicted to go dry
 - Potential Impacts: Encroachment on mission of China Lake NAWS, shallow wells go dry, reduction of buffer to loss of production from deeper wells.
- Chronic Lowering of Groundwater Levels
 - Criteria to establish when undesirable results occur:
 - Amount of shallow wells predicted to go dry.
 - Potential Impacts: Shallow wells need to be deepened or replaced, or the user (domestic well owner) would need to be connected to a water system/co-op/mutual system.



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Undesirable Results

- **Degraded Water Quality**
 - Criteria to establish when undesirable results occur:
 - Beneficial uses are jeopardized
 - Potential Impacts: Water user would need to be connected to a well from another area.
- **Land Subsidence**
 - Criteria to establish when undesirable results occur:
 - Water levels reach clay layers
 - Potential Impact: Sensitive facilities at China Lake NAWS would need to be replaced or repaired, damage to infrastructure.
- **Depletion of Interconnected Surface Water: still under evaluation**



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Minimum Thresholds

- **Reduction of Groundwater Storage**
 - Information/Criteria Used: Results of all modeling runs and analysis of shallow well impacts.
 - Method of Measurement: Change of Groundwater in storage (Thiessen polygon method)
 - Basin will be subdivided into discrete polygons drawn to represent the area closest to each measurement point (monitoring well)
 - Change in groundwater calculated based on bulk hydrogeologic parameters and measured groundwater levels for each polygon
- **Chronic Lowering of Groundwater Levels**
 - Information/Criteria Used: Results from Modeling Scenarios 6 and Shallow Well Impact Analysis.
 - Method of Measurement: Groundwater Levels



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Minimum Thresholds

- **Degraded Water Quality**
 - Information/Criteria Used: Results of Modeling Run 6 (transport results not available yet)
 - Method of Measurement: TDS concentrations
- **Land Subsidence:**
 - Information/Criteria Used: DRI analysis of existing data. Analysis of lithology and predicted water levels at key wells.
 - Method of Measurements: Groundwater levels as a proxy
- **Depletion of Interconnected Surface Water:** still under evaluation



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Undesirable Results and Proposed Project/Management Actions

Sustainability Indicator	Historical/Current Undesirable Results	Future Undesirable Results without GSP Implementation (Baseline)	Proposed Projects/Management Actions
Chronic Lowering of Groundwater Levels	Yes	Yes	Imported Water Recycled Water Water Conservation Pumping Limitations Pumping Optimization Shallow Well Mitigation Potential: Brackish Water Project
Reduction of Groundwater Storage	Yes	Yes	Imported Water Recycled Water Water Conservation Pumping Limitations Pumping Optimization Shallow Well Mitigation Potential: Brackish Water Project
Seawater Intrusion	Not Applicable	Not Applicable	Not Applicable
Degraded Water Quality	Yes	Yes	GWL/Storage projects
Land Subsidence	No	Yes	GWL/Storage projects
Depletion of Interconnected Surface Water	No	Undetermined	GWL/Storage projects



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Sustainable Management Criteria Approach Summary

Sustainability Indicator	Significant/Unreasonable Undesirable Results	Minimum Threshold Draft Approach	Measurable Objective Draft Approach
Chronic Lowering of Groundwater Levels	Current production wells are impacted beyond acceptable value that can be reasonably mitigated (based on shallow well impacts).	Minimum of Model Scenario 6.2 Predictive Water Levels	Model Scenario 6.2 Predictive Water Levels at 2040 (or 2070 if continued declines)
Reduction of Groundwater Storage	Depletion of reserve of useable groundwater. Current production wells are impacted beyond acceptable value that can be reasonably mitigated (based on shallow well impacts).	Model Scenario 6.2 Cumulative Loss of Storage at 2070	Model Scenario 6.2 Cumulative Loss of Storage at 2070 (same as minimum threshold)
Seawater Intrusion	Not Applicable	Not Applicable	Not Applicable
Degraded Water Quality	Current beneficial uses of water are jeopardized	Baseline and Scenario 6.2 Transport results and percent change evaluation (still under evaluation)	Baseline and Scenario 6.2 Transport results and percent change evaluation (still under evaluation)
Land Subsidence	Current facilities and/or infrastructure are impacted.	Groundwater levels as a proxy set at level for Chronic Lowering of Groundwater Levels (still under evaluation)	Groundwater levels as a proxy set at level for Chronic Lowering of Groundwater Levels (still under evaluation)
Depletion of Interconnected Surface Water	Still under evaluation	Still under evaluation	Still under evaluation

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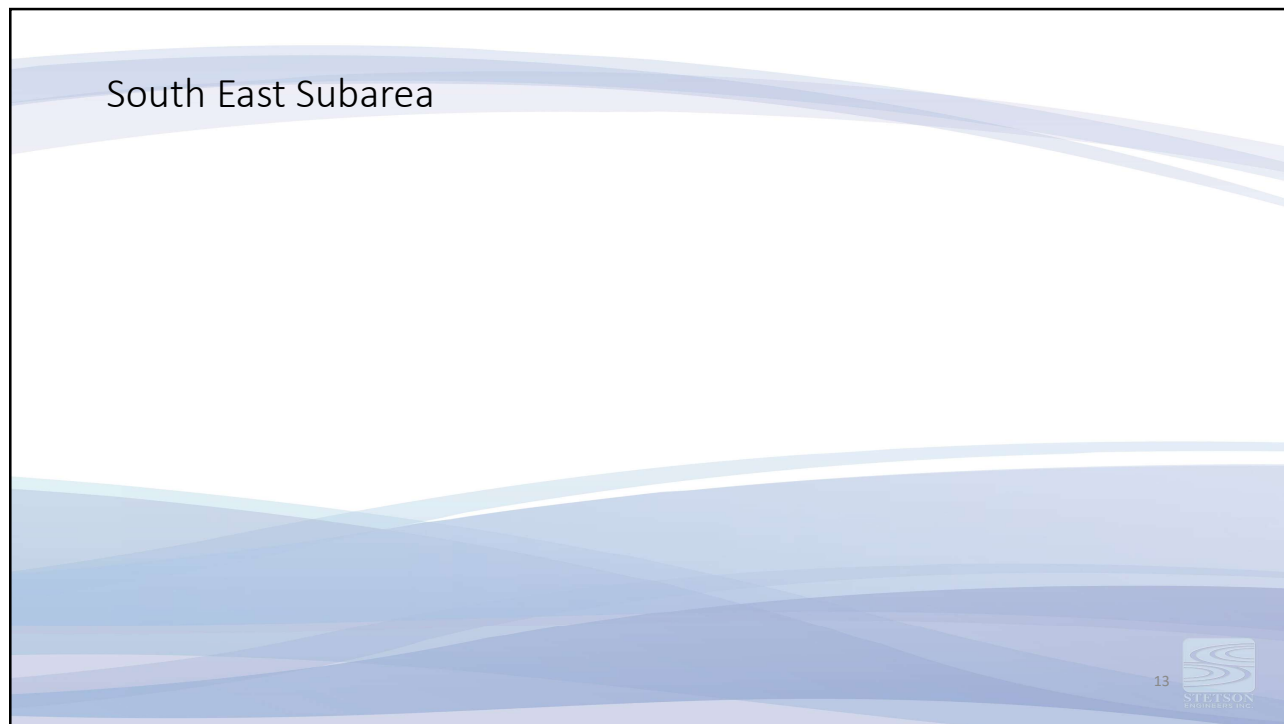
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Proposed Monitoring Network Groundwater Level Key Wells

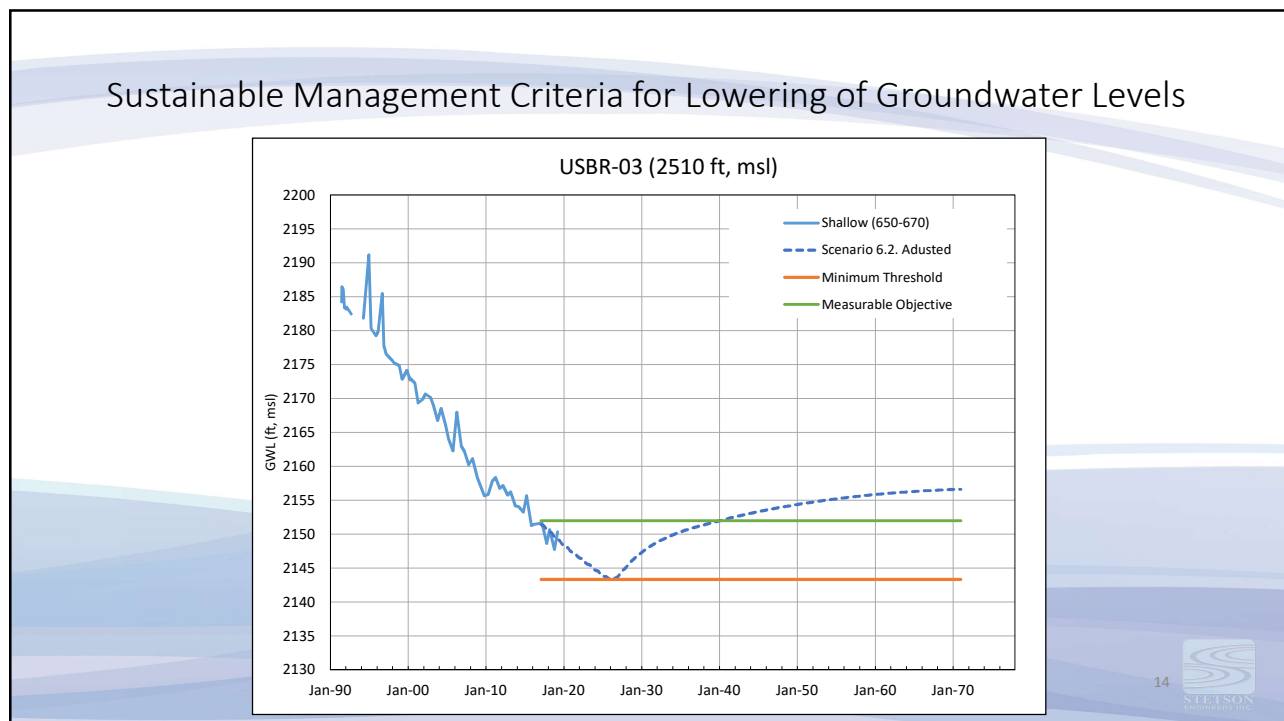
- Location of wells currently considered to be key wells for setting sustainable management criteria for groundwater levels
- “Key Wells” will be re-evaluated during GSP updates
- Different subsets of monitoring network may be used as “key wells” for other indicators
- All wells will continue to be monitored



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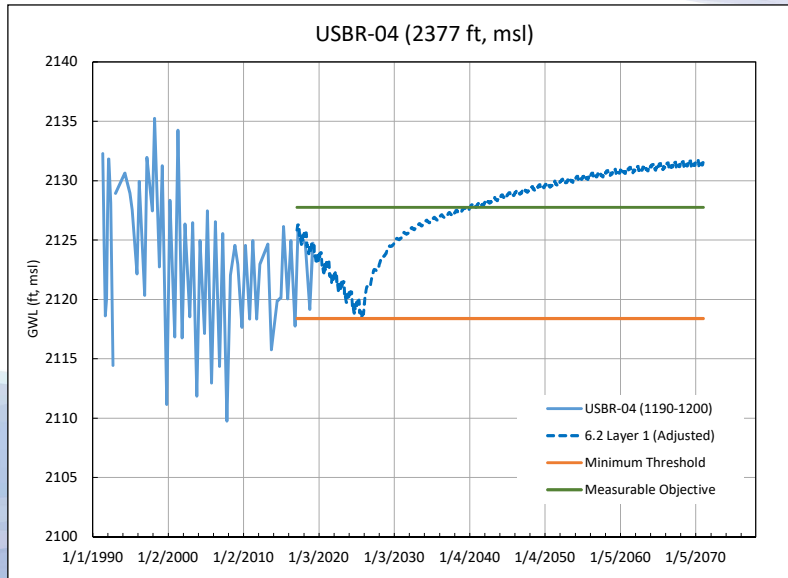


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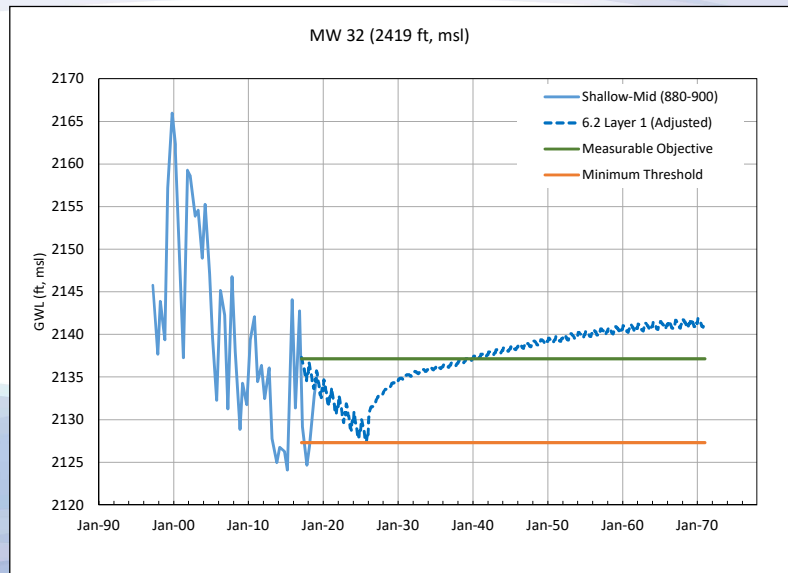
Sustainable Management Criteria for Lowering of Groundwater Levels



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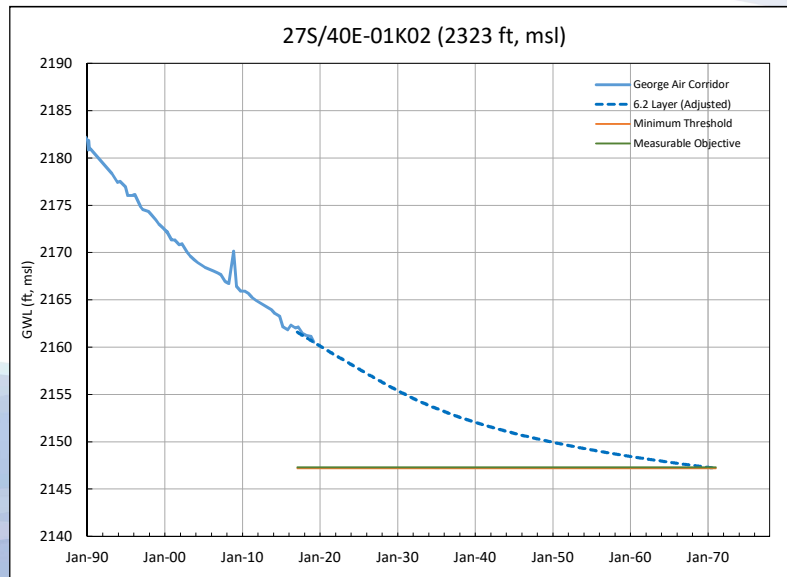
Sustainable Management Criteria for Lowering of Groundwater Levels



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Sustainable Management Criteria for Lowering of Groundwater Levels



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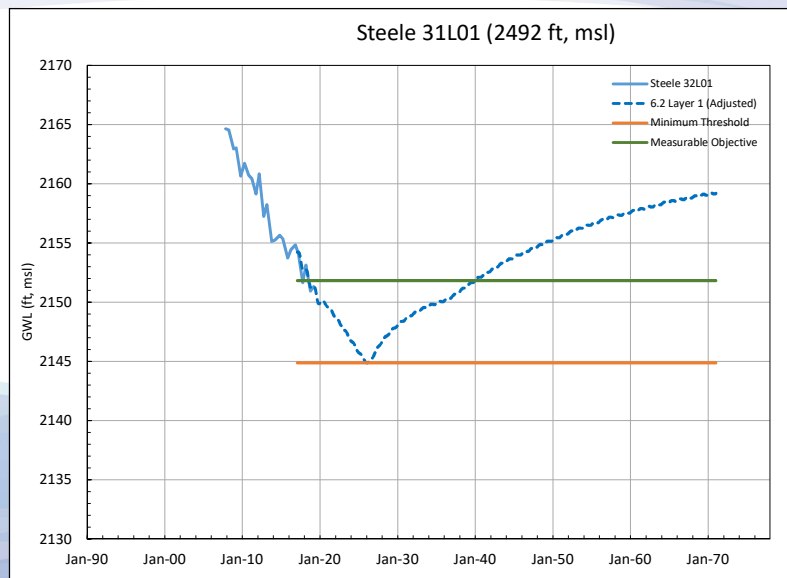


South West Subarea

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Sustainable Management Criteria for Lowering of Groundwater Levels



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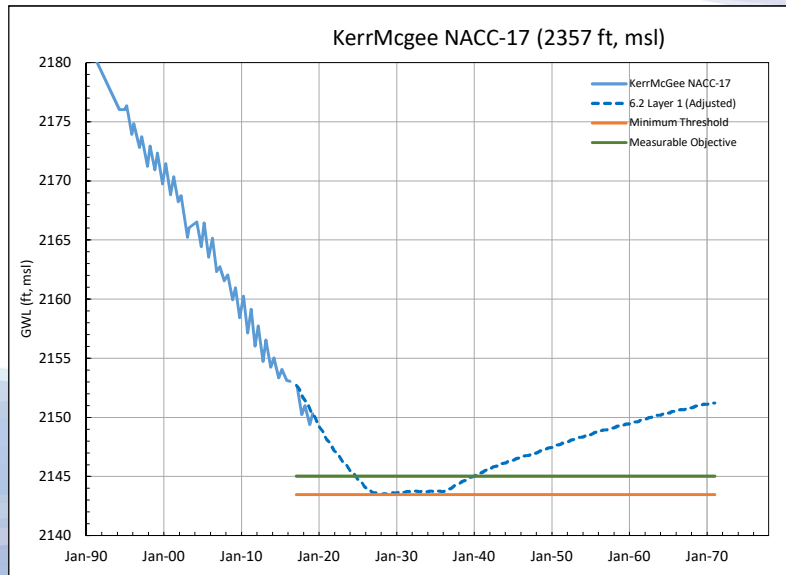


North West Subarea

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Sustainable Management Criteria for Lowering of Groundwater Levels

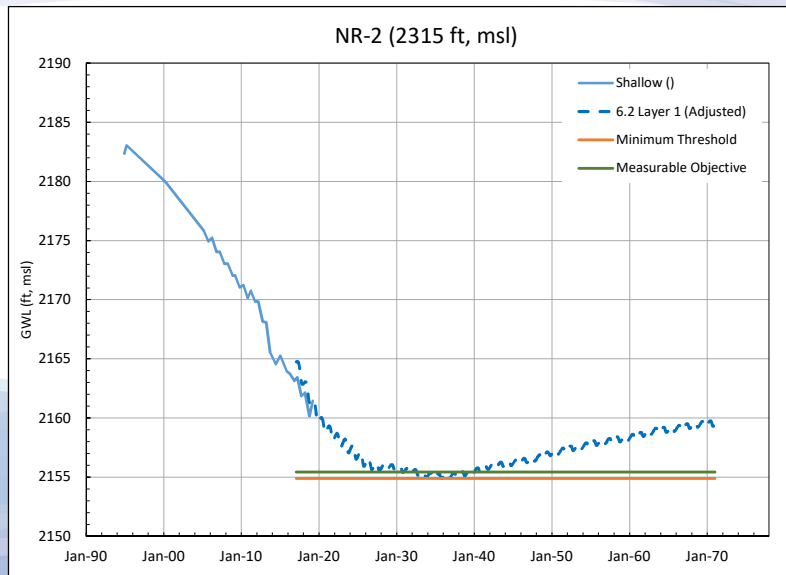


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Sustainable Management Criteria for Lowering of Groundwater Levels

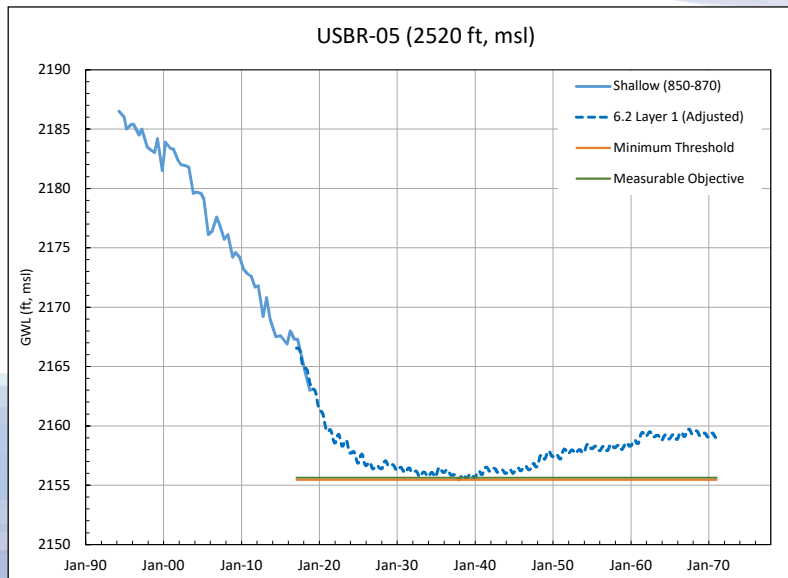


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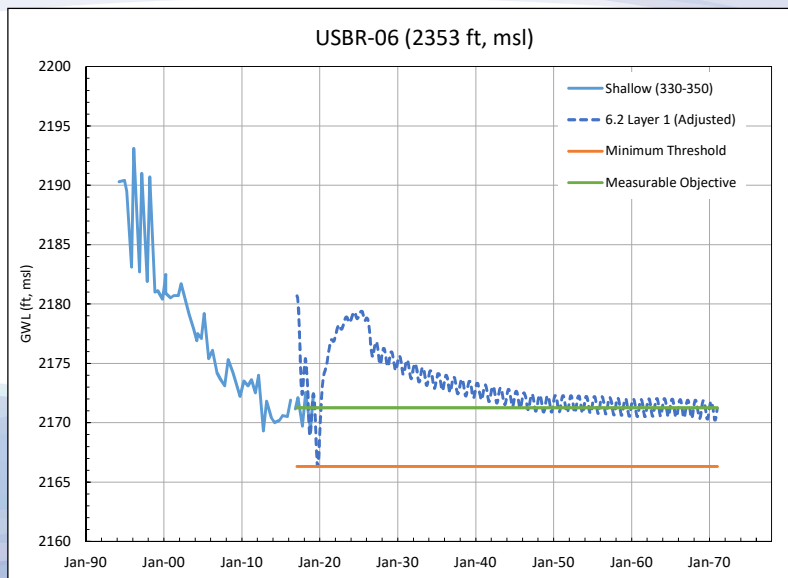
Sustainable Management Criteria for Lowering of Groundwater Levels



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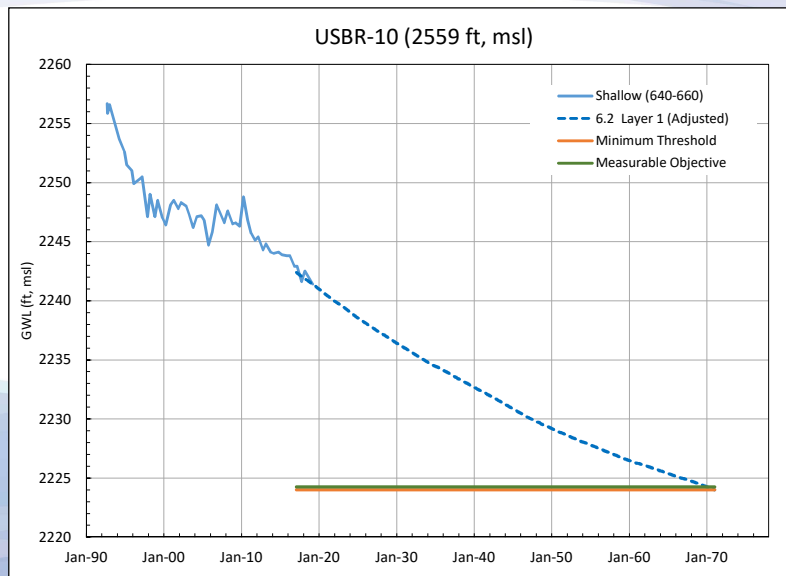
Sustainable Management Criteria for Lowering of Groundwater Levels



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Sustainable Management Criteria for Lowering of Groundwater Levels



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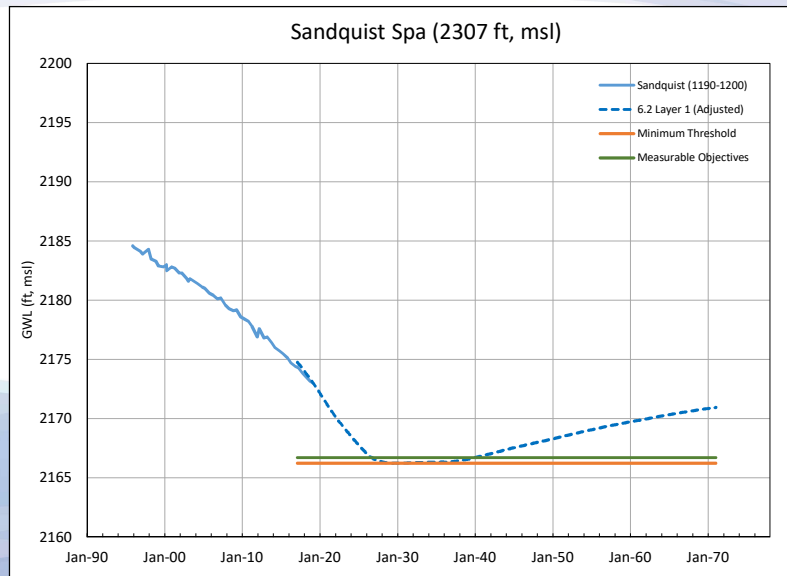
Navy Subarea

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Sustainable Management Criteria for Lowering of Groundwater Levels



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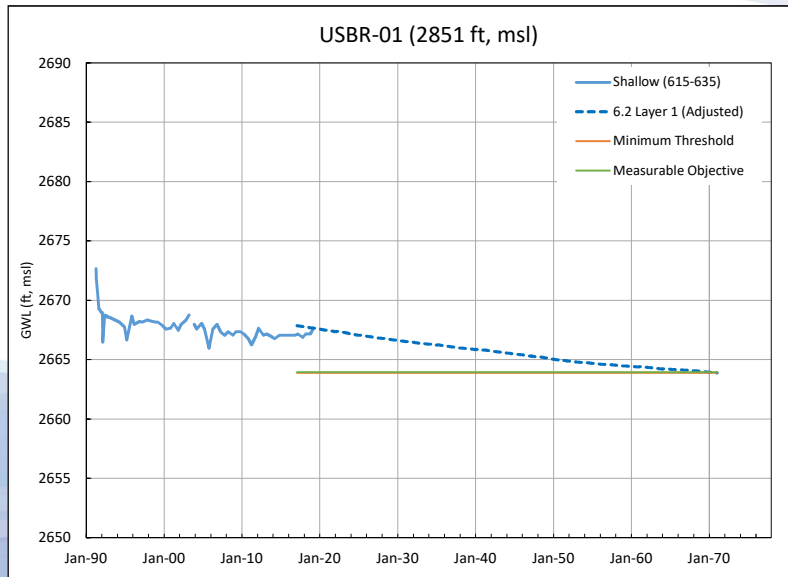


El Paso Subarea

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Sustainable Management Criteria for Lowering of Groundwater Levels

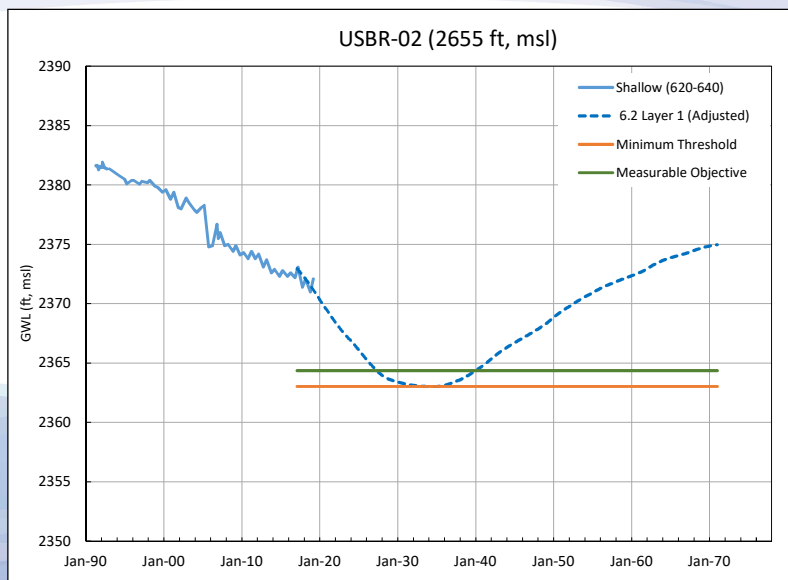


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Sustainable Management Criteria for Lowering of Groundwater Levels

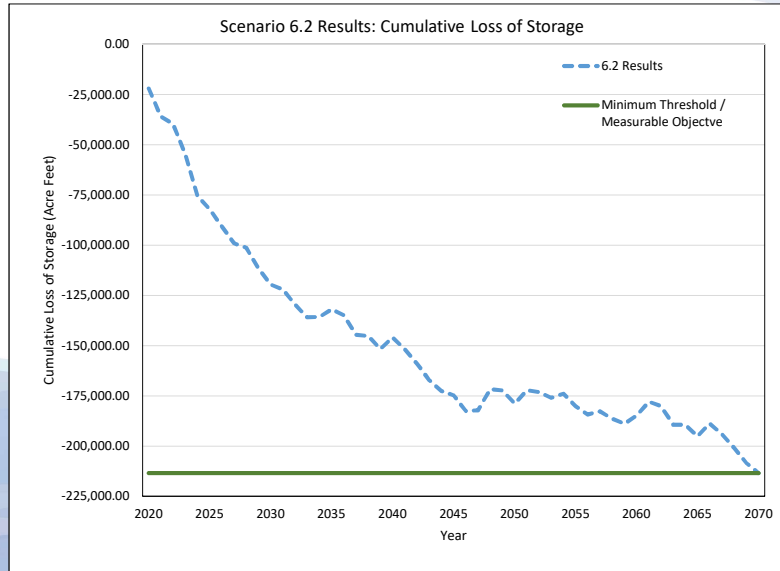


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Sustainable Management Criteria for Reduction of Storage



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Discussion

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