

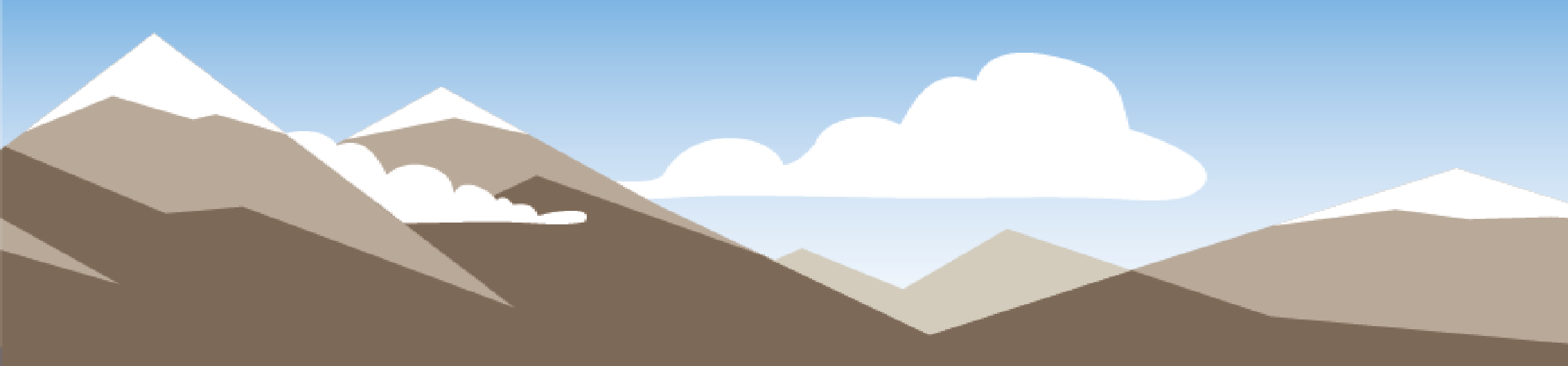


# Division 512 Rulemaking: Ground Water Regulation for the Malheur Lake Administrative Basin

Oregon Water Resources Department

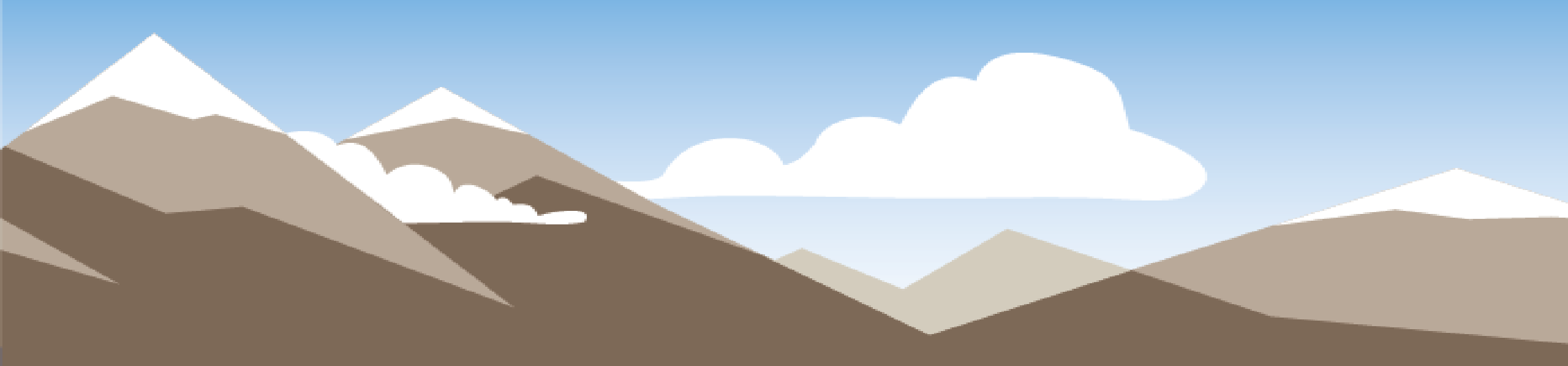
Rules Advisory Committee Meeting

November 29, 2023



# Welcome and Introductions





# Agenda Review & Meeting Guidelines



## Goal of Today's Meeting

- Build a shared understanding on the proposed subareas
- Explain data and analysis used for determining groundwater level trends
- Discuss the subarea rankings
- Discuss the goals for curtailment and the process for setting the PTW

# Meeting Agenda

|                    |                                  |
|--------------------|----------------------------------|
| <b>1:00 - 1:20</b> | <b>Welcome and Introductions</b> |
| <b>1:20 – 1:30</b> | <b>GIS Map Review</b>            |
| <b>1:30 – 2:10</b> | <b>Subarea Discussion</b>        |
| <b>2:10 – 2:20</b> | <b>Break</b>                     |
| <b>2:20 – 3:00</b> | <b>Data Discussion</b>           |
| <b>3:00 – 3:30</b> | <b>Subarea Rankings</b>          |
| <b>3:30 – 4:30</b> | <b>Goals for Curtailment</b>     |
| <b>4:30 – 5:00</b> | <b>Public Comment</b>            |

# Ground Rules

- You are here to express your viewpoint.
- Treat others respectfully.
- If online, remain muted when not speaking.
- If online, use “raise hand” feature to indicate that you would like to speak.
- If in-person, raise hand to indicate that you would like to speak.
- RAC only participates in RAC meeting and Public only participates in comment period.

# RAC Operating Guidelines

## **RAC Role**

- Attend and participate in meetings at the horseshoe or online.
- Provide input/advice and help the Department consider various perspectives.

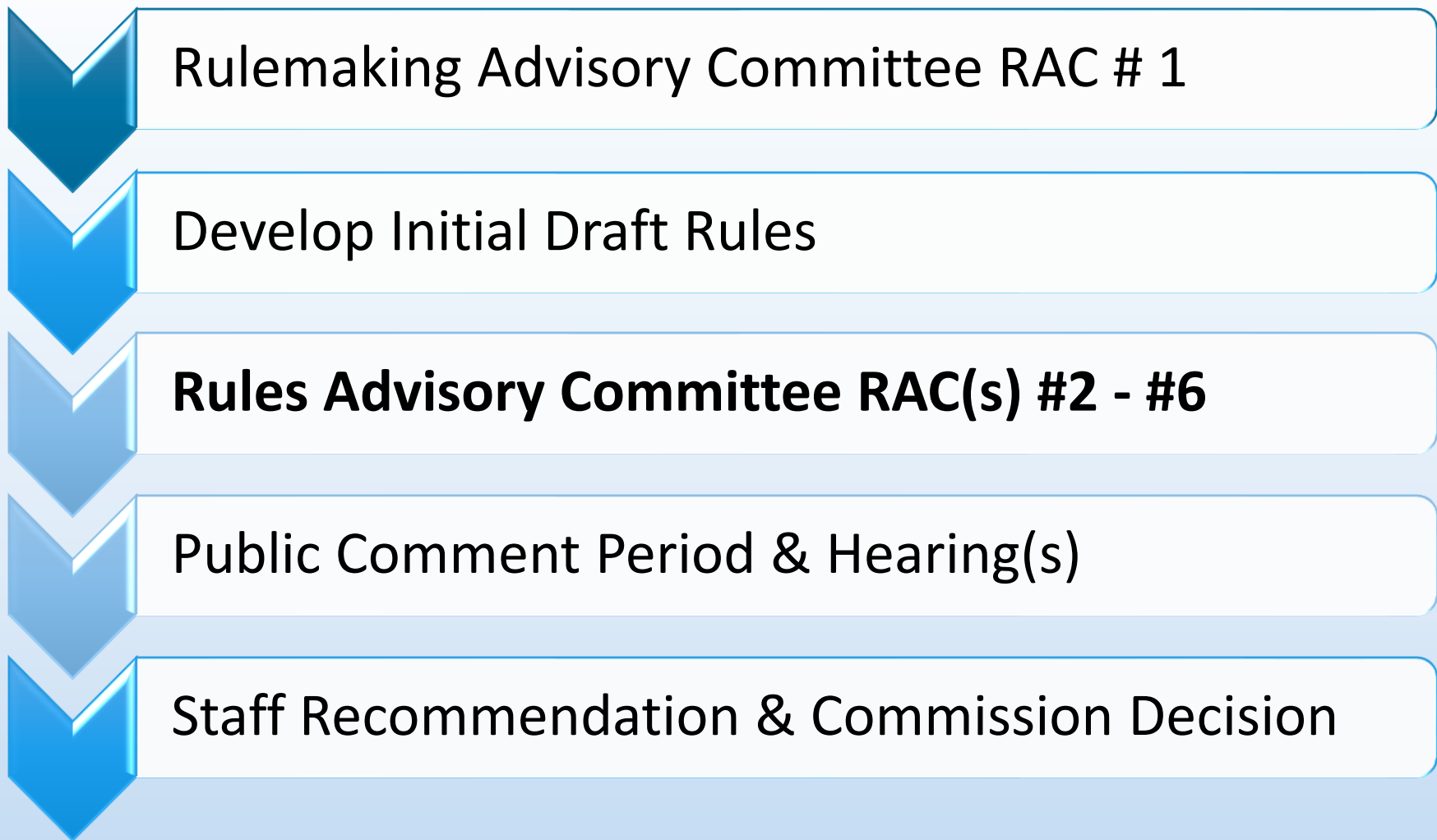
## **Public Role**

- Listen only during the presentations and RAC discussions from the audience or online.
- Provide input/advice during the designated comment time.

## **Department Role**

- Facilitate meetings.
- Foster collaboration.
- Consider RAC and public feedback.
- Draft final rules.

# Overview of Rulemaking Process For Division 512





# Rulemaking Timeline

**April 25, 2023**

RAC Number  
1

**April 2024 –  
June 2024**

Public  
Comment

**September  
2024**

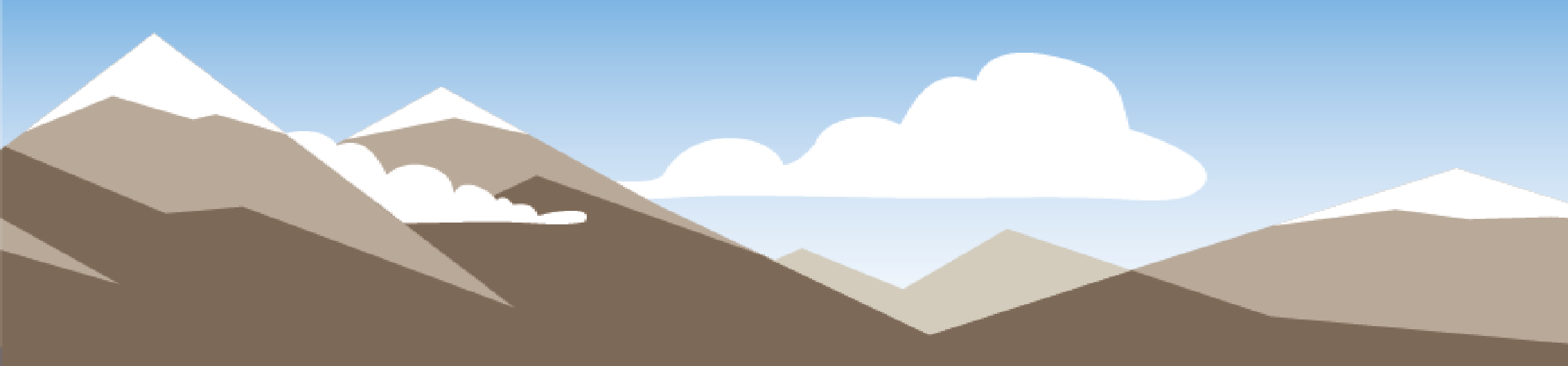
WRC  
Adoption

**August 2023  
– February  
2024**

RAC Number  
2– 6

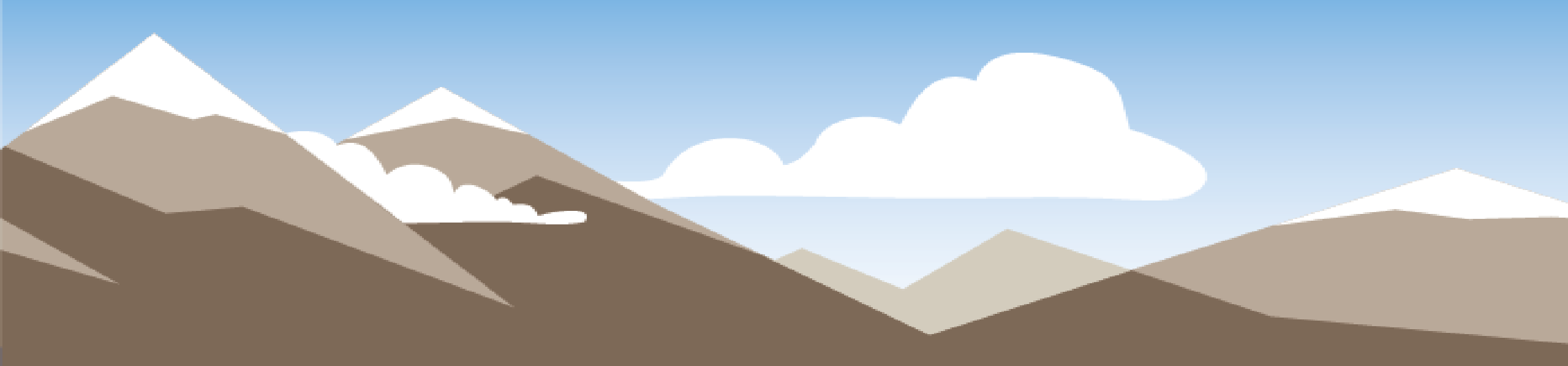
**July - August  
2024**

Draft Staff  
Report



# GIS Map Review





# Subarea Discussion



# Subarea Delineation Criteria

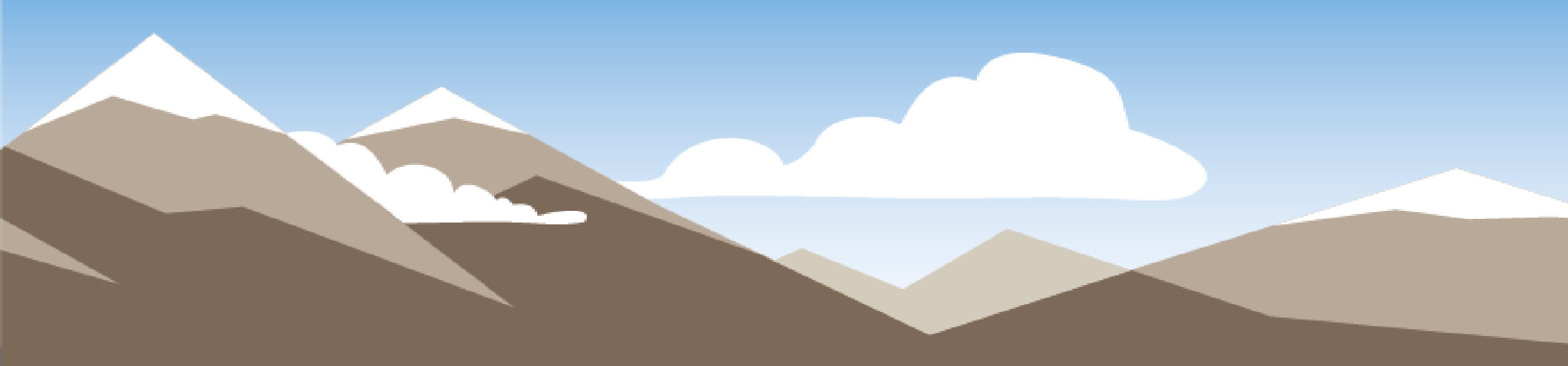
- Primary criteria used to delineate subareas
  - Hydraulic Gradient
    - The driving force of groundwater flow
  - Groundwater Level Trends
    - Provides information on seasonal and long-term response to stresses
  - Subsurface Materials
    - Controls the storage and flow of groundwater

## Subarea information provided in RAC packet

- Division 512 rulemaking interactive map
- Division 512 rulemaking map explainer
- List of groundwater rights by subarea
- Tables of authorized (2023) and actual (2018) groundwater use
- Groundwater level trends in the proposed Harney Basin Critical Groundwater Area (more discussion

# Subarea Discussion

Questions or Feedback?



# Groundwater Level Trends: Data & Analysis



## PRESENTATION OUTLINE:

- Groundwater level data
- Groundwater level trends
- Other considerations
- Subarea comparisons





# Groundwater Level Data at OWRD

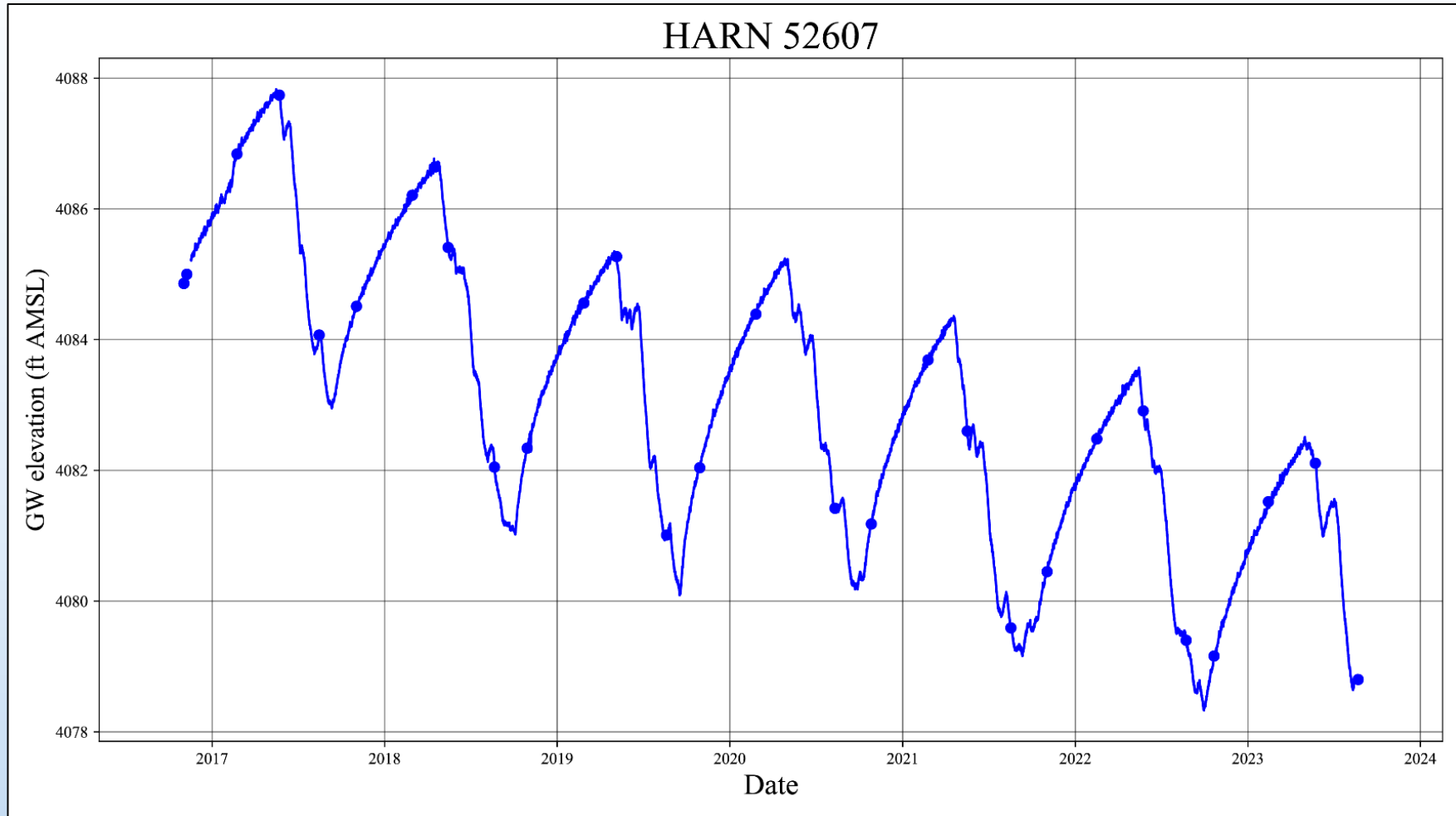
## Groundwater Information System (GWIS):

- OWRD static water level measurements
- USGS static water level measurements
- Reported static water level measurements

| Date       | Time (PST) | WL BMP | MP   | WL BLS | WL Elev | Method           | Status | Measured By       |
|------------|------------|--------|------|--------|---------|------------------|--------|-------------------|
| 08/22/2023 | 11:28:00   | 71.99  | 1.53 | 70.46  | 4067.58 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 05/24/2023 | 13:28:00   | 71.53  | 1.53 | 70.00  | 4068.04 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 02/13/2023 | 12:36:00   | 71.27  | 1.53 | 69.74  | 4068.30 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 10/21/2022 | 10:32:00   | 71.31  | 1.53 | 69.78  | 4068.26 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 08/23/2022 | 12:06:00   | 71.10  | 1.53 | 69.57  | 4068.47 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 05/26/2022 | 14:14:00   | 70.66  | 1.53 | 69.13  | 4068.91 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 02/15/2022 | 15:08:00   | 70.32  | 1.53 | 68.79  | 4069.25 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 11/02/2021 | 08:56:00   | 70.62  | 1.53 | 69.09  | 4068.95 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 08/18/2021 | 09:46:00   | 70.35  | 1.53 | 68.82  | 4069.22 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 05/17/2021 | 13:57:00   | 69.66  | 1.53 | 68.13  | 4069.91 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 02/22/2021 | 11:59:00   | 69.42  | 1.53 | 67.89  | 4070.15 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 10/26/2020 | 13:27:00   | 69.64  | 1.53 | 68.11  | 4069.93 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 08/12/2020 | 06:52:00   | 69.50  | 1.53 | 67.97  | 4070.07 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 02/24/2020 | 17:41:00   | 68.45  | 1.53 | 66.92  | 4071.12 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 10/30/2019 | 11:41:00   | 69.11  | 1.53 | 67.58  | 4070.46 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |
| 08/20/2019 | 10:09:00   | 68.81  | 1.53 | 67.28  | 4070.76 | ETAPE CALIBRATED | STAT   | Darrick Boschmann |



# Groundwater Level Data at OWRD



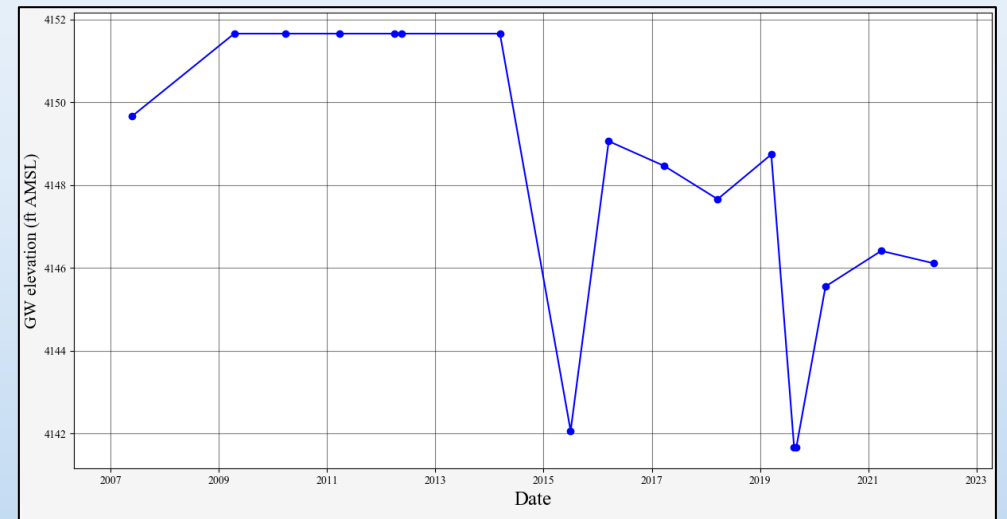
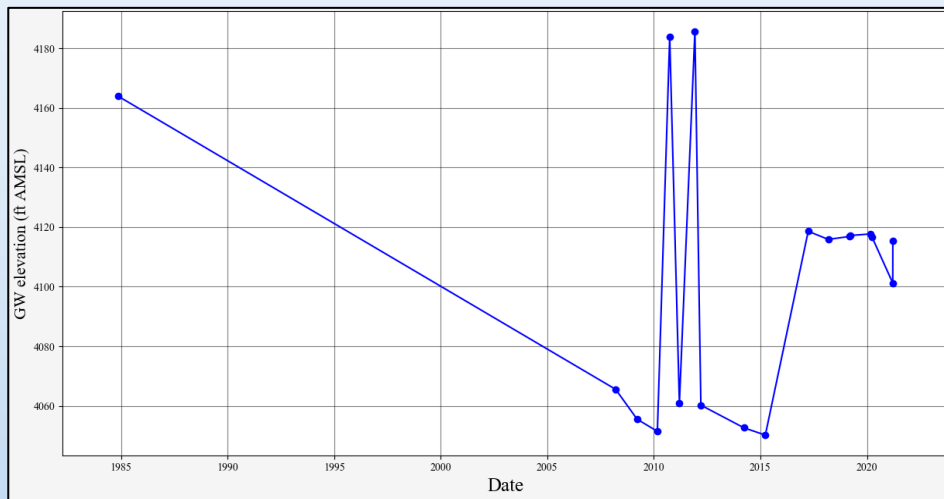
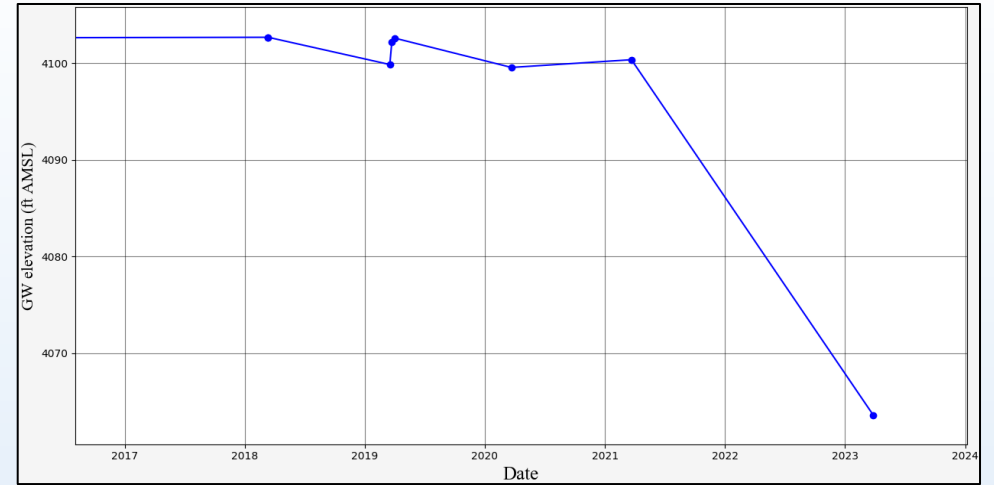
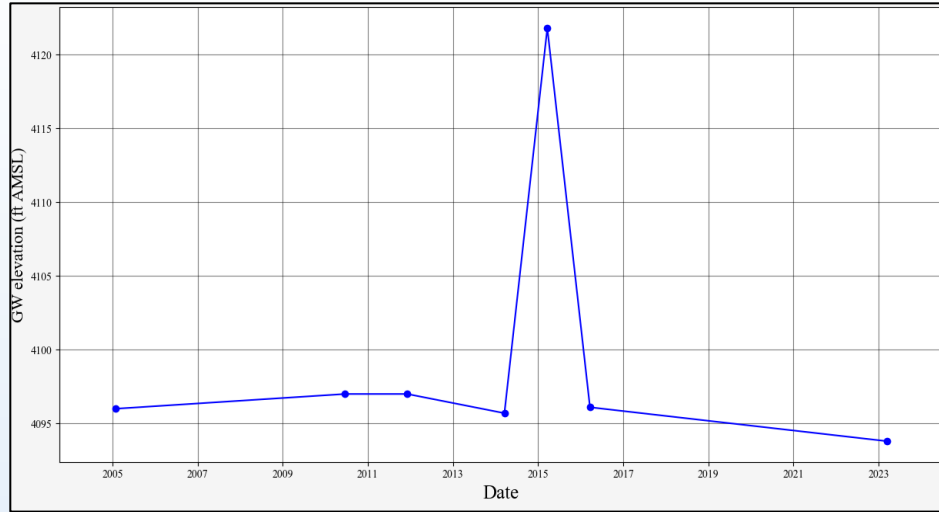
## Common issues with groundwater level data:

- Misidentified wells
  - Measurement reported for the wrong well
- Turbine oil
  - Causes issues with e-tape measurements
- Inconsistent personnel





# Groundwater Level Data - Review



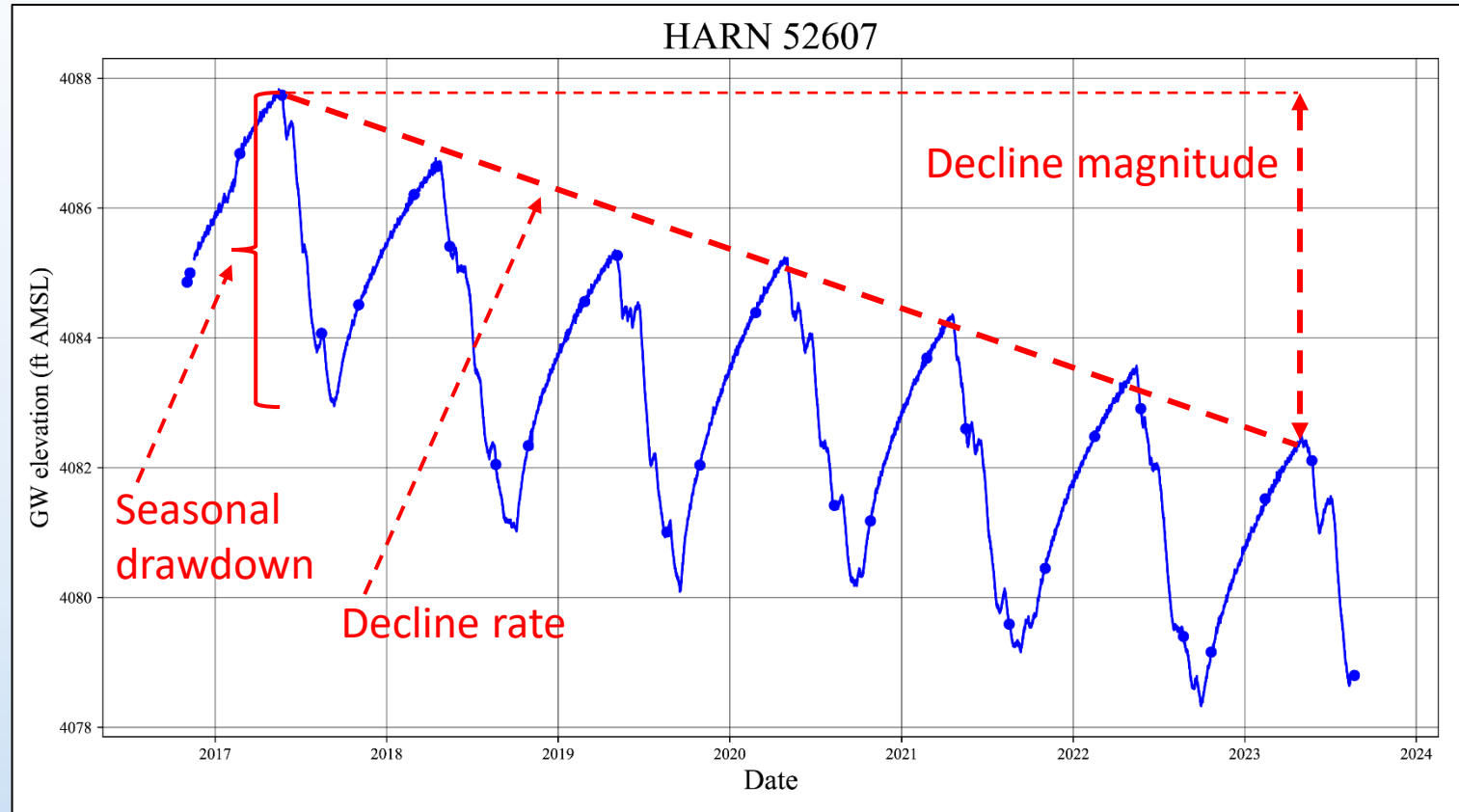
# Groundwater Level Trends - Calculation

## Two primary metrics:

1. Groundwater level decline magnitude
  - Total decline over the period of record in feet
2. Groundwater level decline rate
  - Rate of decline in feet per year

## Annual high measurements:

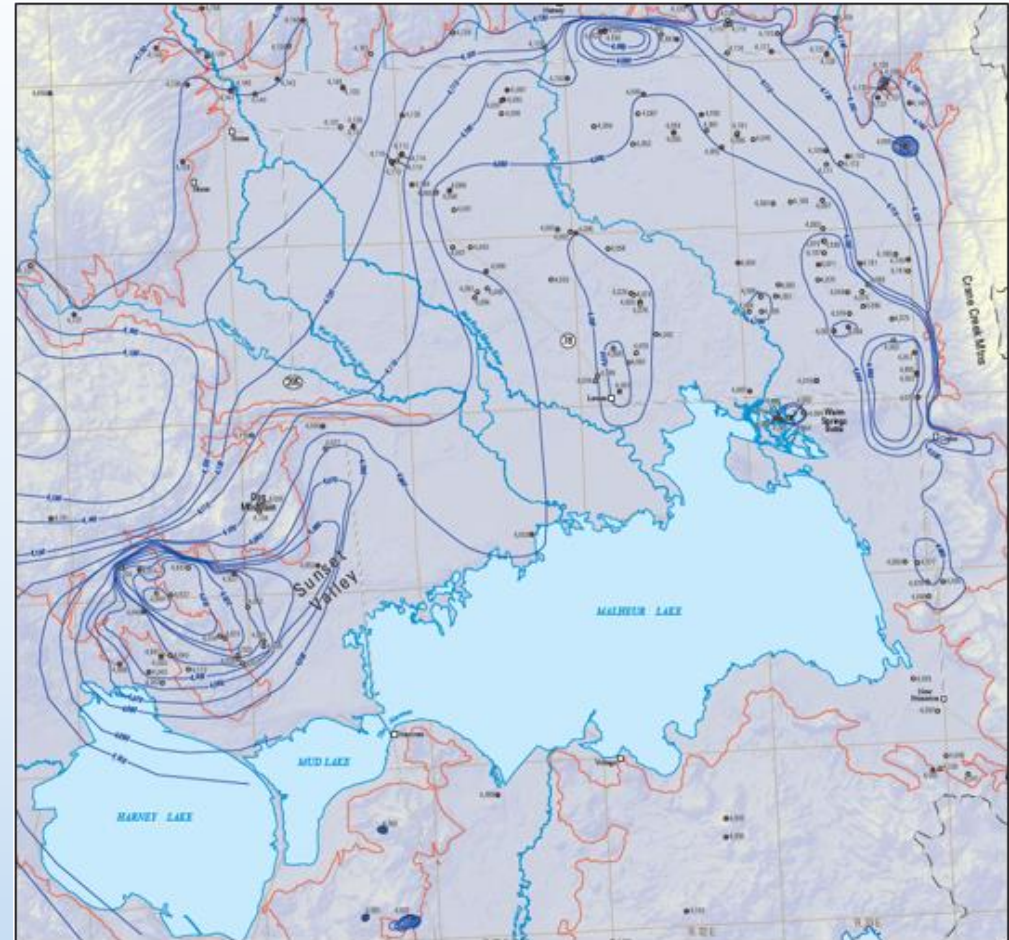
Generally January - April



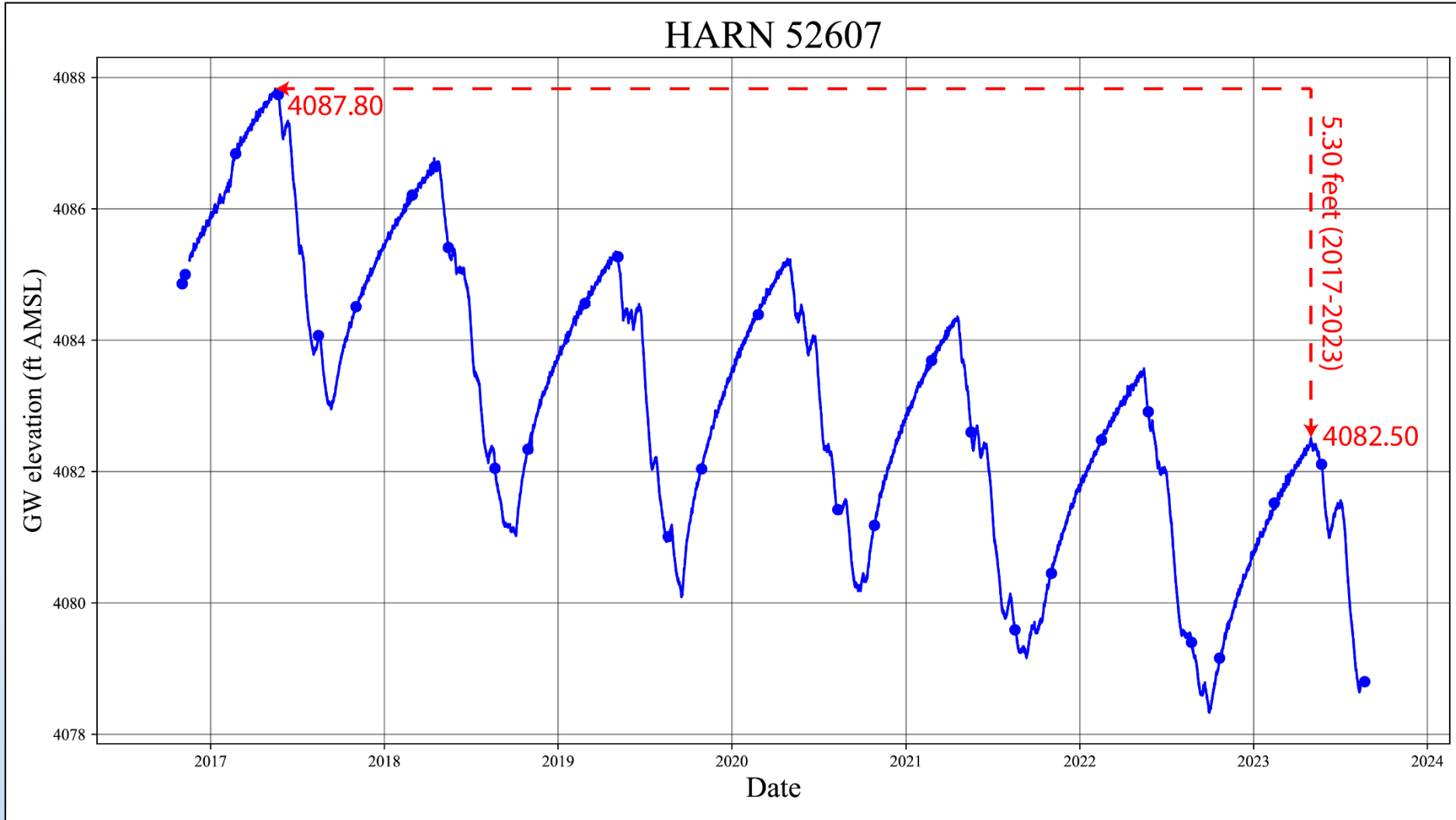
# Groundwater Level Decline Magnitude

## Groundwater Level Decline Magnitude:

- Calculated as change from highest measured to most recent annual high
- Most recent annual high must be in the range 2016 – 2023
- Important to consider period of record



# Groundwater Level Decline Magnitude



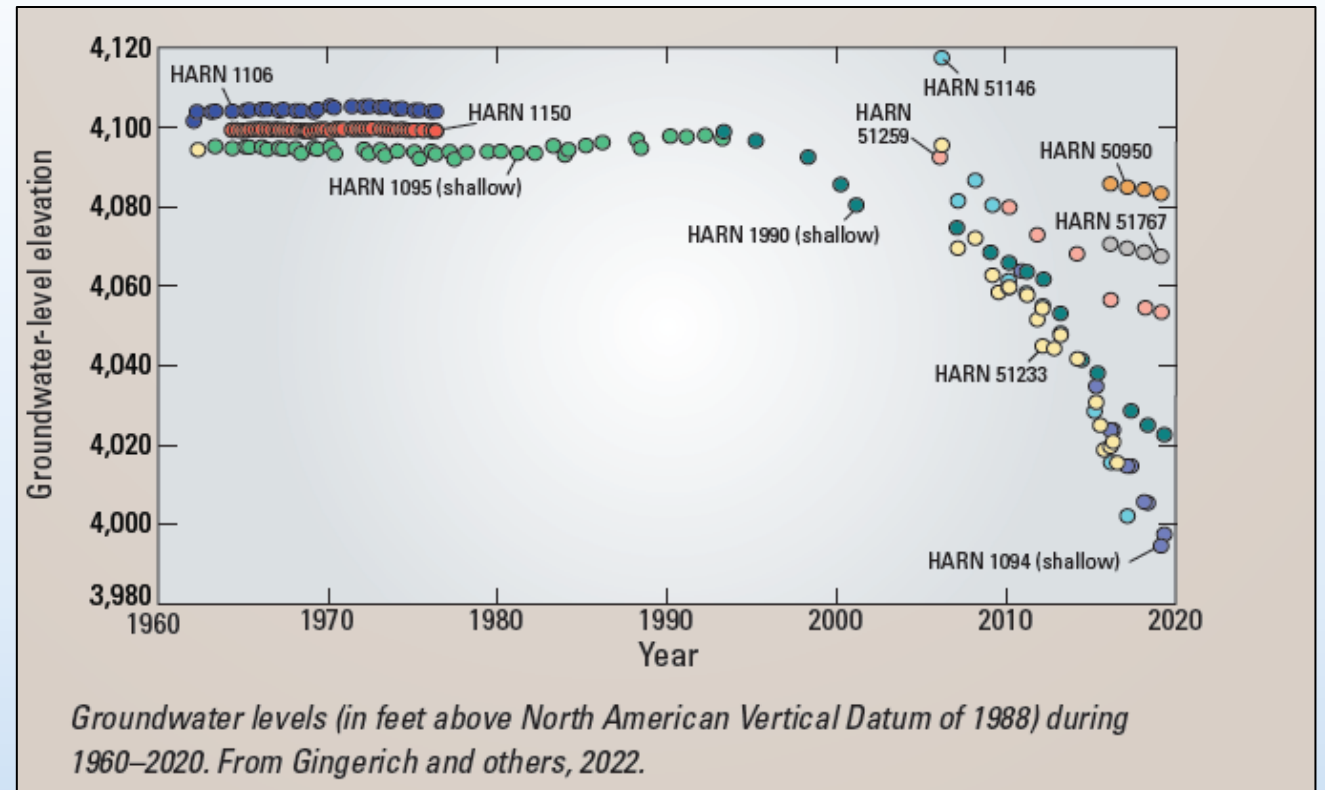
## Magnitude Example:

- -5.30 feet
- Period of record:  
2017 - 2023

# Groundwater Level Decline Rate

## Groundwater Level Decline Rate:

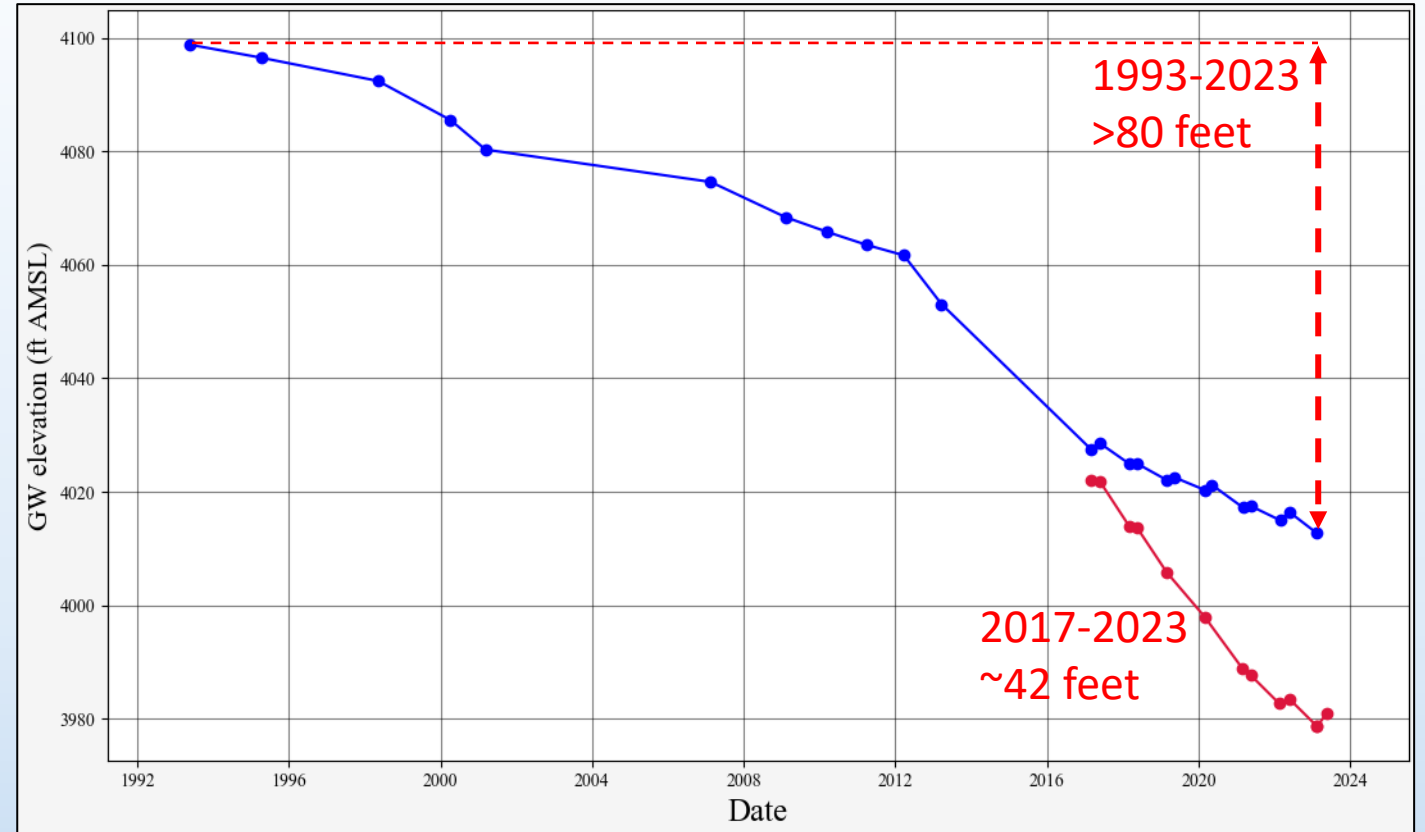
- Calculated as Sen's Slope
  - Median of all slopes between each pair of points in the data
- Rate calculated only for annual high measurements in the range 2016 - 2023





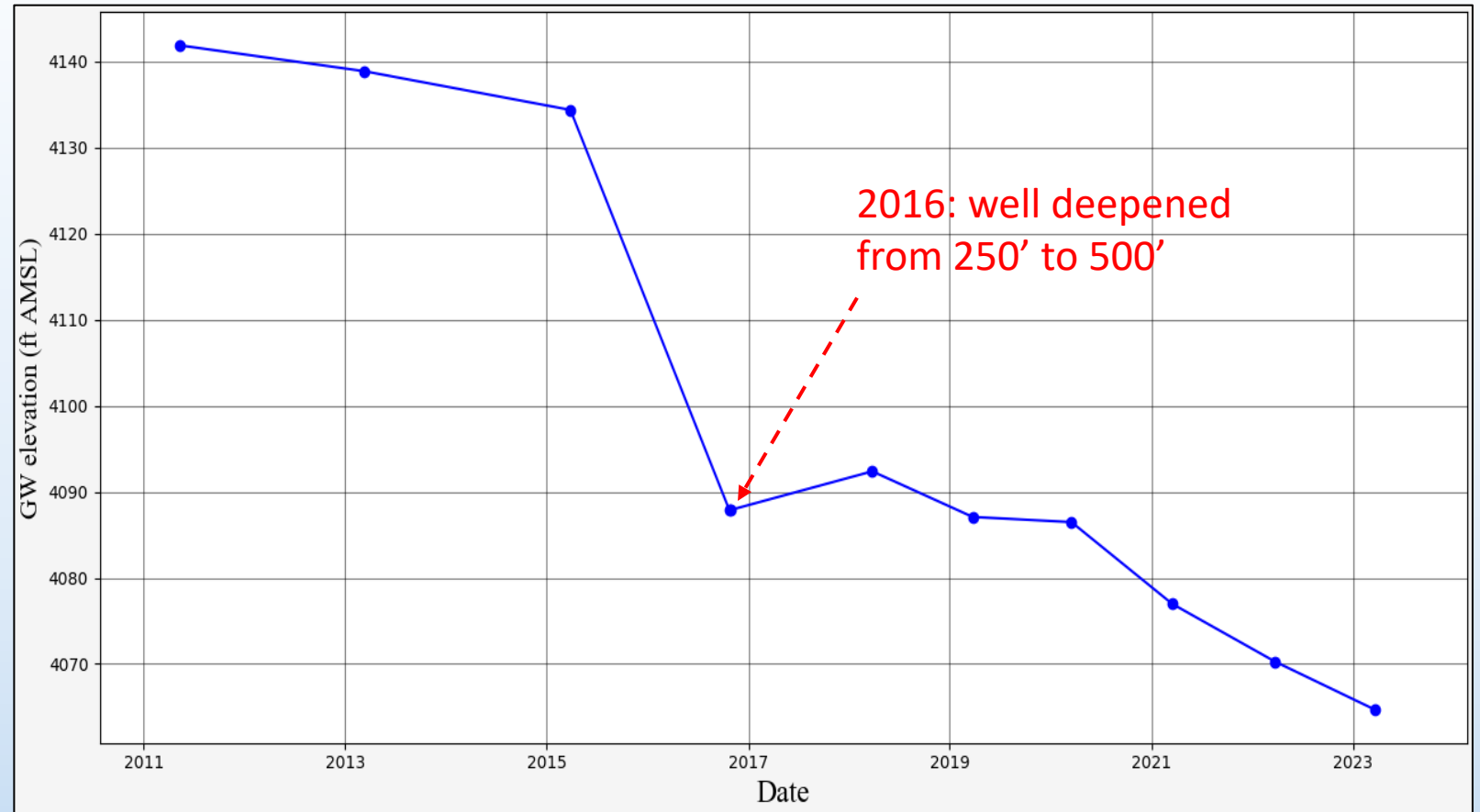
## Other Considerations:

1. Period of record



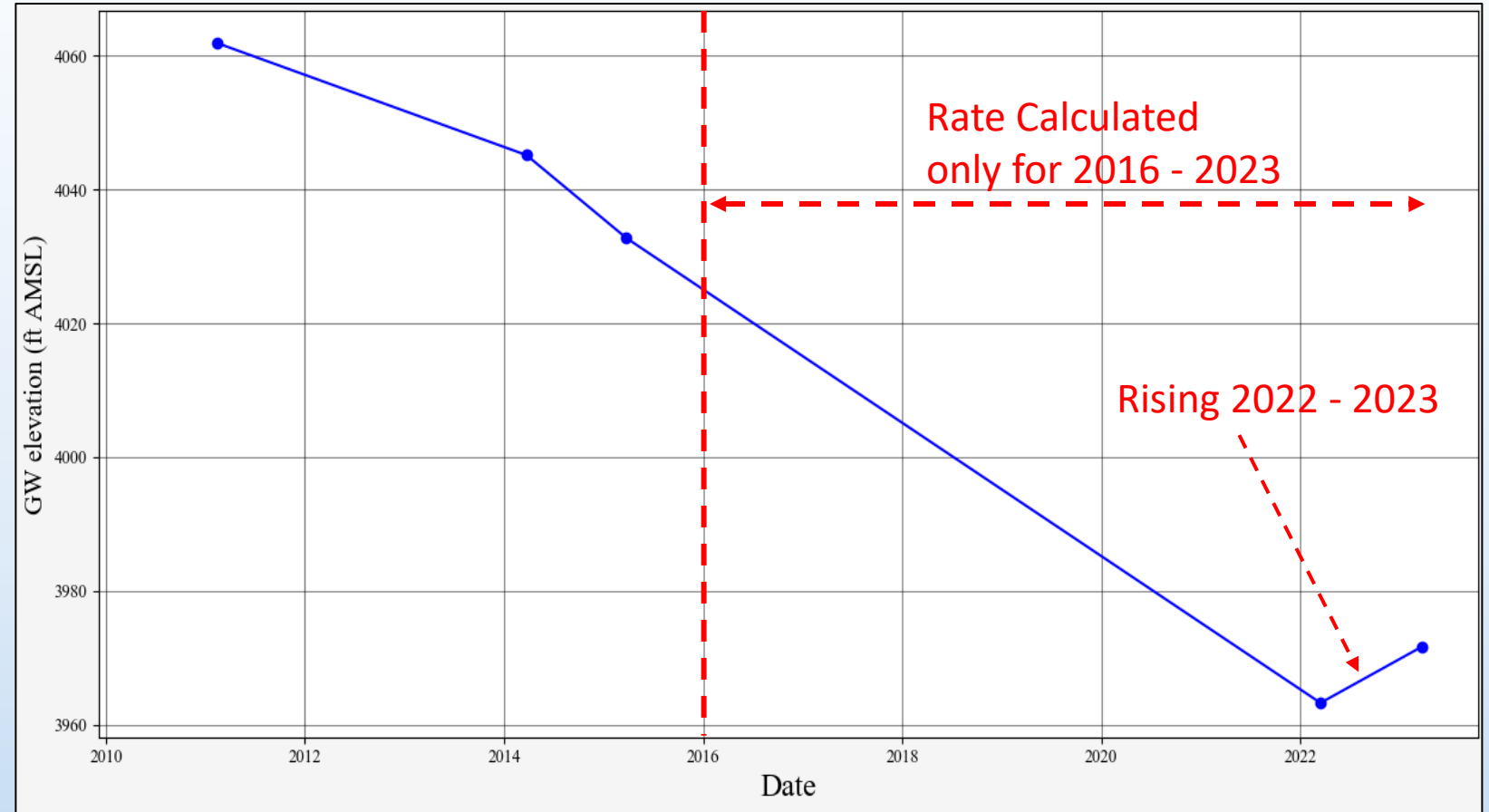
## Other Considerations:

1. Period of record
2. Well construction history

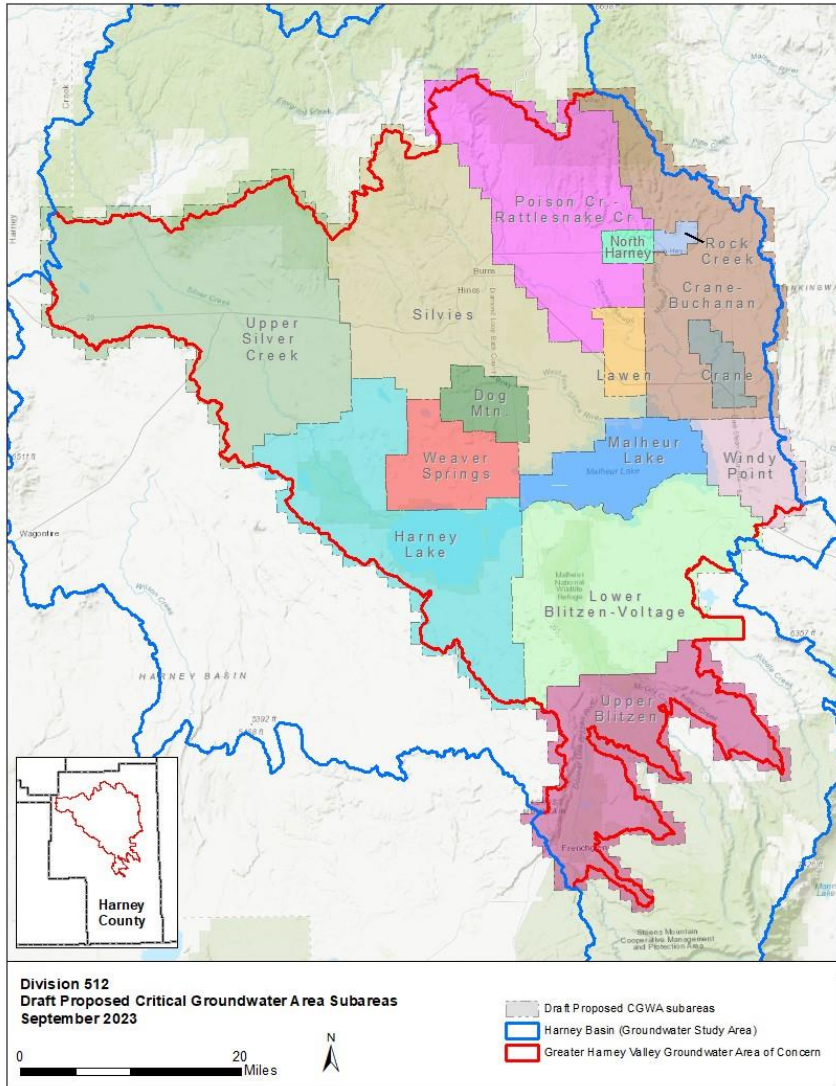


## Other Considerations:

1. Period of record
2. Well construction history
3. Parameter selection



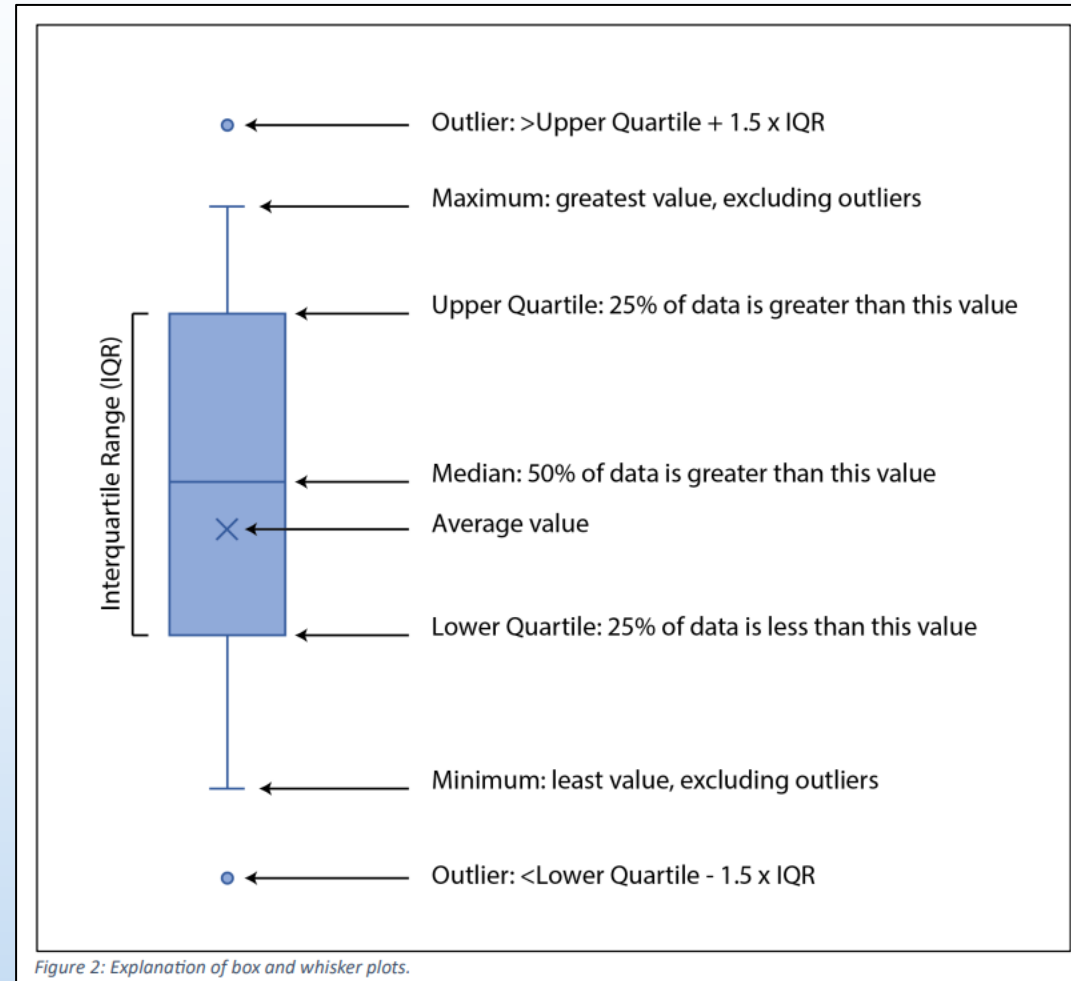
# Harney Basin Critical Groundwater Area Proposed Subareas



## 15 Proposed Subareas:

1. Upper Silver Creek
2. Harney Lake
3. Weaver Springs
4. Dog Mountain
5. Silvies
6. Poison Creek – Rattlesnake Creek
7. North Harney
8. Rock Creek
9. Crane – Buchanan
10. Crane
11. Lawen
12. Malheur Lake
13. Windy Point
14. Lower Blitzen – Voltage
15. Upper Blitzen

# Box-Whisker Plots



# Groundwater Level Decline Magnitude

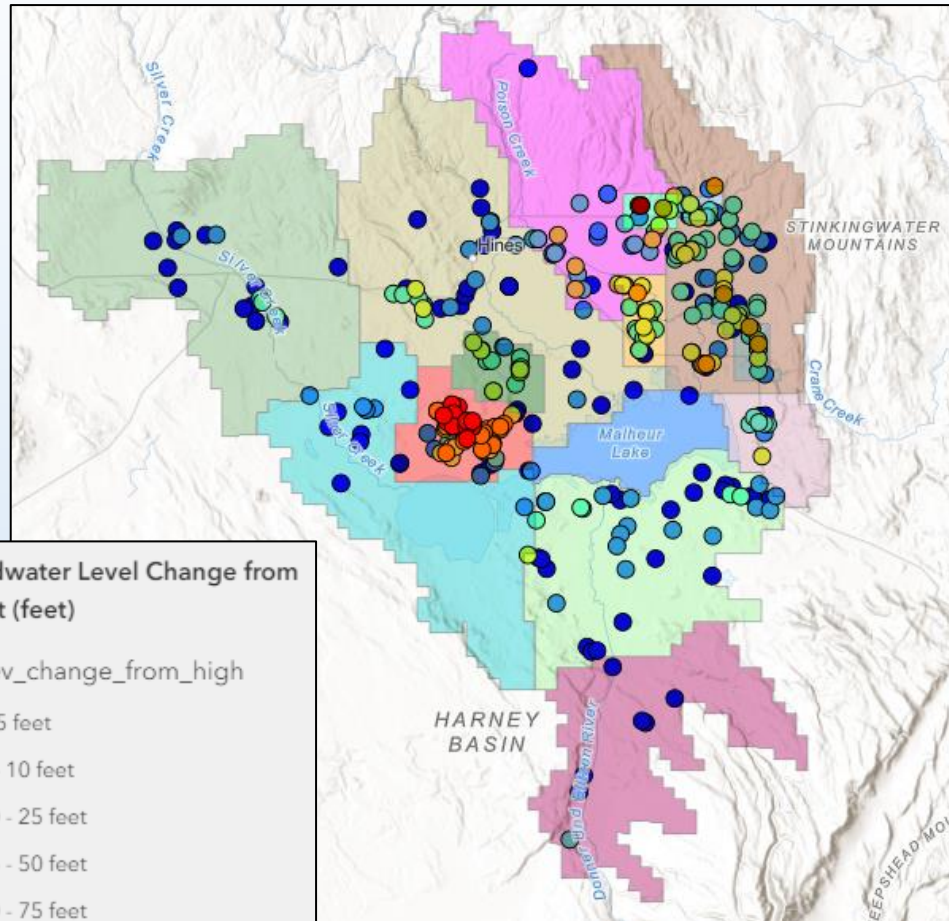


Table 1: Summary statistics of groundwater level decline magnitude by subarea. Negative values indicate a declining trend. (n= the number of wells for which decline magnitude could be calculated).

| Subarea                         | Minimum Magnitude (feet) | Maximum Magnitude (feet) | Average Magnitude (feet) | Median Magnitude (feet) |
|---------------------------------|--------------------------|--------------------------|--------------------------|-------------------------|
| Weaver Springs (n=64)           | -116.9                   | -0.1                     | -49.0                    | -49.9                   |
| North Harney (n=9)              | -83.0                    | -9.1                     | -38.7                    | -33.1                   |
| Crane (n=24)                    | -68.8                    | -2.7                     | -25.2                    | -22.0                   |
| Lawen (n=21)                    | -59.6                    | -0.1                     | -21.7                    | -19.0                   |
| Dog Mountain (n=18)             | -37.2                    | -1.5                     | -17.9                    | -17.0                   |
| Rock Creek (n=16)               | -69.8                    | -4.7                     | -19.0                    | -15.0                   |
| Windy Point (n=10)              | -25.7                    | 0.0                      | -13.7                    | -13.9                   |
| Crane-Buchanan (n=50)           | -52.0                    | -0.9                     | -16.5                    | -12.5                   |
| Poison Ck-Rattlesnake Ck (n=25) | -45.3                    | -0.2                     | -14.2                    | -12.1                   |
| Lower Blitzen-Voltage (n=42)    | -39.8                    | 0.0                      | -5.9                     | -4.4                    |
| Silvies (n=32)                  | -29.3                    | -0.3                     | -6.9                     | -4.2                    |
| Upper Silver Creek (n=17)       | -13.2                    | -0.7                     | -5.0                     | -3.5                    |
| Harney Lake (n=16)              | -9.0                     | -0.1                     | -3.7                     | -3.2                    |
| Upper Blitzen (n=7)             | -10.4                    | -0.1                     | -2.1                     | -1.1                    |
| Malheur Lake (n=2)              | -0.7                     | -0.5                     | -0.6                     | -0.6                    |

- n=number of wells evaluated

# Groundwater Level Decline Magnitude

Period of record for calculating groundwater level decline magnitude.

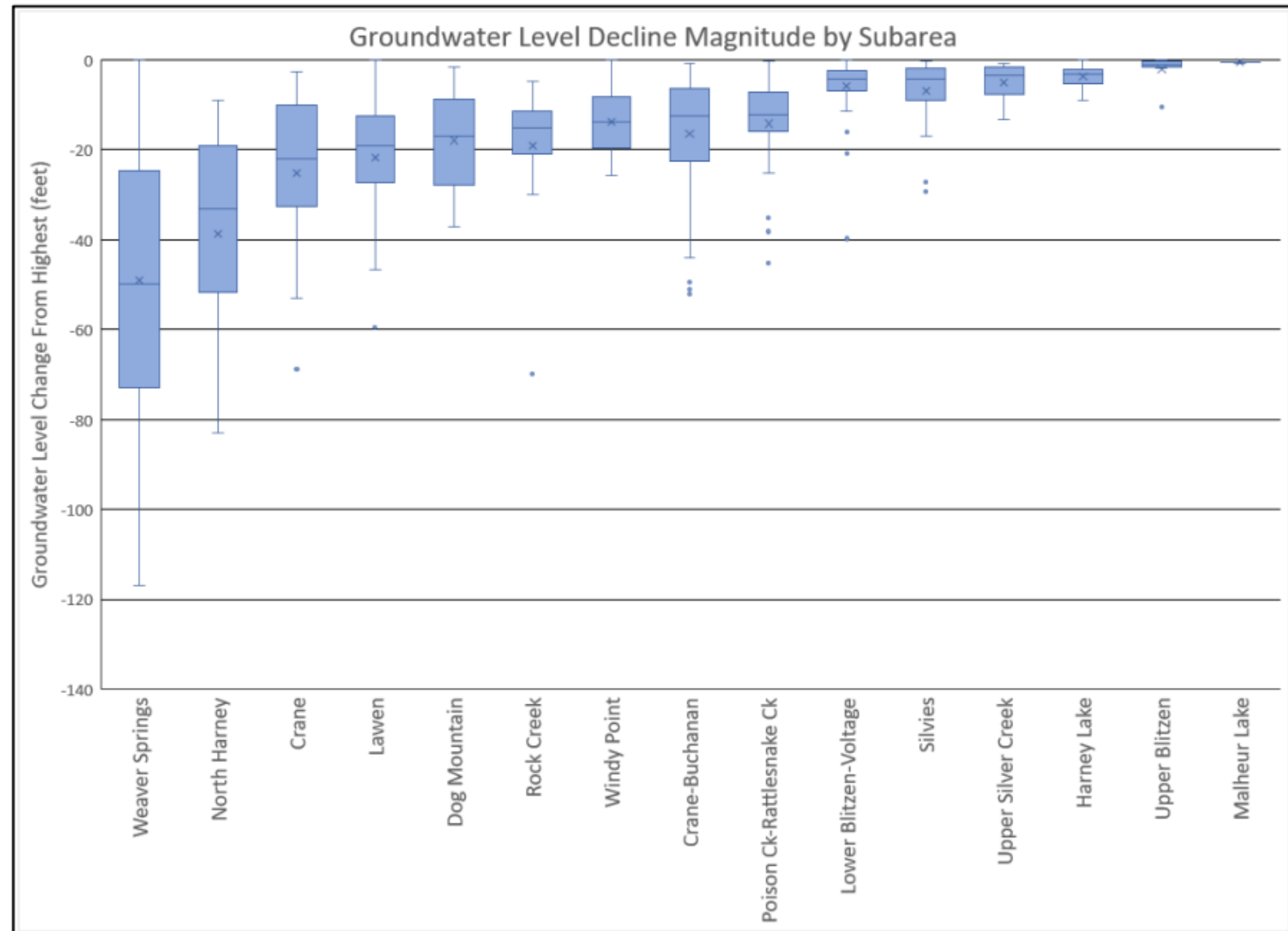
- n=number of wells evaluated

*Table 3: Summary statistics for the periods of record used to calculate decline magnitude by subarea (P.O.R. = period of record).*

| Subarea                         | Minimum           | Maximum           | Average           | Median            |
|---------------------------------|-------------------|-------------------|-------------------|-------------------|
|                                 | P.O.R.<br>(years) | P.O.R.<br>(years) | P.O.R.<br>(years) | P.O.R.<br>(years) |
| Silvies (n=32)                  | 1                 | 63                | 13.6              | 6.5               |
| Upper Silver Creek (n=17)       | 1                 | 61                | 18.5              | 9.0               |
| Dog Mountain (n=18)             | 1                 | 60                | 15.3              | 9.0               |
| Lower Blitzen-Voltage (n=42)    | 1                 | 60                | 20.7              | 11.5              |
| Poison Ck-Rattlesnake Ck (n=25) | 1                 | 58                | 15.3              | 10.0              |
| Crane (n=24)                    | 1                 | 55                | 22.2              | 15.0              |
| Crane-Buchanan (n=50)           | 1                 | 49                | 11.4              | 7.5               |
| Harney Lake (n=16)              | 1                 | 48                | 11.6              | 5.0               |
| North Harney (n=9)              | 4                 | 46                | 21.0              | 21.0              |
| Lawen (n=21)                    | 1                 | 45                | 11.9              | 7.0               |
| Rock Creek (n=16)               | 1                 | 45                | 9.6               | 4.5               |
| Weaver Springs (n=64)           | 1                 | 44                | 13.5              | 9.0               |
| Windy Point (n=10)              | 1                 | 41                | 18.0              | 18.0              |
| Upper Blitzen (n=7)             | 1                 | 39                | 10.0              | 4.0               |
| Malheur Lake (n=2)              | 1                 | 6                 | 3.5               | 3.5               |

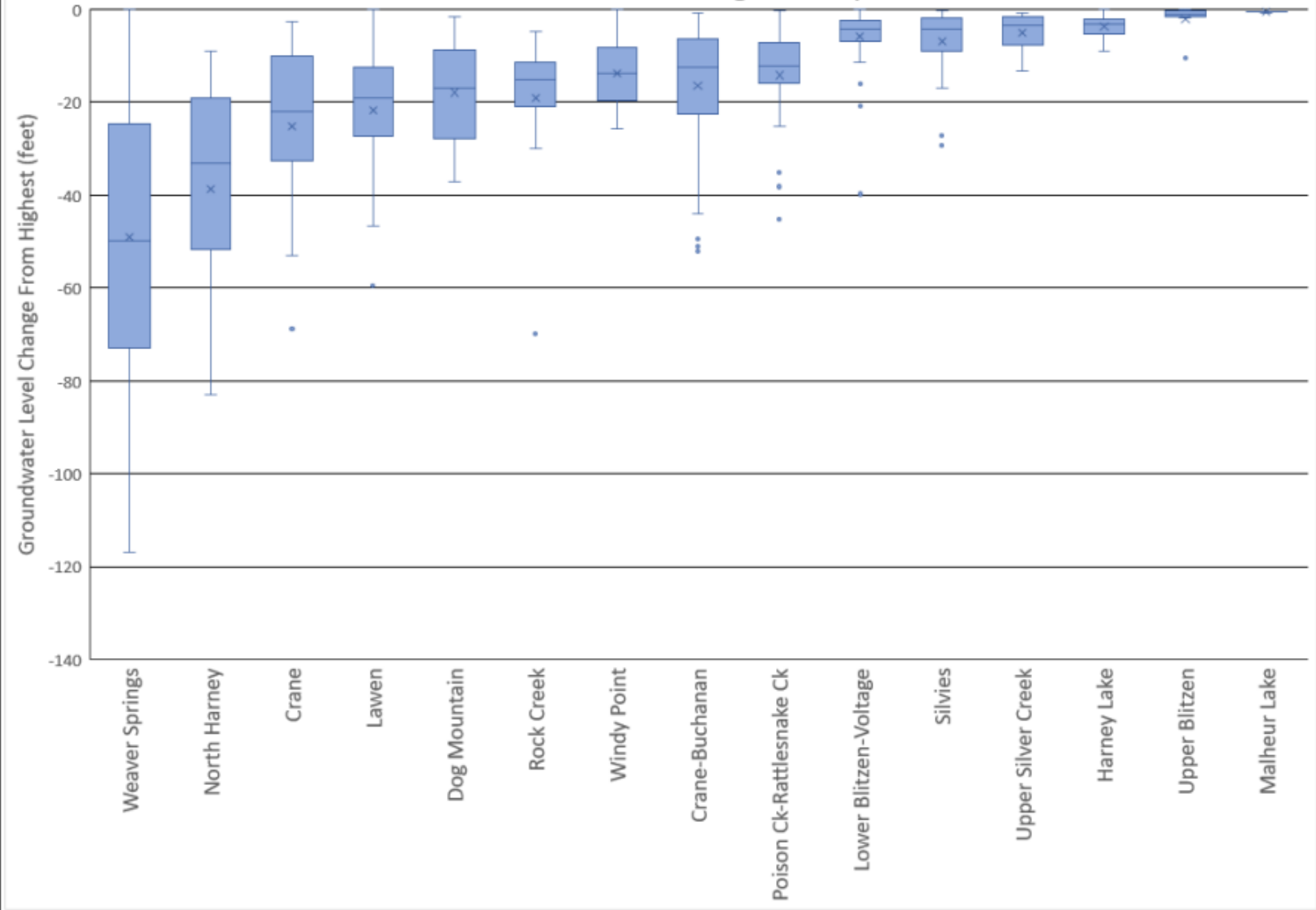
# Groundwater Level Decline Magnitude

- Groundwater level decline magnitude calculated as change in groundwater level from the highest measured to most recent annual high measurement.
- Negative values indicate declining trend.
- Subareas listed from left to right in order of increasing median value.





### Groundwater Level Decline Magnitude by Subarea



# Groundwater Level Decline Rate

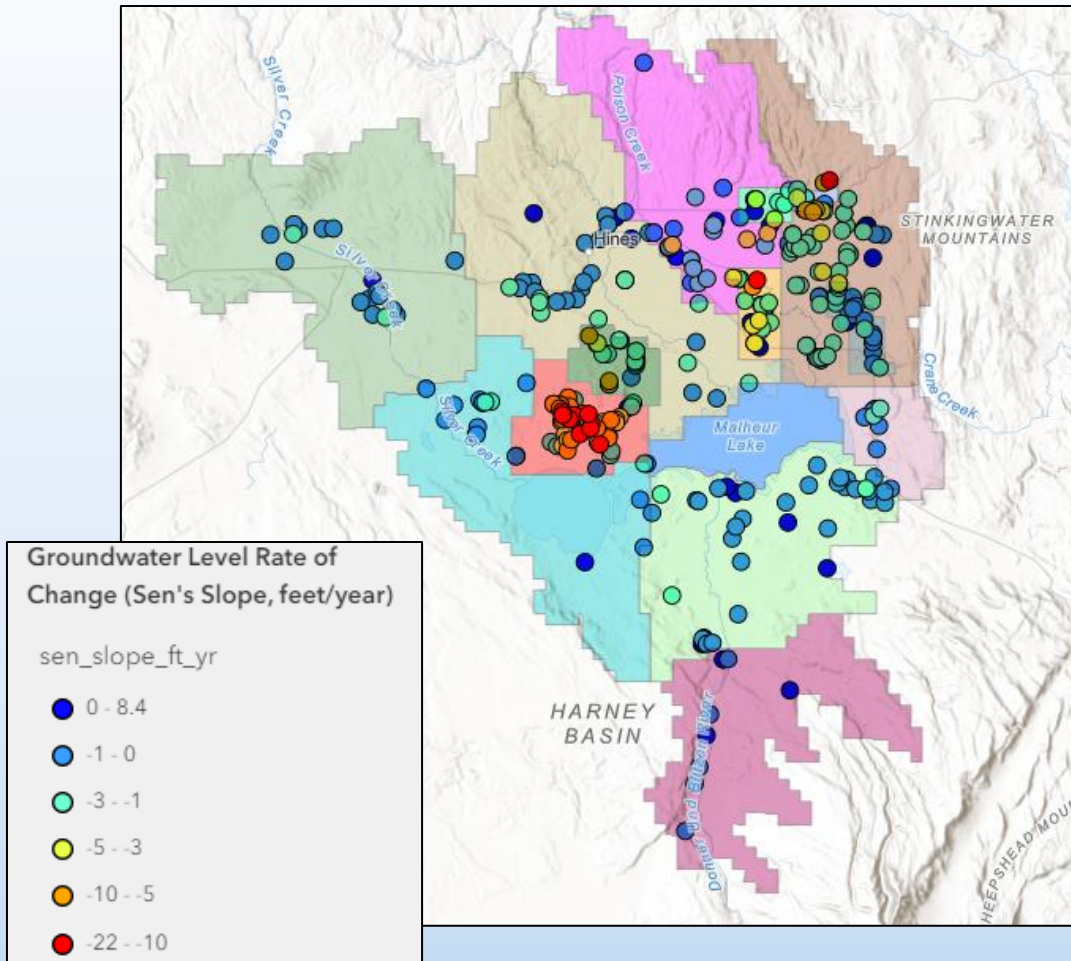


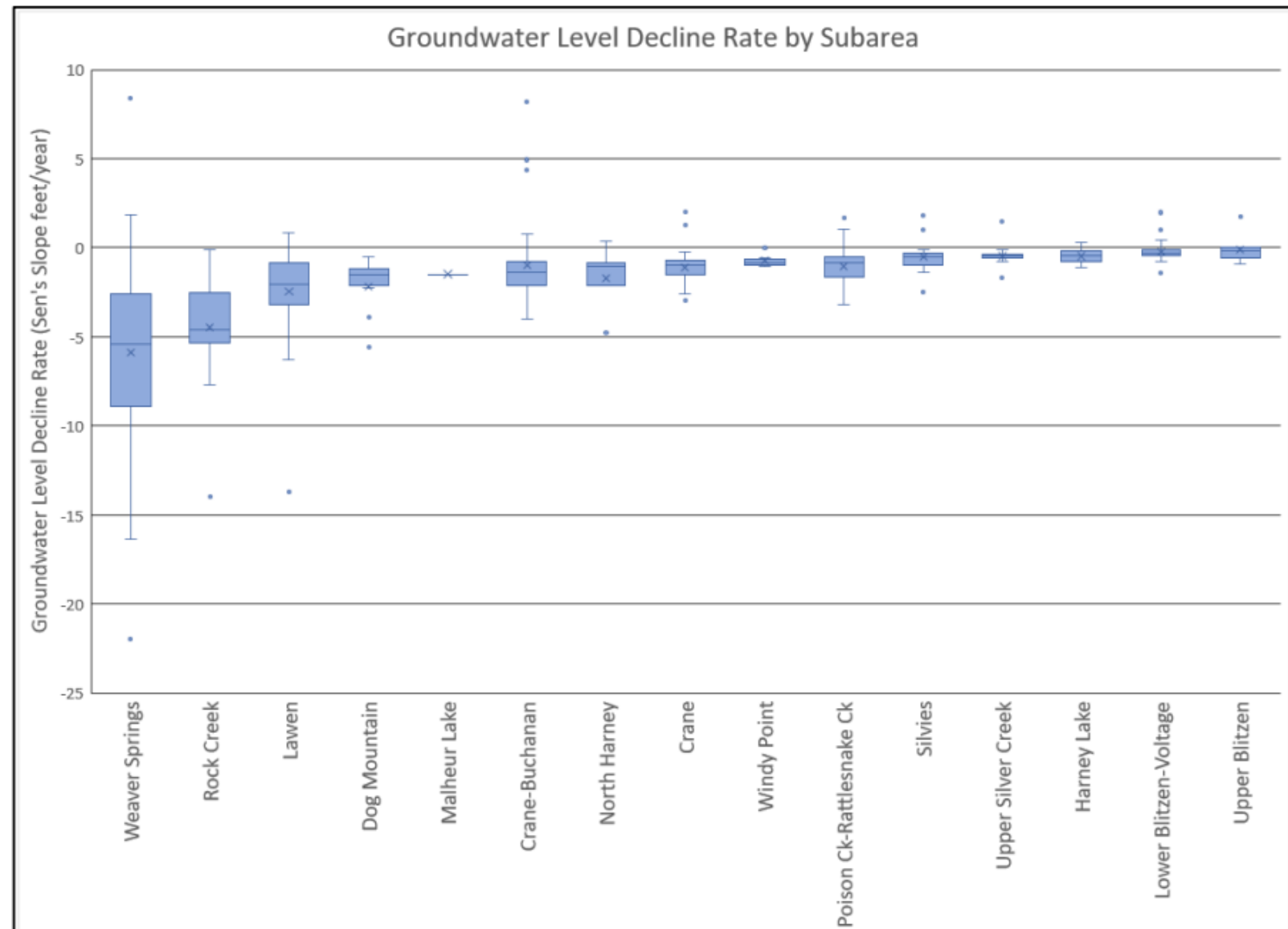
Table 2: Summary statistics of groundwater level decline rate by subarea. Negative values indicate a declining trend. (n= the number of wells for which decline rate could be calculated).

| Subarea                         | Minimum Rate (ft/year) | Maximum Rate (ft/year) | Average Rate (ft/year) | Median Rate (ft/year) |
|---------------------------------|------------------------|------------------------|------------------------|-----------------------|
| Weaver Springs (n=58)           | -22.0                  | 8.4                    | -5.9                   | -5.4                  |
| North Harney (n=9)              | -4.8                   | 0.4                    | -1.7                   | -1.0                  |
| Crane (n=23)                    | -4.9                   | 2.0                    | -1.1                   | -1.0                  |
| Lawen (n=21)                    | -13.7                  | 0.8                    | -2.5                   | -2.0                  |
| Dog Mountain (n=19)             | -5.6                   | -0.5                   | -2.2                   | -1.5                  |
| Rock Creek (n=16)               | -14.0                  | -0.1                   | -4.5                   | -4.6                  |
| Windy Point (n=7)               | -1.1                   | 0.0                    | -0.7                   | -0.9                  |
| Crane-Buchanan (n=49)           | -4.0                   | 8.2                    | -1.0                   | -1.4                  |
| Poison Ck-Rattlesnake Ck (n=26) | -3.2                   | 1.7                    | -1.0                   | -0.9                  |
| Lower Blitzen-Voltage (n=40)    | -1.4                   | 2.0                    | -0.2                   | -0.3                  |
| Silvies (n=31)                  | -2.5                   | 1.8                    | -0.5                   | -0.5                  |
| Upper Silver Creek (n=17)       | -1.7                   | 1.5                    | -0.5                   | -0.4                  |
| Harney Lake (n=16)              | -1.1                   | 0.3                    | -0.5                   | -0.4                  |
| Upper Blitzen (n=8)             | -0.9                   | 1.8                    | -0.1                   | -0.2                  |
| Malheur Lake (n=1)              | -1.5                   | -1.5                   | -1.5                   | -1.5                  |

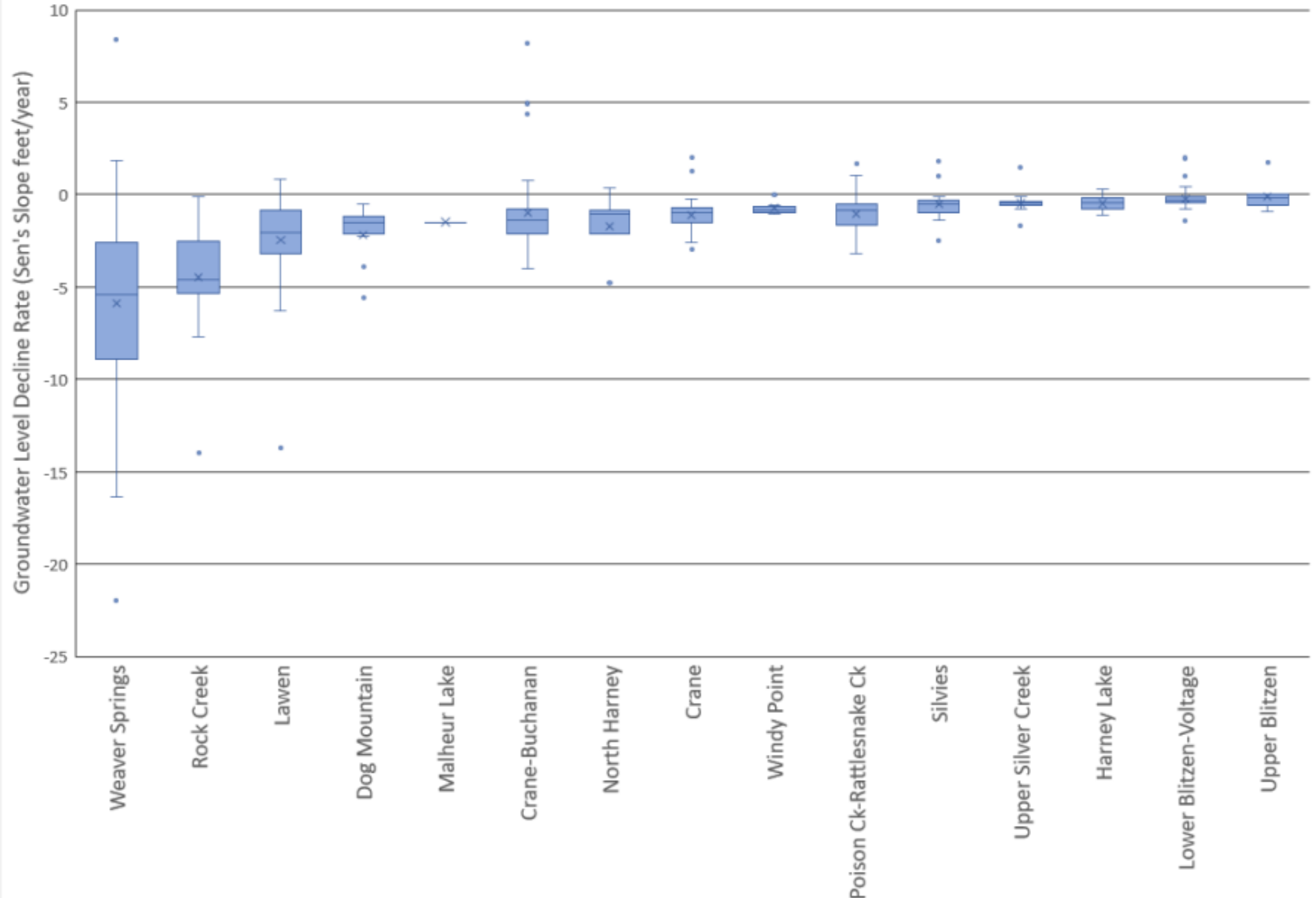
- n=number of wells evaluated

# Groundwater Level Decline Rate

- Groundwater level decline rate by subarea calculated as Sen's Slope.
- Negative values indicate declining trend.
- Subareas listed from left to right in order of increasing median value.



Groundwater Level Decline Rate by Subarea



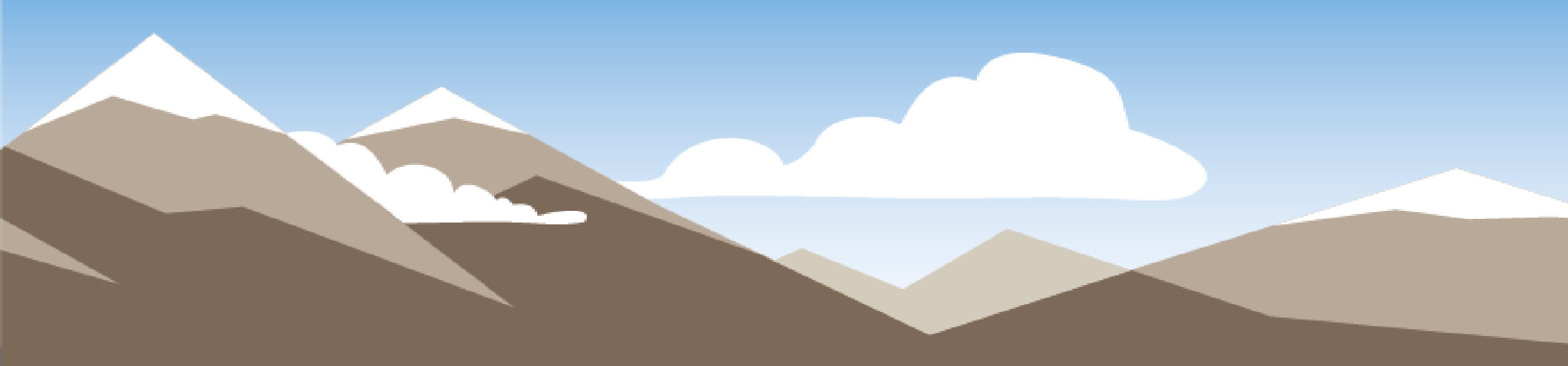


# Groundwater Level Trends: Data Considerations

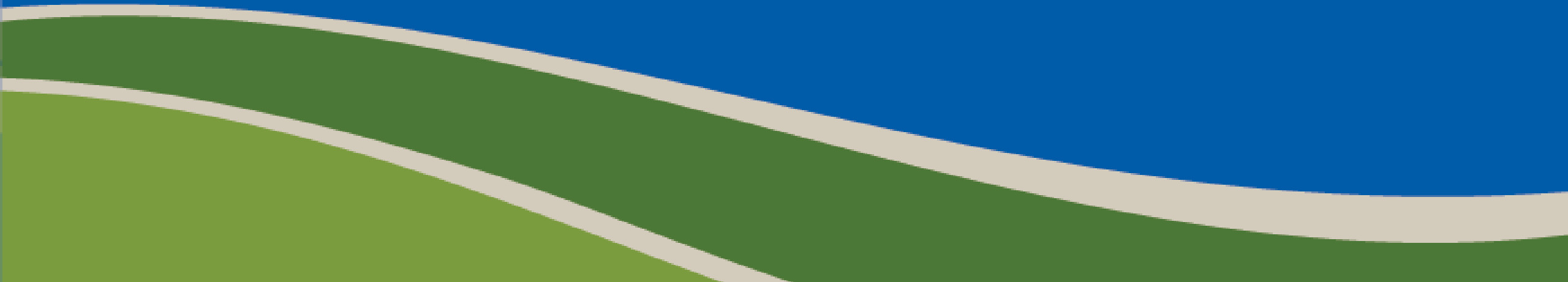
## Key Takeaways:

1. Data from multiple sources is reviewed for quality control.
2. We must understand the specified parameters to interpret the calculations.
3. There is variation within each of the 15 subareas.
4. A small number of subareas have more significant declines.

## RAC Questions and Feedback



# Subarea Priority Ranking



## Proposed criteria for prioritizing CGWA subareas for curtailment

1. Groundwater level decline rate
2. Total groundwater level decline magnitude
3. Groundwater elevation below 4080-feet amsl<sup>1</sup>
4. A well-defined groundwater level cone of depression dominates the subarea<sup>2</sup>

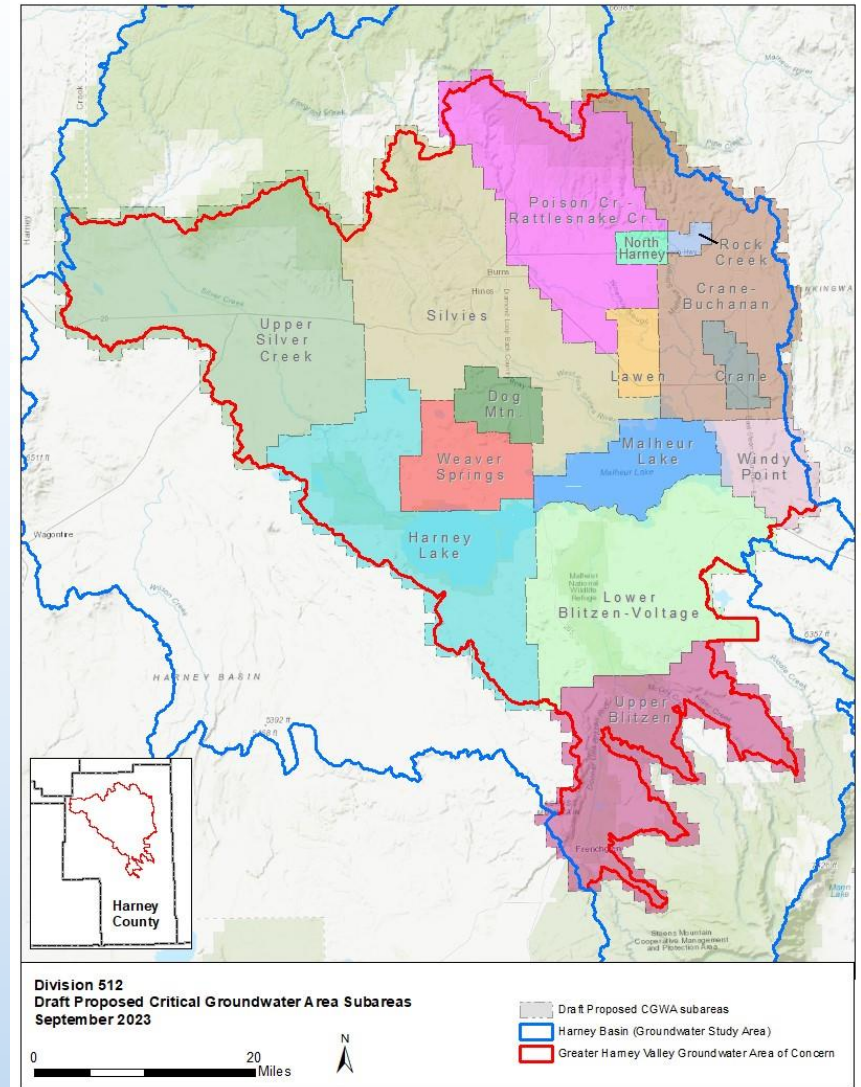
1 4080-feet amsl elevation is below the bottom of Harney Lake (amsl = above mean sea level)

2 Closed GW level contours indicating a depression (a “sink” or low point)



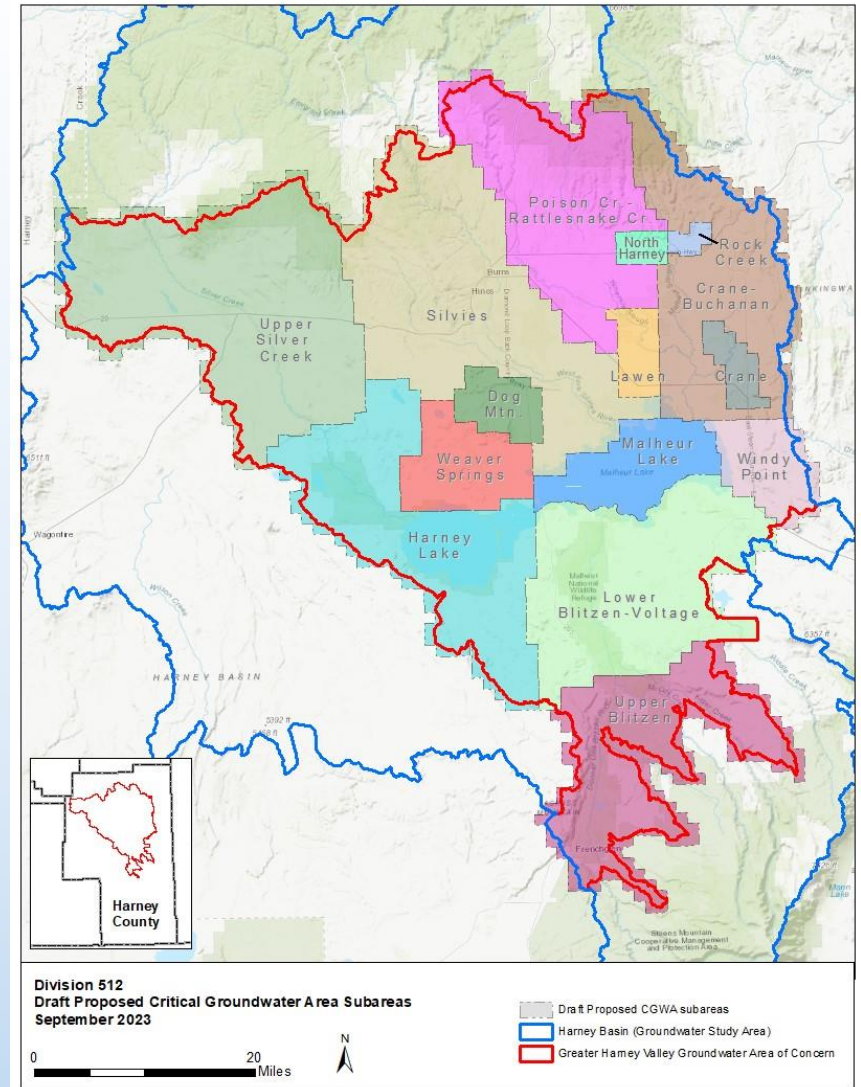
## High Priority Subareas:

- Crane
- Dog Mountain
- Lawen
- North Harney
- Rock Creek
- Weaver Springs

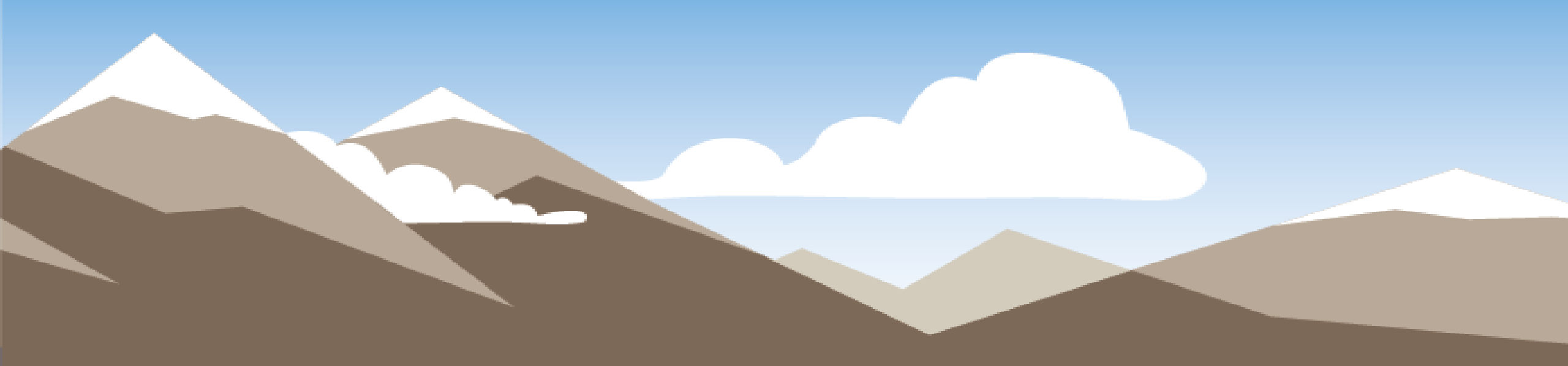


## Lower Priority Subareas:

- Crane-Buchanan
- Harney lake
- Lower Blitzen – Voltage
- Malheur Lake
- Poison Creek – Rattlesnake Creek
- Silvies
- Upper Blitzen
- Upper Silver Creek
- Windy Point



## RAC Questions and Feedback



# Goals for Curtailment



# Management Strategy

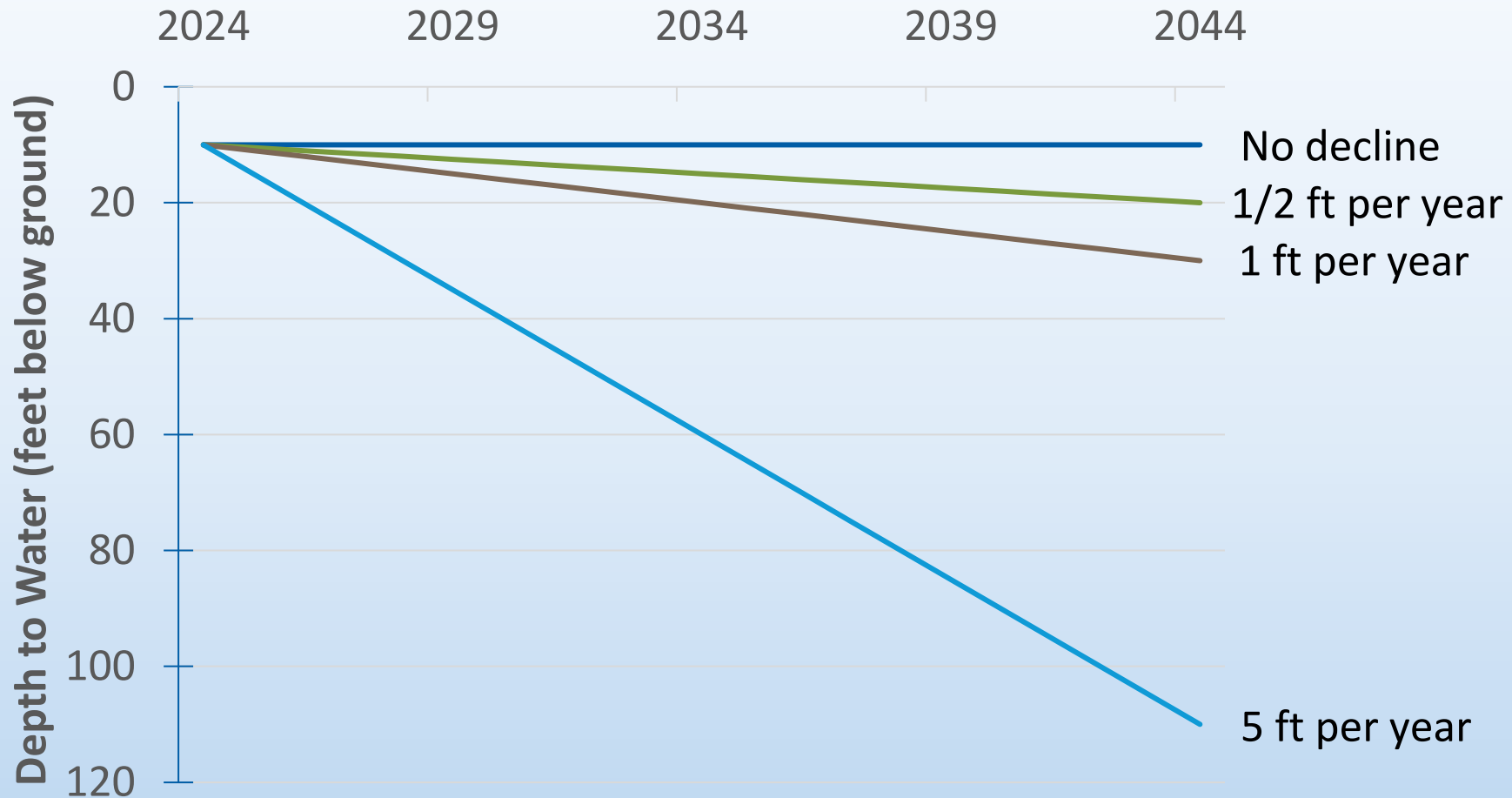
- Reduce water use basin-wide through straightforward and transparent rules
- High priority subareas will be the focus for reducing use
  - Voluntary reduction
  - Regulatory curtailment
- Lower priority subareas will need thresholds for future action to incentivize reductions in use
  - Voluntary reduction

# Inputs for curtailment decisions

1. Target water level trend
2. Permissible Total Withdrawal (PTW )
3. Timing for achieving the PTW

# Target Water Level Trend

## Various decline rates over 20 years



# Target Water Level Trend

- The Department's position is that we need to halt declines
- Impact of declines:
  - Dry wells
  - Reduced spring flow or dry springs
  - Increased pumping costs
  - Deterioration in water quality
  - Land subsidence



## Establish Permissible Total Withdrawal (PTW)

- PTW will be set to quantity that achieves the Target Water Level Trend
- Options to calculate PTW:
  - Hydrograph approach
  - Pumping rate & decline rate analysis

Note: A numerical flow model can help with forward-looking simulations

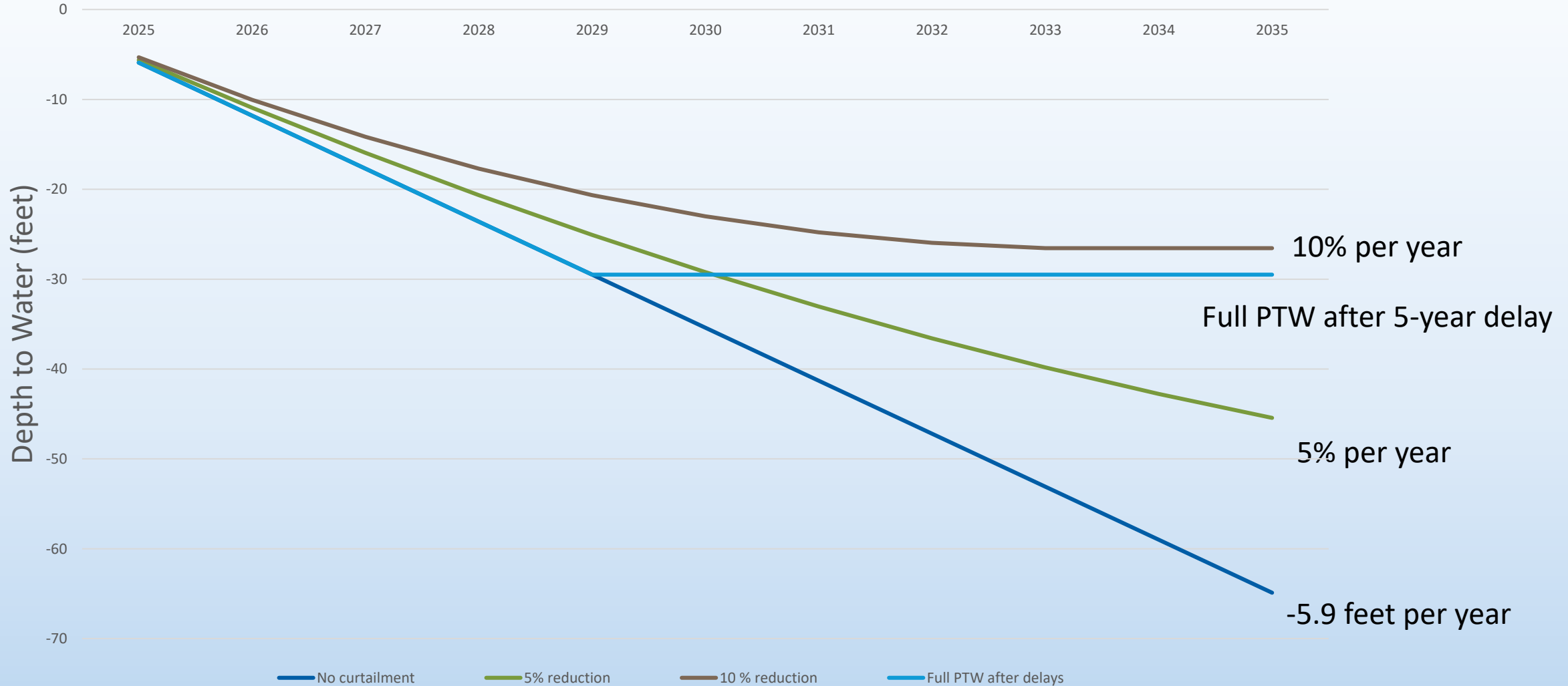
## Timing for implementing the PTW

- The longer it takes to implement the full PTW, the more groundwater level declines will occur
- Implementing a phased approach to reductions in use will result in accepting a lower groundwater elevation than exists currently in each subarea
- The groundwater system is complex and thus the response to reductions in use will be complex



# Timing to achieve PTW

## Different Use Reduction Scenarios



## Measuring progress

- Track groundwater level trends and evaluate the change in each subarea's rate of decline
- Sentinel wells and a minimum groundwater elevation
- Measure total annual pumpage and compare to current ET/consumptive use and historic data

## Sentinel Wells and Minimum Water Level Elevation

- Establish sentinel wells or groups of wells in each subarea
- Using the current water level elevation, the current rate of decline, and the timeline for implementing PTW to establish a minimum groundwater elevation per subarea
- Evaluate progress in relation to this minimum groundwater elevation

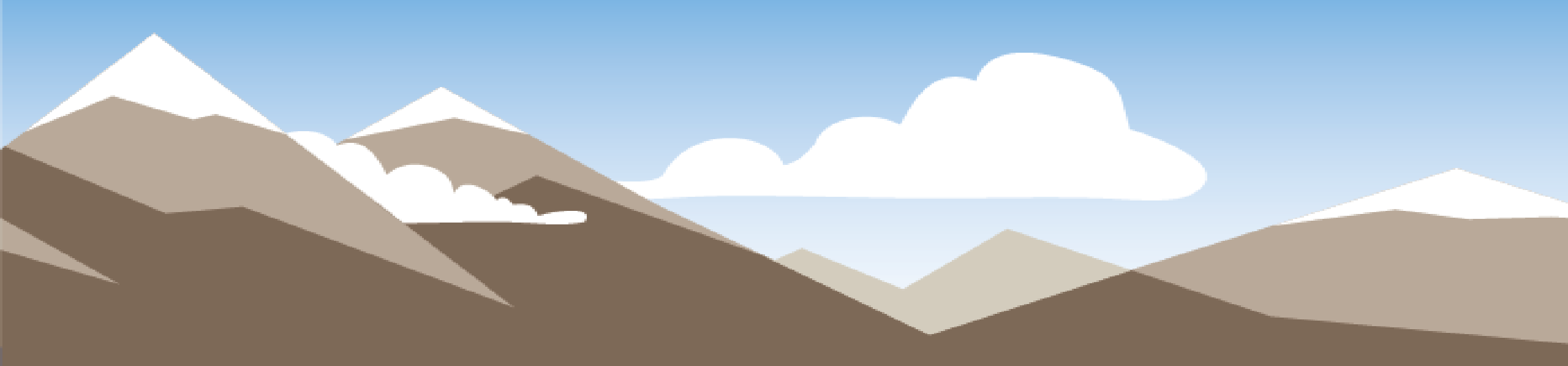
# Thresholds for lower priority subareas

- In lower priority subareas, establishing thresholds for future action can help incentivize voluntary reductions
- What thresholds should we establish?
  - Magnitude of decline
  - Rate of decline
  - Groundwater level elevation

## Discussion

- Ivan presented some of these concepts to GWAC and the WRC and we received feedback (recordings are online)

Questions and Feedback?



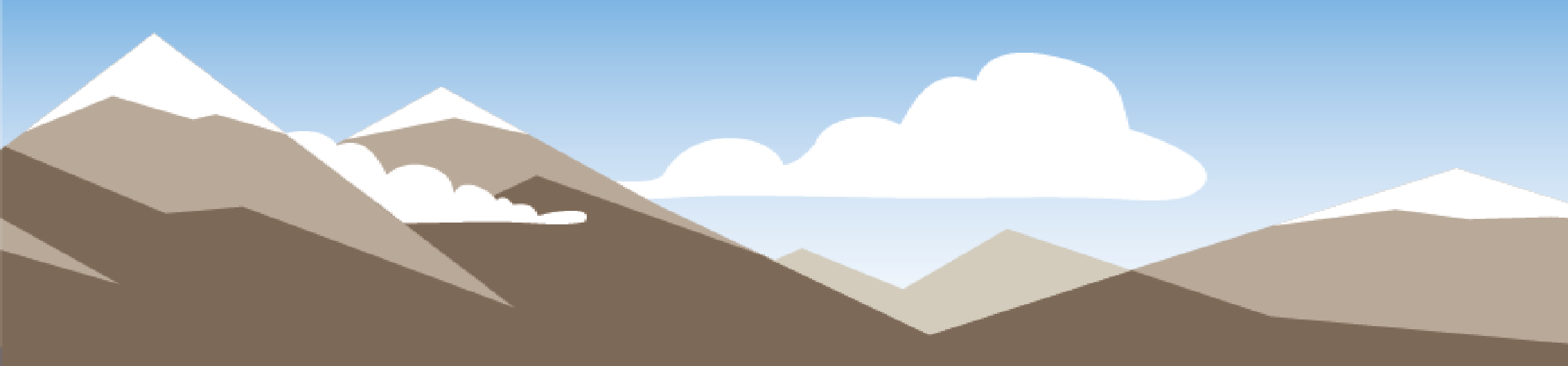
Questions or Comments?





The background features a stylized landscape. The top portion shows brown mountains with white snow-capped peaks and white, fluffy clouds against a light blue sky. The middle section is a solid dark blue band. The bottom portion shows rolling green hills with light tan outlines, suggesting a valley or road.

# Public Comment



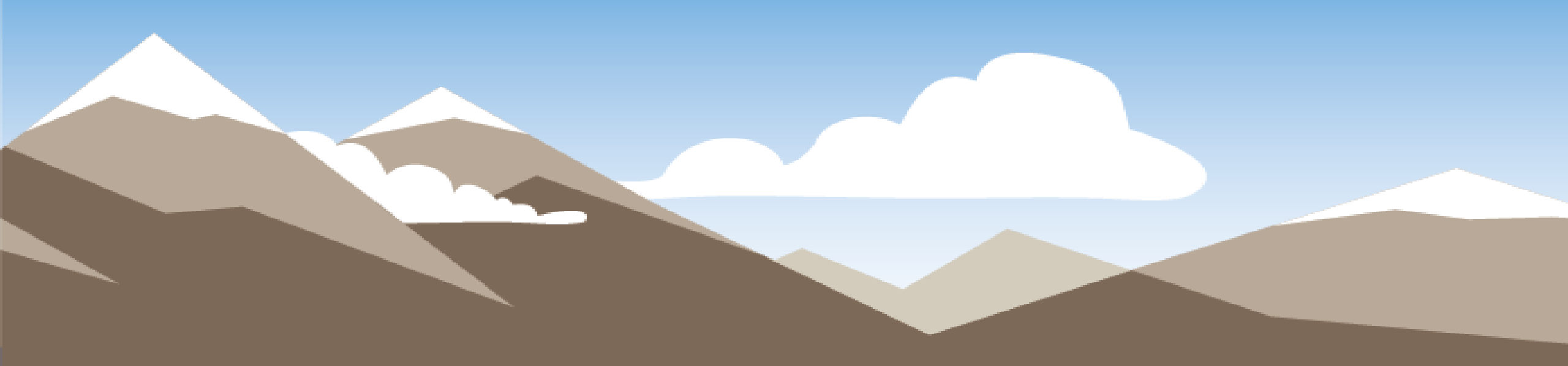
Next Steps/ Wrap up



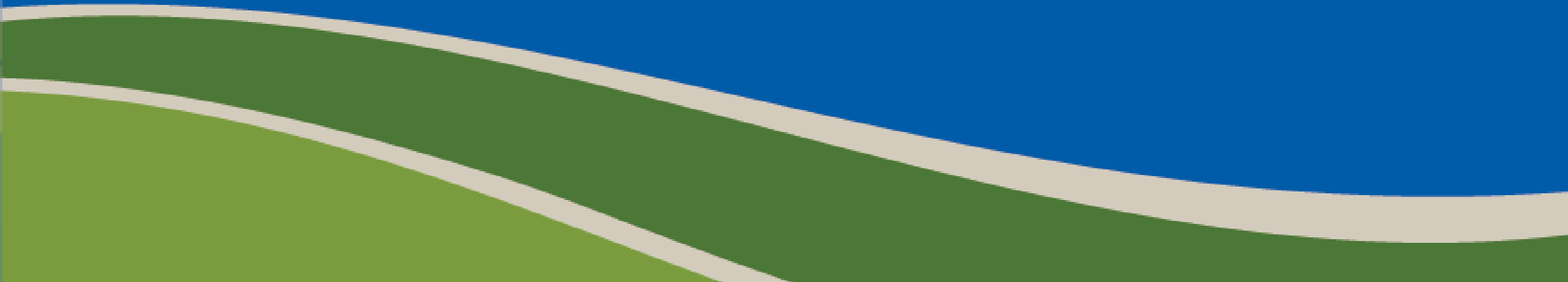


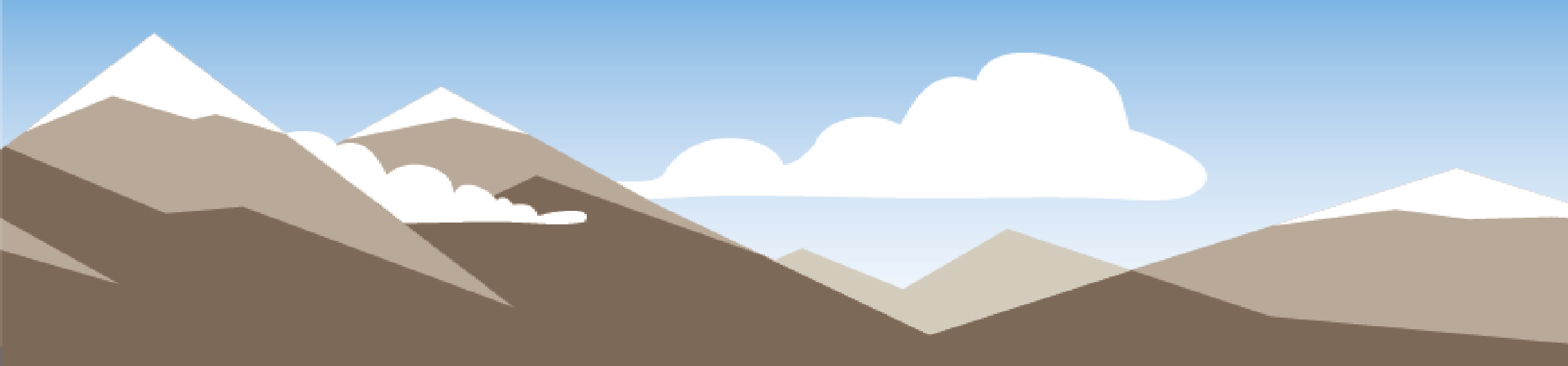
# Summary and Next Steps

- Next RAC: RAC #5, January 24, 2024
- Location: Harney County Community Center.
- Time: 1 pm to 5 pm.



Thank you





# Appendix Slides

