

Exploring and Optimizing Management Scenarios



Harney GW RAC Discussion Groups – 11.18.24

Five Model Scenarios

- OWRD presented initial results from 5 different model scenarios (see PPT):
 - **A.** 15 sub areas with curtailment in 6 subareas and no curtailment in 9 subareas
 - **B.** 6 subareas with modest reductions phased in over 30 years in 3 subareas
 - **C.** 6 subareas with more significant reductions phased in over 30 years in 5 subareas
 - **D.** 6 subareas with more significant reductions phased in over 10 years
 - **E.** 1 subarea with regulation by priority back to 1990

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How was the meeting? What came up for you?

- Good meeting - seeing the results of the scenarios that there is a light at the end of the tunnel - now its a matter of how to get there and to keep the community viable while we do that
- A lot of information that took awhile to process through - it took me until the next day
- Hydrographs for different subareas - each subarea covers a big distance - selected one well, is that representative? how to put this into context
 - Water level statistics vs hydrographs - how to look at the different representations of results/outputs

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How was the meeting? What came up for you?

- 6 subarea vs 15 - there wasn't a big delta between subareas - 6 subareas may be more in line with prior appropriation
- Silver Creek and Donner Und Blitzen - optimized approach of 30-31% is more than expected - what would the Department's plan be? magnitude of decline is 0.2 -0.5 - seems like a steep cut
- when looking at thresholds for success (50% vs 80% of wells) - strong preference for 50% - other thresholds are too much/too aggressive
- Agree with observations/points above
- Need to take into account rate of decline in management areas - if rate of decline is minimal it doesn't need as much reduction if any

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How was the meeting? What came up for you?

- A lot to take in - pretty hard to keep on top of the amount of information being shared
- Good to figure out depths of gw when “reasonably stable” ++ lots of interest in this and don't have a good graspp
- Phase in reductions - preference for slowly phasing in so we don't over-cut
- Overwhelmed with the amount of information - additional paper materials to soak it in a little better - ability to take it in at my own pace - still processing

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How was the meeting? What came up for you?

- Meeting went well - got what I needed and appreciative of input
- Props to Darrick, Ben, and Tim - lots of effort put into sharing the results - did a good job explaining a complex topic
- Breakfast burritos were great
- Recognize that we had a lot of complex material - new concepts and new figures being introduced - might have been overwhelming at times - hope it communicated the high points - please review meeting materials
- We're generating a lot of information - hopefully that generates good questions and conversations rather than overwhelm into silence
- Appreciate all of the work that Darrick, Ben, and Tim put into prep
- Great questions from the RAC - lot of things were clicking with people
- Long meetings are tough - appreciate everyone's time

Other Example Management Scenarios

- USGS model report looked at two scenarios (both hypothetical):
 - Continue 2018 pumping until 2100 (status quo).
 - All groundwater pumping ceases after 2018 until 2100 (no groundwater pumping).
- TNC explored different levels reductions (10%, 40%, 65%) to see how it played out in different areas of the basin – for learning purposes only
- OSU explored 15 different scenarios along with economic impact
 - <https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2023WR036972>

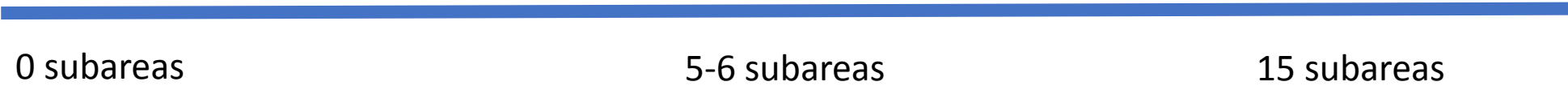
The “dials” for Scenarios

Variable

Definition of success



Management areas



Vol. of pumping reductions



Start date and phasing of reductions



Timeline to achieve success



Optimization

Output - what is the maximum amount of water that can be pumped (e.g., maximum permissible total withdrawal)?

Definition of success: Zero decline (0 ft/yr of decline) optimized for three different thresholds (50% of wells, 80% of wells, 90% of wells)

Management areas: Optimized for 1, 6, and 15

Volume of pumping reductions: This is what the model is being used to answer

Start date and phasing of reductions: Reductions phased in over 10 years (2030-2039)

Timeline to achieve success: 30 years after reductions begin (2060)

What dials do you want to adjust? What is the most sensitive dial?

Optimization

Comparison of Scenario A with optimization for 15 subarea approach

Subarea	Scenario A	Optimized	Difference
Crane	60%	66%	5%
Crane - Buchanan	0%	10%	10%
Dog Mountain	24%	47%	23%
Harney Lake	1%	20%	19%
Lawen	60%	63%	3%
Lower Blitzen - Voltage	1%	36%	35%
Malheur Lake	0%	0%	0%
North Harney	64%	66%	2%
Poison - Rattlesnake	0%	6%	6%
Rock Creek	43%	49%	6%
Silvies	0%	6%	7%
Upper Blitzen	0%	0%	0%
Upper Silver Creek	0%	31%	31%
Weaver Springs	74%	35%	-38%
Windy Point	0%	14%	14%
All	20%	28%	8%

Optimization

Comparison of Scenarios B-D with optimization for 6 subarea approach

Subarea	B	C	D	Optimized
Crane - Buchanan	30%	45%	40%	34%
Dog Mountain	54%	75%	65%	38%
Lower Blitzen - Voltage	0%	9%	5%	31%
Silver Creek	9%	24%	18%	31%
Silvies	0%	9%	5%	5%
Upper Blitzen	0%	0%	0%	0%
All	22%	37%	31%	29%

Observations from Model Scenarios

What was consistent with your expectations? What was different? What information were you expecting or hoping for?

- What is the resultant groundwater level when stable (0ft/yr decline) is reached
- Wasn't quite sure what to expect
- Would like to know reductions in acres irrigated - what comes out of production - would like to hear from irrigators about what is "survivable"
 - Put this into the context of prior appropriation
 - Who will be put out of business? Juniors will be curtailed under prior appropriation
 - Would be good to know where most junior rights are located - concentrated in certain subareas? What year would be the most senior user allowed to use water under each scenario/each subarea?
 - Farmers have a mix of senior and junior water rights - depends on each individual user - how could we understand this for individual producers...might be difficult to understand
 - So many factors to consider - not linear - cascading effects (e.g., break even, debt load) - some might not even be able to survive 15% reductions
- There is significant variability in profitability - may only have a good year every 13 years and break even half of them...how will this play out for irrigators?
- Economic impacts

Observations from Model Scenarios

What was consistent with your expectations? What was different? What information were you expecting or hoping for?

- What is % reduction of? Is it from 2018 levels? Reduction from 2018 pumping levels.
 - Water will be allocated based on historical beneficial use - if you've only been historically irrigating a portion of your right then that is what would be allocated.
 - Use maximum amount that has been used vs median of past few years - how to account for drought/dry years
 - What does this look like in practice/what does implementation of this look like?
 - Need to better understand authority to curtail to 2018 use
 - Devil is in the details - final method for calculating
 - When you start going through prior appropriation, will the most senior right be given 3 af/acre or a different amount...
 - Calculated based on acres irrigated vs. amount of water applied/used? Need for clarity.

Observations from Model Scenarios

What was consistent with your expectations? What was different? What information were you expecting or hoping for?

- What is the carrying capacity of the region? The carrying capacity of the region is nowhere near the volume being pumped.
- Responsibility of the Department is to understand carrying capacity and then ease the region into conformance with that.
- Can OR look to NV supreme court about spreading out reductions across seniors and juniors
- Strident critiques of prior appropriation - arbitrariness and inequity of seniority - encourage everyone to “pitch in” to the end result rather than a strict interpretation of winners and losers
- Profit margins are thin...if you have to dial back 30% then you’ll likely just go out of business. If there is a more broadly shared effort to reduce water use, may maximize ability to ability for folks to stay in business.

Observations from Model Scenarios

What was consistent with your expectations? What was different?
What information were you expecting or hoping for?

- Optimized results from Donner Und Blitzen and Silver were higher than expected
- Under 537.742 - can specify reductions/permissible withdrawals for specific wells or appropriators
- Is the Department talking to the AG? The Department is doing its due diligence
- when looking at thresholds for success (50% vs 80% of wells) - strong preference for 50% - other thresholds are too much/too aggressive

RAC Requests (some of what we heard)

- Examine different impacts of each scenario
 - What are the estimated impacts to springs/surface water discharge?
 - What are the estimated impacts to exempt wells?
 - What are the estimated reductions in irrigated acres?
 - Other impacts to examine?
- Examine different scenarios for each subarea
 - What happens in each subarea under each scenario?
 - What are the impacts in each subarea under each scenario?
- Better understand connectivity between subareas
 - How do reductions in one area affect what occurs or needs to occur in another area? What is the sensitivity between subareas?

RAC Requests (some of what we heard)

- Clarify starting point for all scenarios
- Include priority date that would be regulated back to for each subarea in each scenario
- Discuss what is known about relationship between groundwater levels and spring discharge
- What is water use in 2023? How have things changed in the previous 5 years?
- When the water stabilizes, what is the new groundwater level for each scenario in each subarea?

Results for X Subarea (repeat for each subarea)

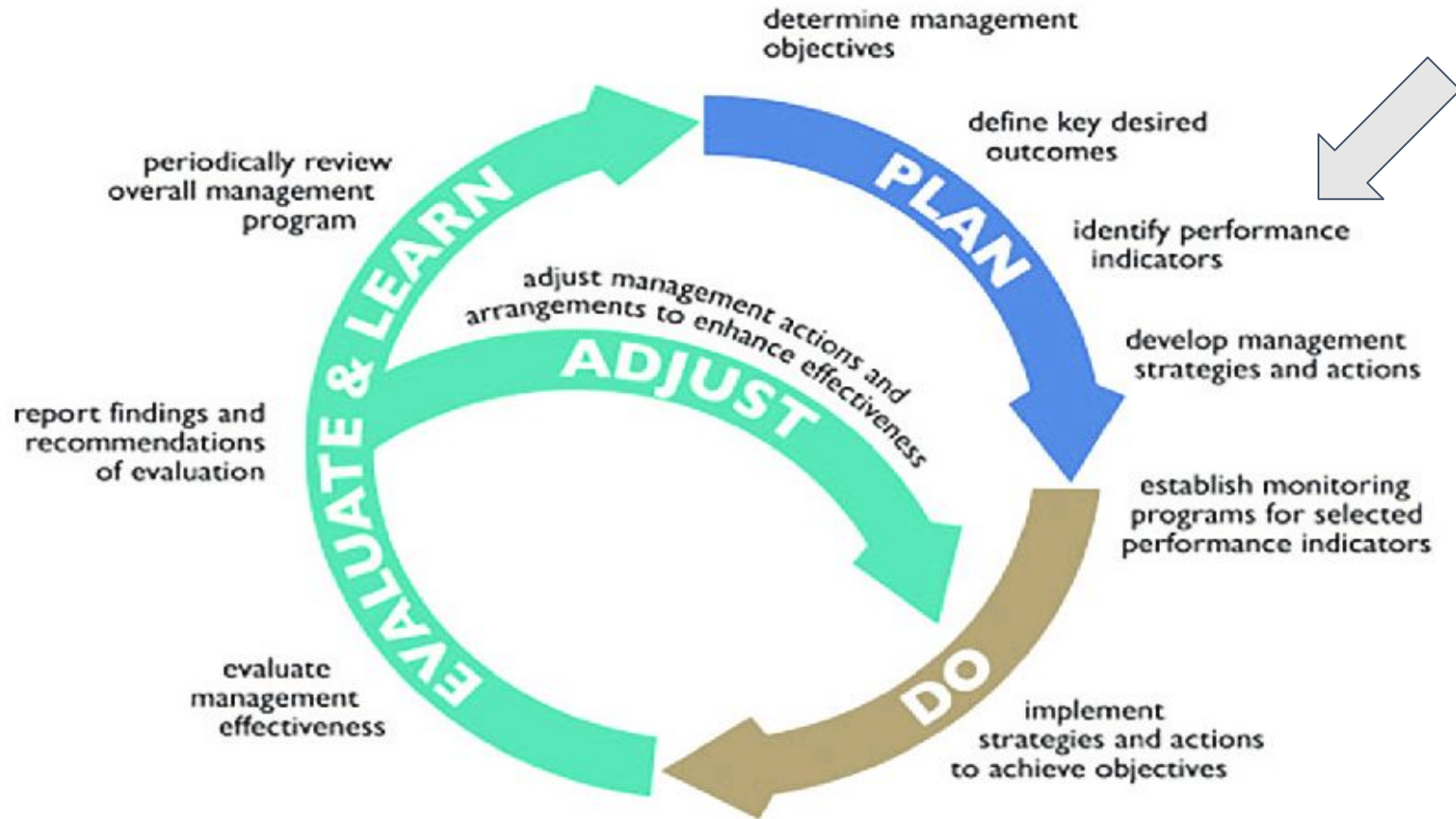
Scenario/ Result	A	B	C	D	E
Allowable Use (amount [af/yr]) and Reductions in use (from 2018 levels/permitted amounts)	0%				
Priority Date for Regulation (from 2018 levels or certificated amount)					
Stability or Recovery Achieved and Timing (year achieved)					
Overall Change in GW Level - Magnitude (once stable is reached)					
Number of Exempt Wells Impacted (wells unable to access water at new stable depth without deepening)					
Change in Natural					

Future Discussion Group Topics

- Deeper dive on management scenarios
- Economic impact
- Adaptive management
- Mapping out considerations for voluntary/regulatory approaches to achieve success

Adaptive Management - Overview

The adaptive management cycle



Adaptive management in the context of:

- Rules
- Contested Case
- Voluntary Agreements
- Groundwater management more generally