OREGON WATER RESOURCES DEPARTMENT

Memorandum

TO: Ivan Gall, Director
FROM: Ben Scandella, Darrick Boschmann; Groundwater Section
DATE: September 30, 2025
SUBJECT: Technical Evaluation of Petition to Amend Division 512

Introduction

On September 12, 2025, the Water Resources Commission received a rulemaking petition for OAR 690-512 (The Malheur Lake Basin Program rules). The petition included proposed rule language submitted as an alternative to the Oregon Water Resources Department (OWRD) proposed rules that had been developed through the Division 512 Rules Advisory Committee process. The proposed rules included in the petition contain numerous substantive differences from OWRD's proposed rules with respect to groundwater management in the Harney Basin (Figure 1).

This memo outlines the Department's process for modeling the petitioner's groundwater management scenario and describes the modeled outcomes in terms of various hydrologic factors using the Harney Basin Groundwater Model (HBGM; Gingerich and others, 2024). For comparison, this memo also outlines the outcomes from the OWRD proposed groundwater management scenario. Note that there are many aspects of the proposed rule language both in the petition and in the OWRD proposed rules that are outside the scope of this modeling exercise.

The modeling results presented here provide a sound basis for evaluating groundwater system response under different groundwater management scenarios. However, all groundwater flow models are a mathematical simplification of complex natural systems. As such they are subject to uncertainty and limitations arising from assumptions in conceptualizations, the availability of data, and the approximations inherent in numerical simulation. Therefore, model results should be interpreted as one possible representation of system behavior rather than a precise prediction of future conditions. For a full discussion of model development, calibration, uncertainty and limitations, see Gingerich and others, 2024.

Model Inputs

The petitioner's proposed rules [hereinafter 'Petition Proposal'] and OWRD's proposed rules [hereinafter 'OWRD Proposal'] are structured around several parameters defined to specify how groundwater management will occur in the basin. These management parameters are used as model inputs and constraints in the HBGM to define how the model scenarios will proceed over the model period, and include:

- Spatial extent
- Permissible total withdrawal (PTW, the amount of pumping that can occur in an area)

- Frequency of adaptive management
- Timeline for pumping reductions

The Petition Proposal and the OWRD Proposal are simulated with the HBGM from 2018 to 2098 using mean 1982-2016 recharge for annual recharge in the forward-looking simulations. Pumping is simulated using 2018 values until the onset of pumpage reductions. The exemption of specific types of water rights and the proposed reduction in duty to 2.5 acre-feet per acre was not implemented in any of the simulations presented here, for consistency with results presented previously to the Rules Advisory Committee.

Petition Proposal

The Petition Proposal designates 5 separate CGWAs covering the Greater Harney Valley Groundwater Area of Concern as shown in Figure 2. There are four notable differences between the boundaries of the OWRD Proposal subareas and the Petition Proposal CGWAs:

- Portions of the OWRD Proposal Dog Mountain subarea are combined into the Petition Proposal Weaver Springs and Silvies CGWAs.
- The OWRD Proposal Lower Blitzen-Voltage and Upper Blitzen subareas are combined into the Blitzen-Voltage CGWA.
- The boundary between the Lower Blitzen-Voltage subarea and the Northeast-Crane subarea is shifted northward.
- The six PLSS-section projection of the GHVGAC on the southeast margin is removed.

For two CGWAs (Weaver Springs and Northeast-Crane) permissible total withdrawal (PTW) is specified and a schedule for reductions defined. For the remaining 3 CGWAs (Silver Creek, Silvies, Blitzen-Voltage) 10% voluntary reductions from 2017/2018 mean pumping are required by 2040. The Petition Proposal also includes decline triggers which, if met, would allow for implementation of additional regulatory controls through subsequent rulemaking and contested case proceedings. These decline triggers and additional regulatory controls are not considered or implemented in the model scenario here, as any additional regulatory controls implemented through subsequent rulemaking are not specified.

For the Weaver Springs CGWA the model scenario for the Petition Proposal assumed 2018 pumpage continues from 2019-2027, and reductions down to the PTW are implemented in full in 2028. Pumpage reductions are applied to permitted wells based on prior appropriation. Management parameters for the Weaver Springs CGWA are described in Table 1.

For the Northeast-Crane CGWA the model scenario for the Petition Proposal assumed 2018 pumpage continues from 2019-2027, and reductions down to the PTW are implemented starting in 2028 at six-year intervals as described in Table 2. Pumpage reductions are applied to permitted wells based on prior appropriation. Management parameters for the Northeast-Crane CGWA are described in Table 2.

For the Silver Creek, Silvies, and Blitzen-Voltage CGWAs the model scenario for the Petition Proposal assumed 2018 pumpage continues from 2019-2039, and a 10% reduction from 2017/2018 mean pumpage is implemented in 2040. Pumpage reductions are distributed equally across all permitted wells. Management parameters for the Silver Creek, Silvies, and Blitzen-Voltage CGWAs are described in

Table 3. The values supporting determination of Permissible Total Withdrawal (PTW) in these subareas are shown in Table 4.

Table 1: Management parameters for Petition Proposal Weaver Springs Critical Groundwater Area (CGWA)

Parameter	Petition Proposal
Spatial extent	Weaver Springs CGWA
Permissible total withdrawal	9.2 thousand acre-feet
Frequency of adaptation	N/A
Timeline for reductions	PTW implemented fully in 2028

Table 2: Management parameters for Petition Proposal Northeast-Crane Critical Groundwater Area (CGWA)

Parameter	Petition Proposal
Spatial extent	Northeast-Crane CGWA
Permissible total withdrawal	37.0 thousand acre-feet
Frequency of adaptation	6 years
Timeline for reductions	24-year adjustment period starting in 2028 with a curtailment breakdown of 30-20-20-20-10 percent at the 6-year checkpoints

Table 3: Management parameters for Petition Proposal Silver Creek, Silvies, and Blitzen-Voltage Critical Groundwater Areas (CGWAs)

Parameter	Petition Proposal
Spatial extent	Silver Creek CGWA; Silvies CGWA; Blitzen-Voltage CGWA
Permissible total withdrawal	10% voluntary reductions from 2017/2018 mean pumping
Frequency of adaptation	6 years (if necessary)
Timeline for reductions	Reductions implemented in 2040

Table 4: Values supporting determination of modeled pumpage beginning in year 2040 in subareas where a voluntary 10% reduction from the average 2017-2018 pumpage was proposed in the Petition. All values are specified in TAF/yr (thousand acre-feet per year). PTWs were specified directly in the petition rule language for the Northeast-Crane (37.0 TAF/yr) and Weaver Springs Subareas (9.2 TAF/yr).

CGWA	Modeled 2017 Nonexempt Pumpage	Modeled 2018 Nonexempt Pumpage	Modeled 2017-2018 Mean Nonexempt Pumpage	Modeled Pumpage Beginning 2040
Blitzen	16.7	16.6	16.6	15.0
Silver Creek	22.6	21.0	21.8	19.6
Silvies	34.6	28.9	31.8	28.6

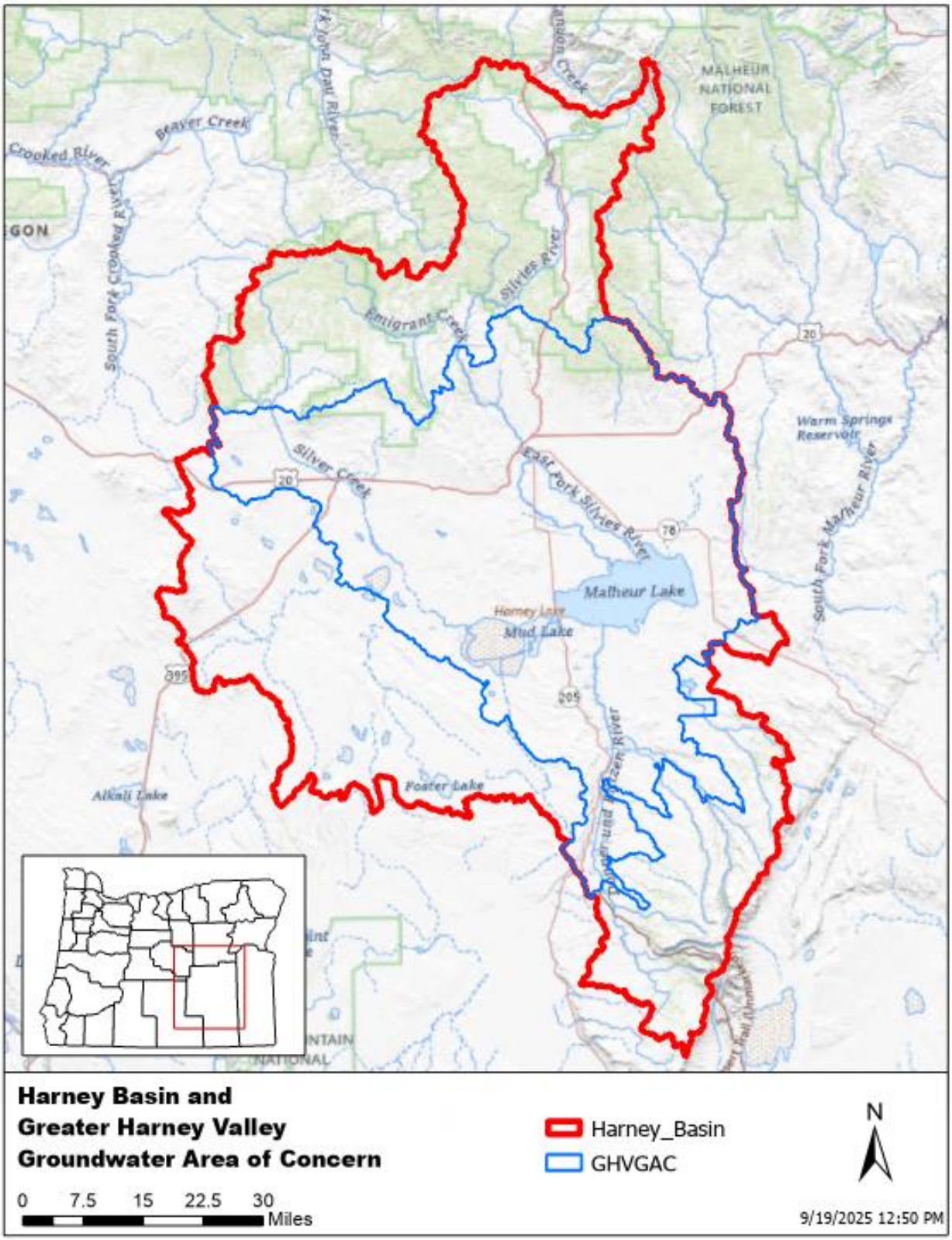

Figure 1: Map showing the extent of the Harney Basin and Greater Harney Valley Groundwater Area of Concern (GHVGAC).

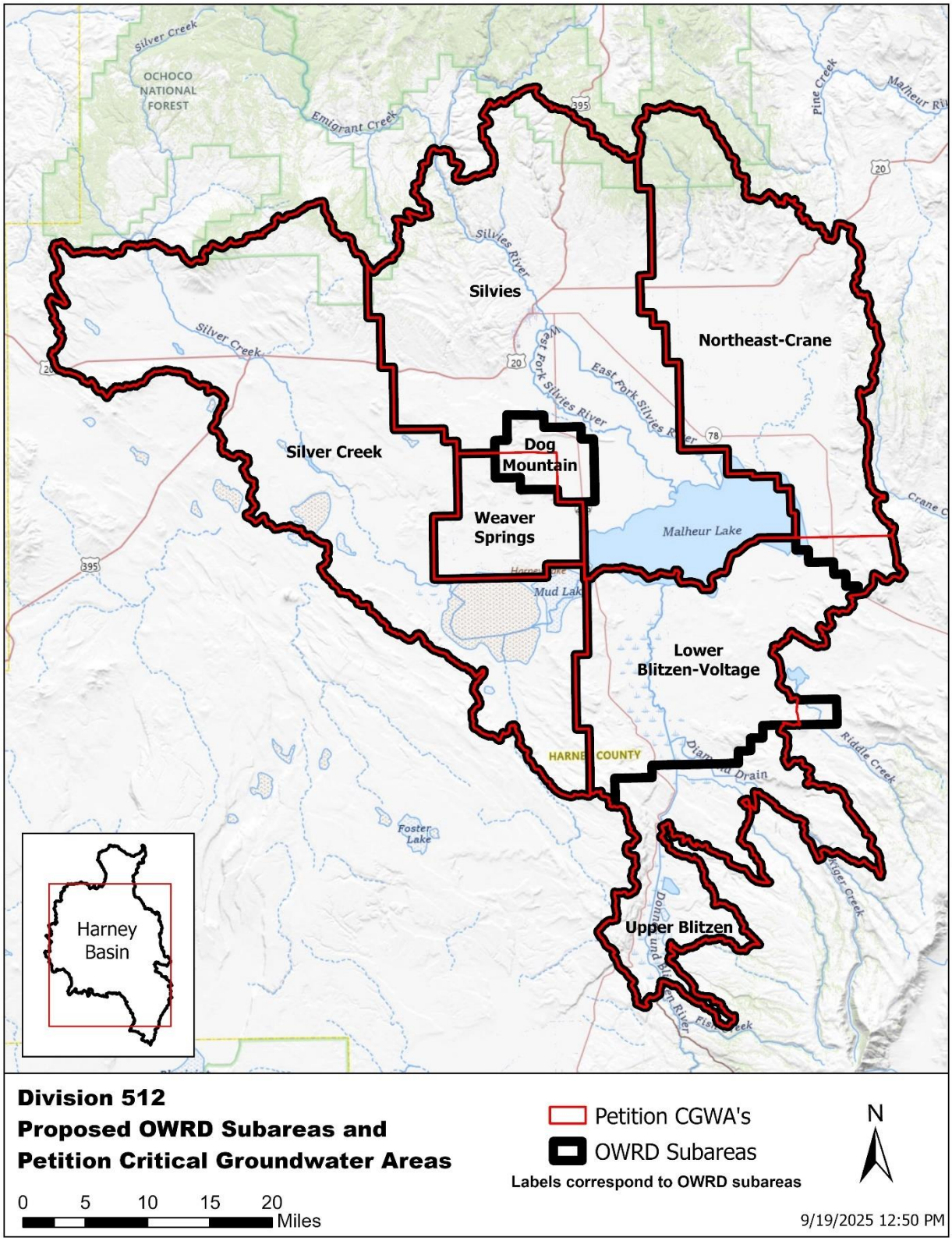

Figure 2: Map showing comparison of OWRD Proposal and Petition Proposal Critical Groundwater Area and Subarea Boundaries.

OWRD Proposal

The OWRD Proposal designates the Greater Harney Valley Groundwater Area of Concern (GHVGAC; Figure 1) as a single Critical Groundwater Area (CGWA) with 7 subareas as shown in Figure 2. For each subarea permissible total withdrawal (PTW) is specified and a schedule for reductions defined. The PTW for each subarea (Table 5) was determined through an iterative modeling optimization process constrained by the management parameters described in Table 6.

The goal of the OWRD Proposal was to achieve durable stability by 2058 for 50th percentile (median) of model cells with wells ("well-cells") in each subarea after 30 years, except in Weaver Springs and Upper Blitzen. As used to constrain the model, durable stability by 2058 means that by 2058 and for every model-year thereafter, the interannual rate of groundwater level change in a model cell is zero feet per year or rising. Durable stability by 2058 in the median for a subarea means that the median (among well-cells in that subarea) interannual rate of change (minimum from 2058 through the end of the model run) is zero feet per year or rising. In Weaver Springs, reductions from modeled 2018 pumpage were fixed at a 75% reduction. Pumpage was not reduced in Upper Blitzen. In all other subareas, the PTW value was optimized to be the largest amount of nonexempt pumpage that achieved durable stability for 50th percentile of wells cells in that subarea by 2058. The pumpage reductions from 2018 values to the PTW were phased in incrementally, with 40%, 30%, 15%, 10%, and 5% of the total implemented at 6-year intervals beginning in 2028.

For all subareas the model scenario assumed 2018 pumpage continues from 2019-2027, and reductions down to the PTW are implemented starting in 2028 at six-year intervals as described in Table 6. Pumpage reductions are applied to permitted wells based on prior appropriation.

Table 5: Permissible Total Withdrawal (PTW) for subareas in the OWRD Proposal.

Subarea	**PTW (thousand acre-ft per year)**
Dog Mountain	4.2
Lower Blitzen-Voltage	8.3
Northeast-Crane	35.0
Silver Creek	15.2
Silvies	21.2
Weaver Springs	4.8

Table 6: Management parameters for the OWRD Proposal.

Parameter	OWRD Proposal
Spatial extent	GHVGAC with 7 subareas
Permissible total withdrawal	See Table 5
Frequency of adaptation	Every 6 years
Timeline for reductions	Weaver Springs: 75% in year 1, 25% in year 6 Upper Blitzen: no reductions All others: 24-year adjustment period starting in 2028 with a curtailment breakdown of 40-30-15-10-5 percent at the 6-year checkpoints

Model Results

The following hydrologic factors are used to evaluate the outcomes of the Petition Proposal on various aspects of the groundwater-flow system:

- Groundwater level change magnitude
- Groundwater level change rate
- Groundwater levels
- Impacts to dry domestic wells
- Impacts to springs and streams
- Impacts to natural evapotranspiration (ET)

The figures and tables presented here compare the modelled outcomes of the Petition Proposal and OWRD Proposal. In some instances, Scenario 1 from Gingerich and others (2024) is included for comparison purposes. In Scenario 1 from Gingerich and others (2024) [hereinafter 'Full Pumpage'], the model assumes average recharge and 2018 pumpage remain constant throughout the model period, representing the outcomes of continuing current pumping levels on the groundwater-flow system. To allow for direct comparison of model outcomes across equivalent spatial extents, in some cases the model results in the figures and tables presented here are aggregated over the 7 subareas from the OWRD proposal.

A time-series plot of groundwater pumpage for non-exempt uses from 2018-2098 used to model the OWRD Proposal and Petition Proposal is shown in Figure 3. Pumpage is shown both in thousand acre-feet per year and as a percentage reduction from 2018 pumpage. The Full Pumpage scenario is included for comparison. Pumpage under both proposals steps down at 6-year intervals starting in 2028 as described in Tables 2-5, with the final reduction in pumping implemented in 2052.

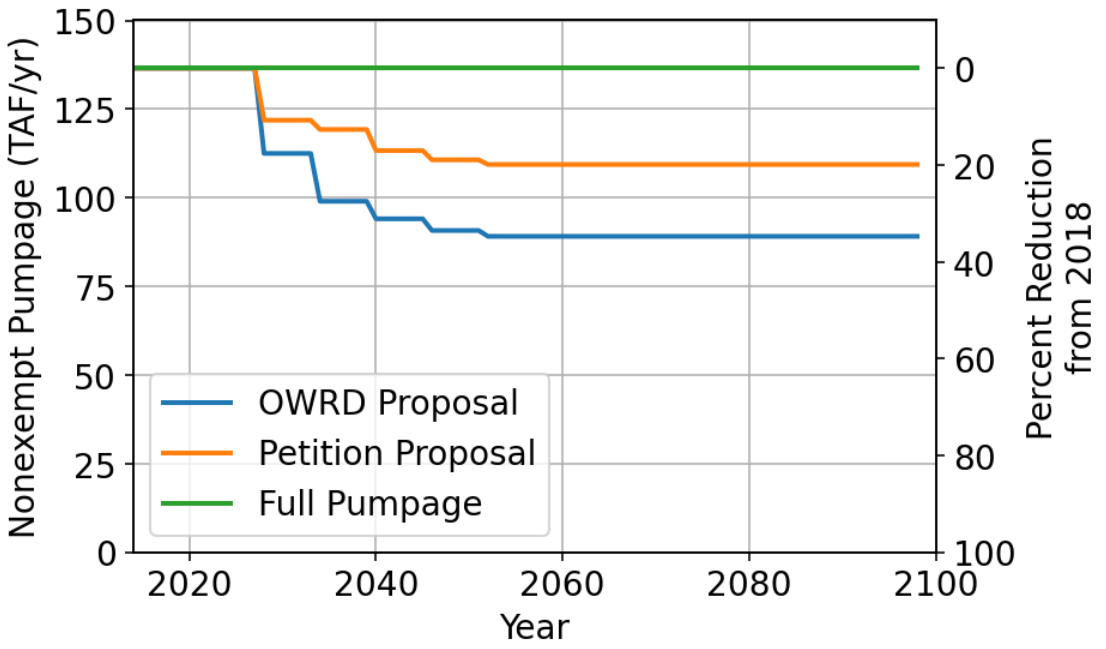

Figure 3: Time series of groundwater pumpage for non-exempt uses over the model period for the OWRD Proposal and Petition Proposal within the GHVGAC boundary. USGS full pumpage scenario included for comparison.

Groundwater Level Change Magnitude

Time-series plots of modeled median groundwater level change magnitude since 2018 under the OWRD Proposal and the Petition Proposal are shown in Figure 4-Figure 10. The Full Pumpage scenario is included for comparison. Values are plotted relative to 2018 modeled groundwater levels and therefore do not account for the groundwater level declines that had already occurred prior to 2018, which were significant in some parts of the basin.

Under the Petition Proposal median groundwater level changes in the Dog Mountain subarea (Figure 4) continue to decline through the entire model period. At the end of the model period, the median groundwater level changes remain in a state of decline, and the median groundwater level change since 2018 is a decline of 9.7 feet.

Under the OWRD Proposal median groundwater level changes in the Dog Mountain subarea continue to decline until 2046, after which they stabilize and begin a slow recovery through the end of the model period. At the end of the model period, the median groundwater level change since 2018 is a decline of 4.1 feet.

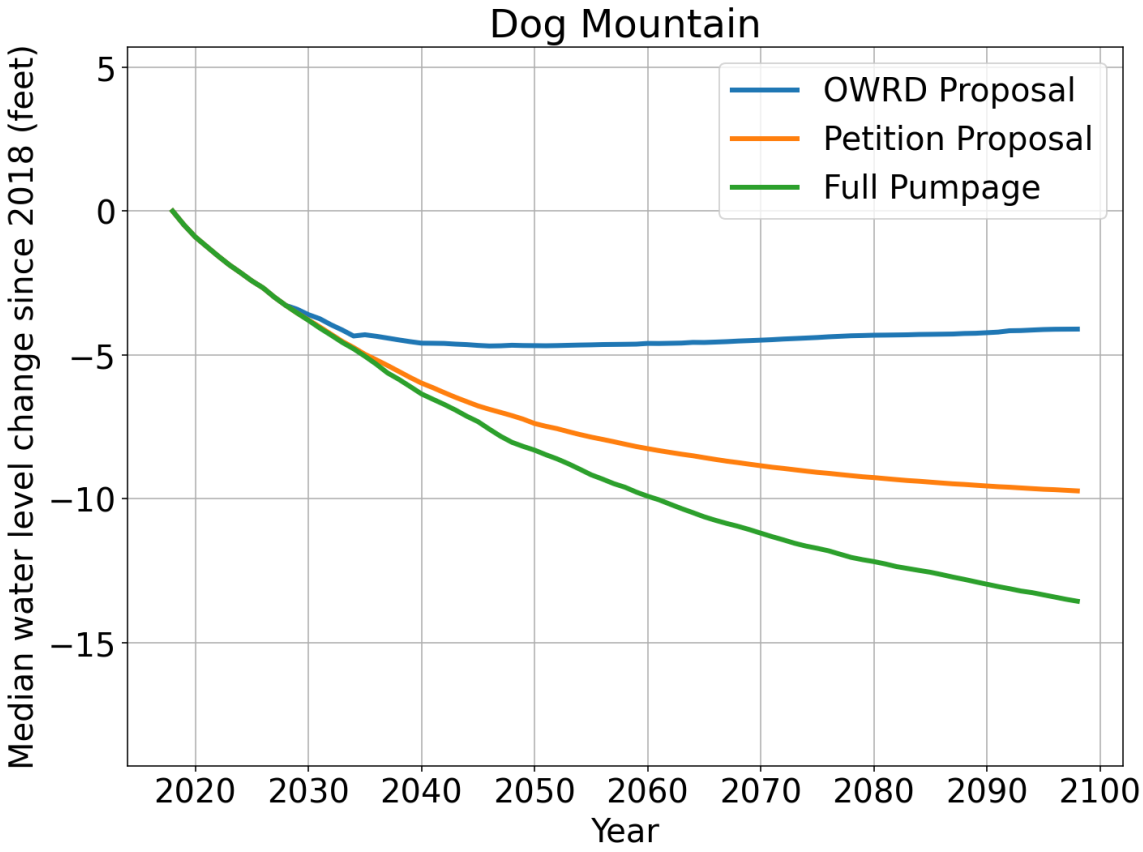

Figure 4: Time-series of median water level change since 2018 in the OWRD Proposal Dog Mountain Subarea under the OWRD Proposal, Petition Proposal, and Full Pumpage scenario. The results of the petition proposal are aggregated over the OWRD Proposal subarea for comparison.

Under the Petition Proposal median groundwater level changes in the Lower Blitzen-Voltage subarea (Figure 5) continue to decline through the entire model period. At the end of the model period, the median groundwater level changes remain in a state of decline, and the median groundwater level change since 2018 is a decline of 11.6 feet.

Under the OWRD Proposal median groundwater level changes in the Lower Blitzen-Voltage subarea continue to decline until 2040, after which they stabilize and begin a slow recovery through the end of the model period. At the end of the model period, the median groundwater level change since 2018 is a decline of 5.0 feet.

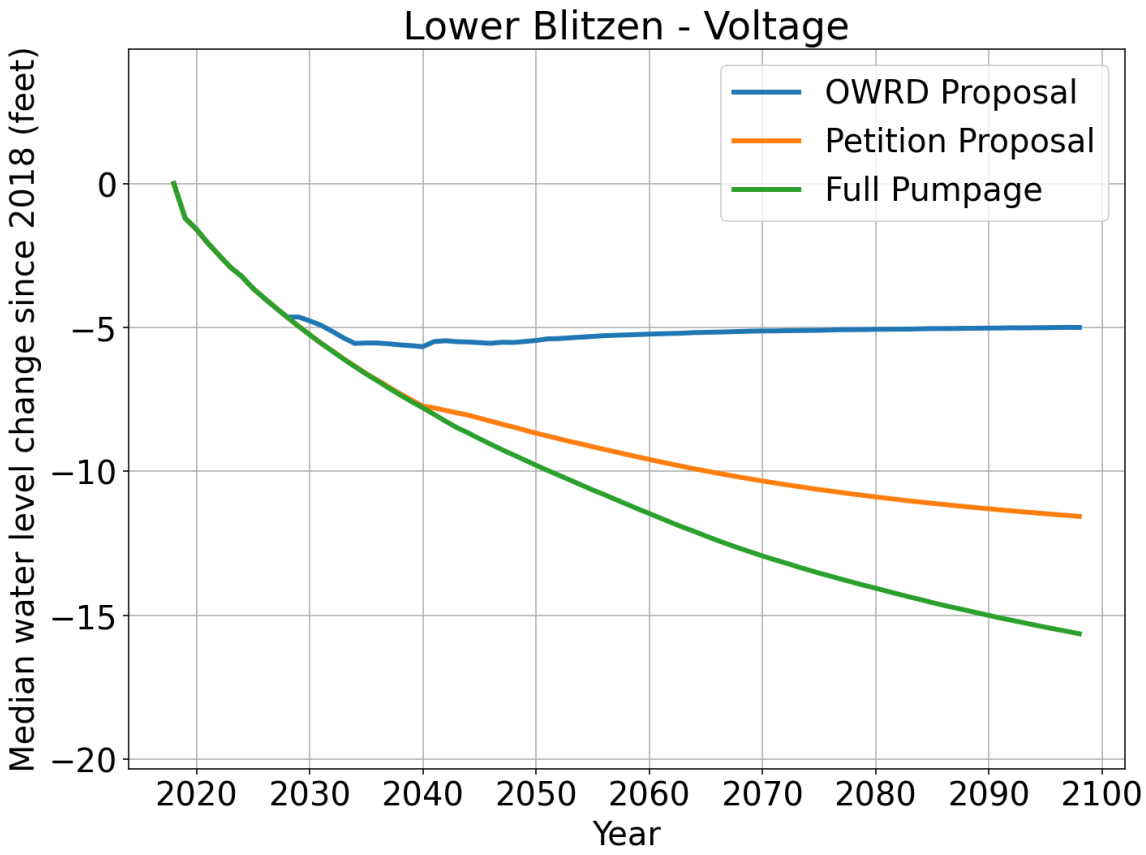

Figure 5: Time-series of median water level change since 2018 in the OWRD Proposal Lower Blitzen-Voltage Subarea under the OWRD Proposal, Petition Proposal, and Full Pumpage scenario. The results of the petition proposal are aggregated over the OWRD Proposal subarea for comparison.

Under the Petition Proposal median groundwater level changes in the Northeast-Crane subarea (Figure 6) continue to decline through the entire model period. At the end of the model period median groundwater level changes remain in a state of decline, and the median groundwater level change since 2018 is a decline of 24.8 feet.

Under the OWRD Proposal median groundwater level changes in the Northeast-Crane subarea continue to decline until 2054, after which they stabilize and begin a slow recovery through the end of the model period. At the end of the model period, the median groundwater level change since 2018 is a decline of 15.6 feet.

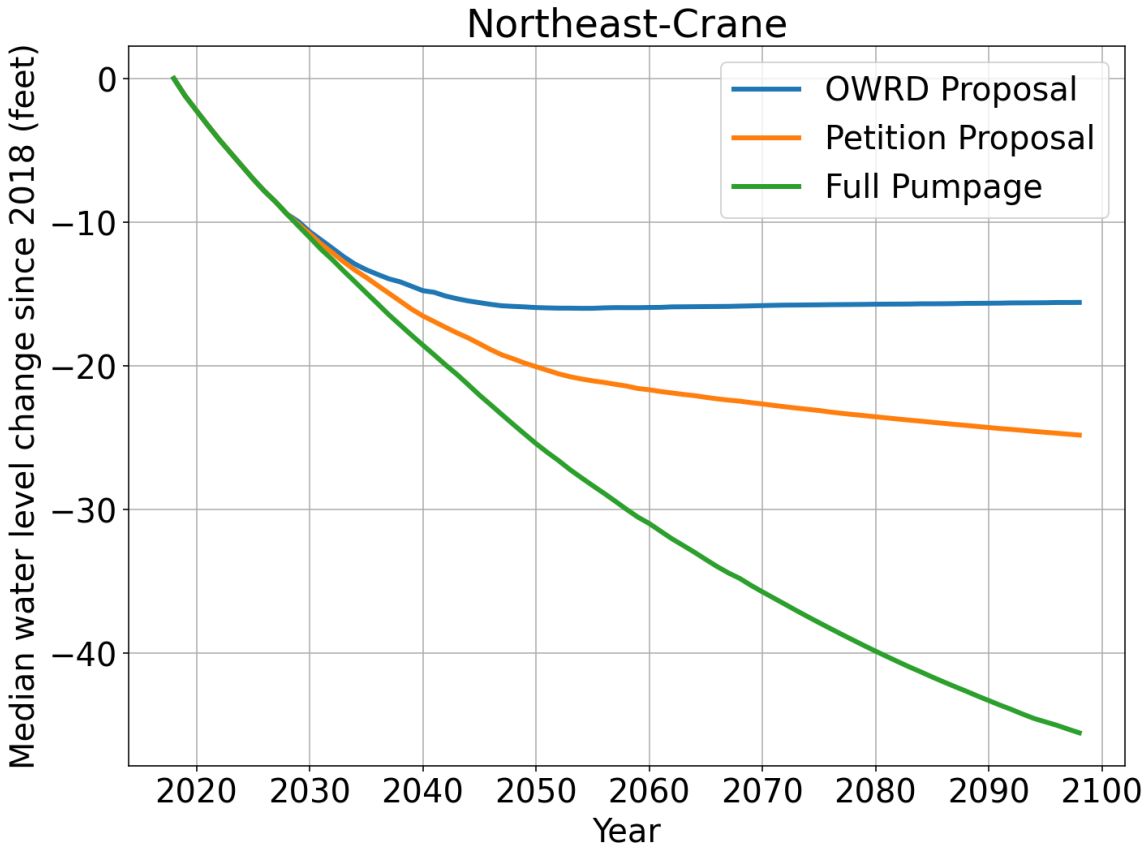

Figure 6: Time-series of median water level change since 2018 in the OWRD Proposal Northeast-Crane Subarea under the OWRD Proposal, Petition Proposal, and Full Pumpage scenario. The results of the petition proposal are aggregated over the OWRD Proposal subarea for comparison.

Under the Petition Proposal median groundwater level changes in the Silver Creek subarea (Figure 7) continue to decline through the entire model period. At the end of the model period, they remain in a state of decline, and the median groundwater level change since 2018 is a decline of 10.3 feet.

Under the OWRD Proposal median groundwater level changes in the Silver Creek subarea continue to decline until 2052, after which they stabilize and begin a slow recovery through the end of the model period. At the end of the model period, the median groundwater level change since 2018 is a decline of 5.3 feet.

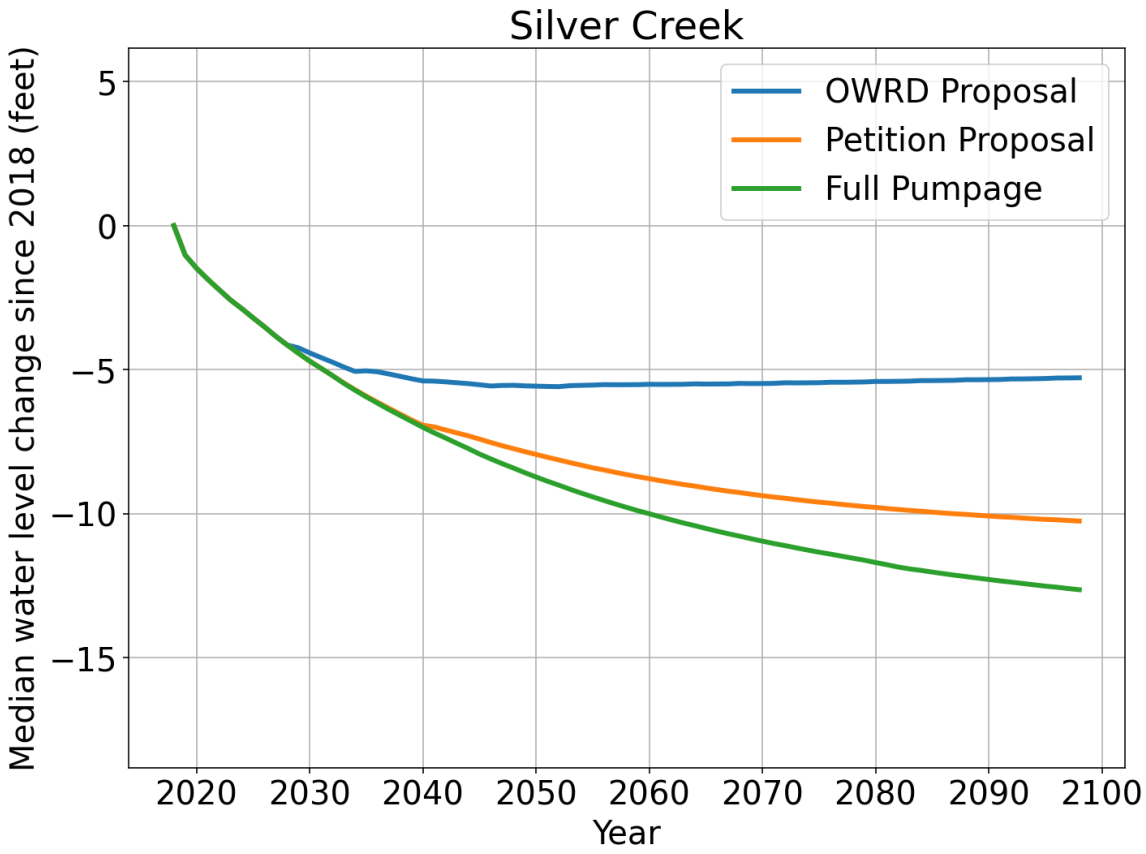

Figure 7: Time-series of median water level change since 2018 in the OWRD Proposal Silver Creek Subarea under the OWRD Proposal, Petition Proposal, and Full Pumpage scenario. The results of the petition proposal are aggregated over the OWRD Proposal subarea for comparison.

Under the Petition Proposal median groundwater level changes in the Silvies subarea (Figure 8) continue to decline through the entire model period. At the end of the model period, they remain in a state of decline, and the median groundwater level change since 2018 is a decline of 2.8 feet.

Under the OWRD Proposal median groundwater level changes in the Silvies subarea continue to decline until 2028, after which they stabilize and begin a slow recovery through the end of the model period. At the end of the model period, the median groundwater level change since 2018 is an increase of 0.1 feet.

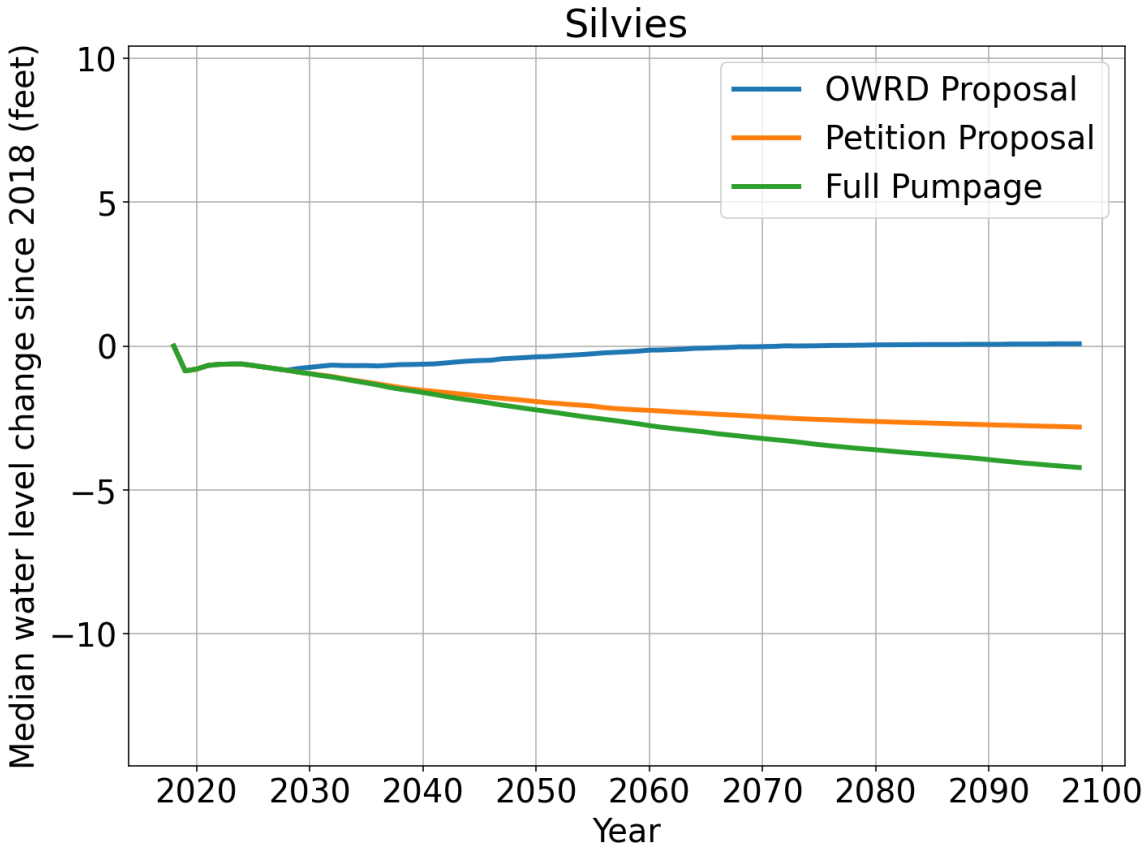

Figure 8: Time-series of median water level change since 2018 in the OWRD Proposal Silvies Subarea under the OWRD Proposal, Petition Proposal, and Full Pumpage scenario. The results of the petition proposal are aggregated over the OWRD Proposal subarea for comparison.

Under the Petition Proposal median groundwater level changes in the Upper Blitzen subarea (Figure 9) undergo a slow recovery through the end of the model period. At the end of the model period, the median groundwater level change since 2018 is an increase of 0.2 feet.

Under the OWRD Proposal median groundwater level changes in the Upper Blitzen subarea undergo a slow recovery through the end of the model period. At the end of the model period, the median groundwater level change since 2018 is an increase of 0.2 feet.

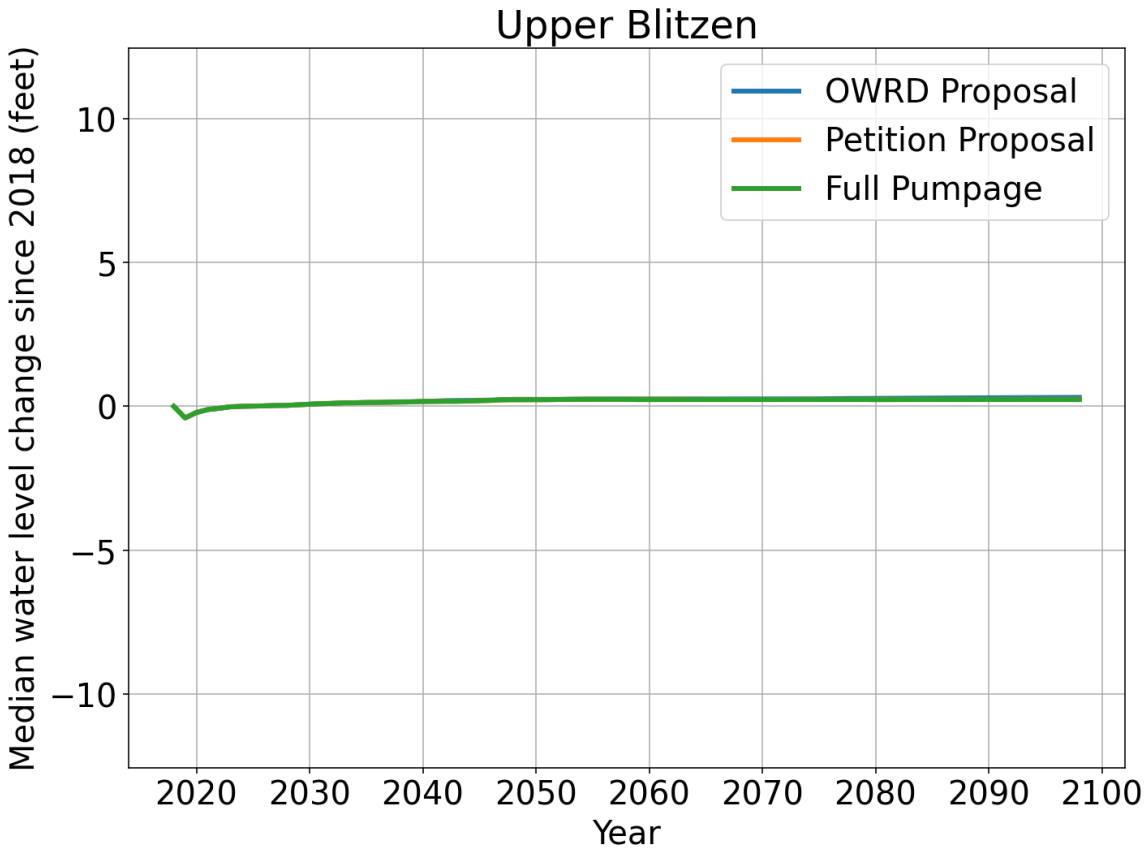

Figure 9: Time-series of median water level change since 2018 in the OWRD Proposal Upper Blitzen Subarea under the OWRD Proposal, Petition Proposal, and Full Pumpage scenario. The results of the petition proposal are aggregated over the OWRD Proposal subarea for comparison.

Under the Petition Proposal median groundwater level changes in the Weaver Springs subarea (Figure 10) continue to decline until 2028, after which they transition to a steady recovery until 2080 and then stabilize through the end of the model period. At the end of the model period, the median groundwater level change since 2018 is a decrease of 6.6 feet.

Under the OWRD Proposal median groundwater level changes in the Weaver Springs subarea continue to decline until 2028, after which they begin a rapid recovery through the end of the model period. At the end of the model period, the median groundwater level change since 2018 is an increase of 18.5 feet.

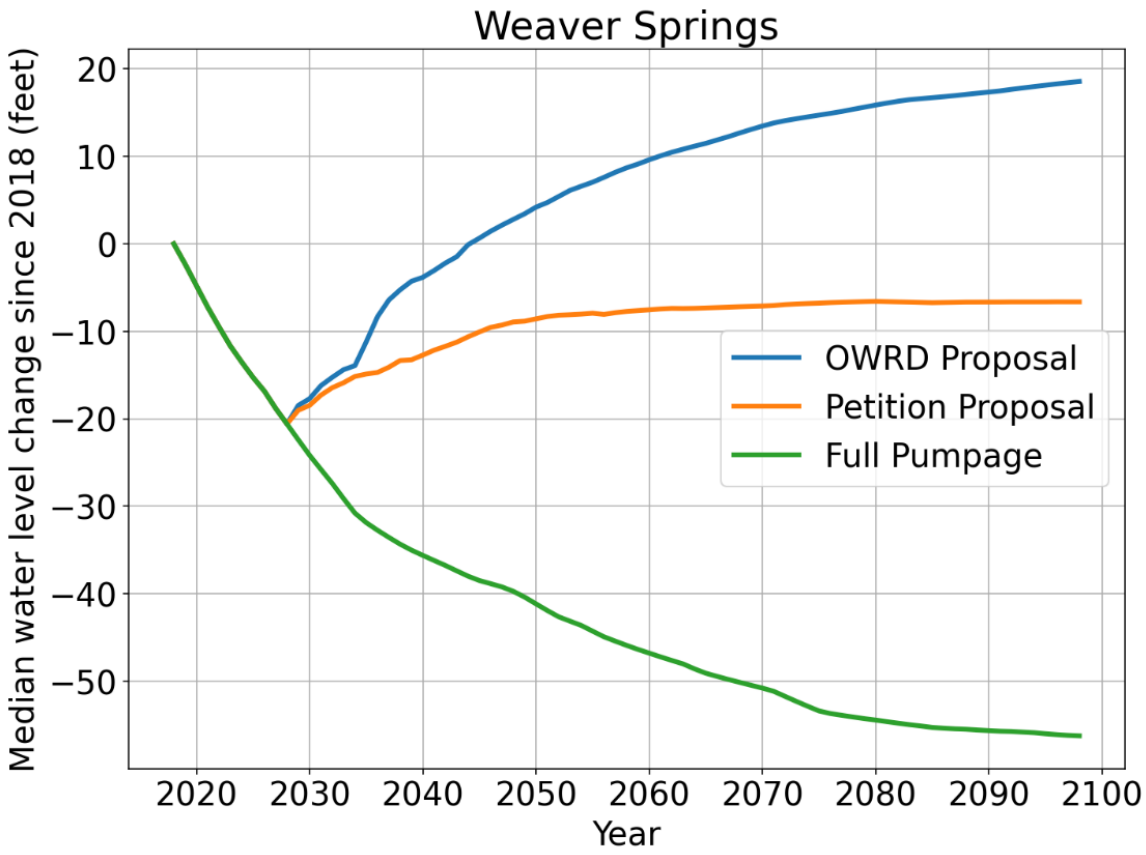

Figure 10: Time-series of median water level change since 2018 in the OWRD Proposal Weaver Springs Subarea under the OWRD Proposal, Petition Proposal, and Full Pumpage scenario. The results of the petition proposal are aggregated over the OWRD Proposal subarea for comparison.

Groundwater Level Change Rate

The violin plot in Figure 11 shows the distribution of minimum groundwater level rates of change after 2058 for the Petition Proposal aggregated over the 5 Petition Proposal CGWAs. With the exception of the Weaver Springs CGWA the median value (red dashed lines) is less than zero (declining) for all CGWAs, meaning that the median groundwater level change rate is not stable or rising in 2058 and does not reach stability in any model year thereafter. The 90th percentile rate (green dashed lines) is declining in Northeast-Crane, Silver Creek, and Silvies subareas, and is effectively zero in the Blitzen subarea, meaning that at least 90% of well-cells in each of these subareas are declining in year 2058 or later. Over the GHVGAC combined, 91% of well-cells continue to decline through in 2058 or later.

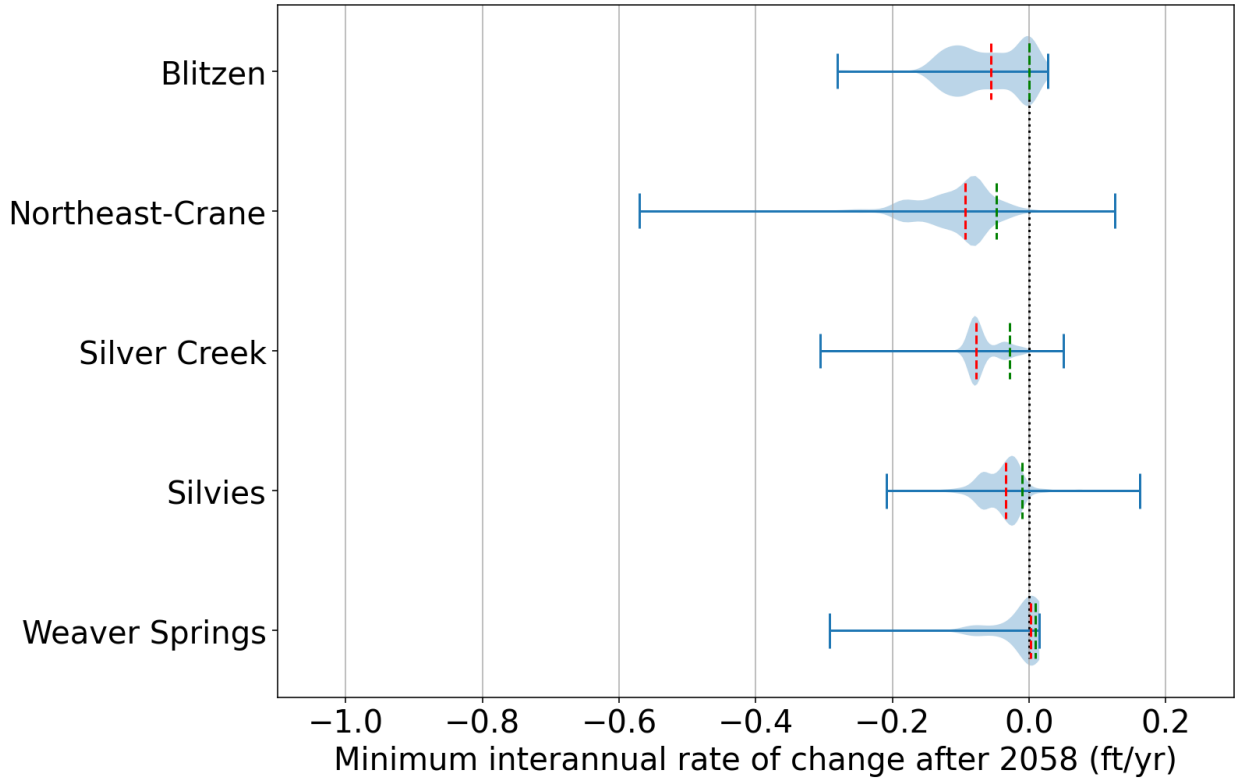

Figure 11: Violin plot showing the distribution of minimum interannual rates of change after 2058 for the Petition Proposal aggregated over the 5 Petition Proposal Critical Groundwater Areas. Red dashed line = median rate. Green dashed line 90th percentile rate. Black dotted line = 0.0 ft/yr.

The violin plot in Figure 12 shows the distribution of minimum groundwater level rates of change after 2058 for the Petition Proposal aggregated over the 7 OWRD Proposal subareas. With the exception of the Weaver Springs and Upper Blitzen subareas both the median value (red dashed lines) and 90th percentile rate (green dashed lines) is less than zero (declining) for all subareas. This means that more than 90% of well-cells are declining in 2058 or later in each of those 5 subareas.

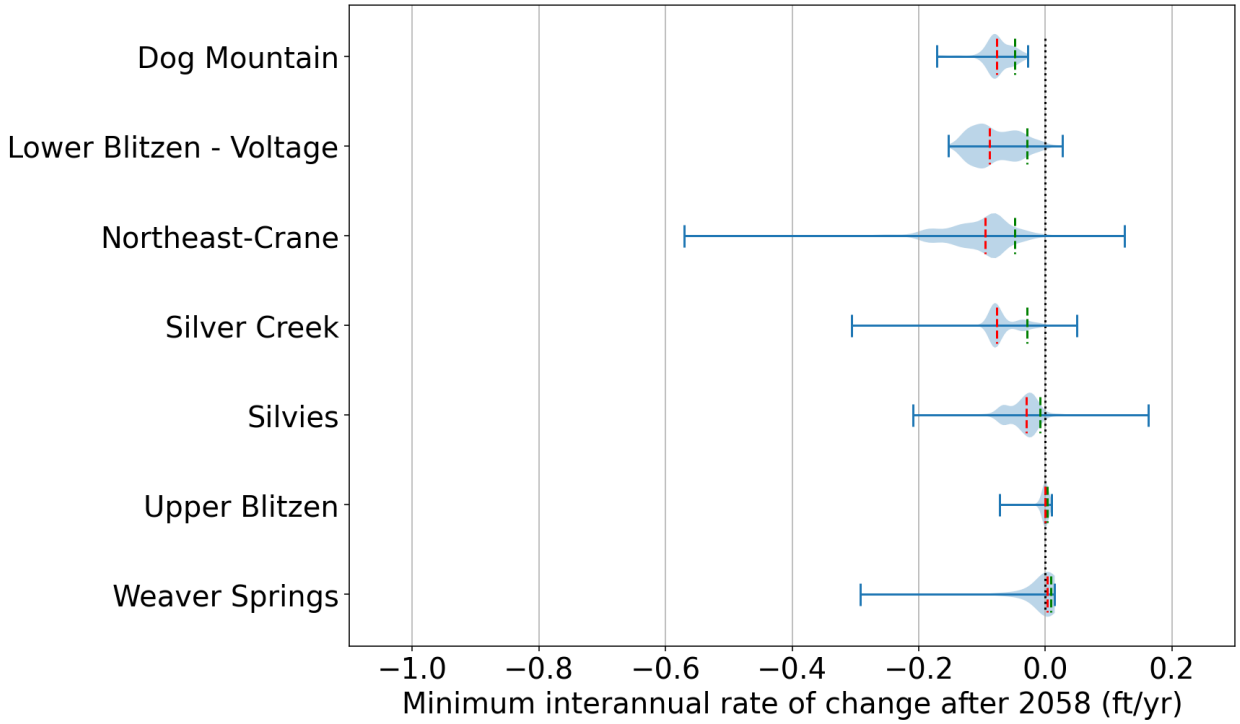

Figure 12: Violin plot showing the distribution of minimum interannual rates of change after 2058 for the Petition Proposal aggregated over the 7 OWRD Proposal subareas. Red dashed line = median rate. Green dashed line 90th percentile rate. Black dotted line = 0.0 ft/yr.

The violin plot in Figure 13 shows the distribution of minimum groundwater level rates of change after 2058 for the OWRD Proposal aggregated over the 7 OWRD Proposal subareas. With the exception of the Weaver Springs subarea, the median value (red dashed lines) is equal to zero (stable), meaning that the median groundwater level change rate is not declining in 2058 or any model year thereafter. In the Weaver Springs subarea the median value is greater than zero (rising groundwater levels) in 2058 and every model year thereafter. Over the entire GHVGAC, 44% of well cells do not achieve durable stability by 2058.

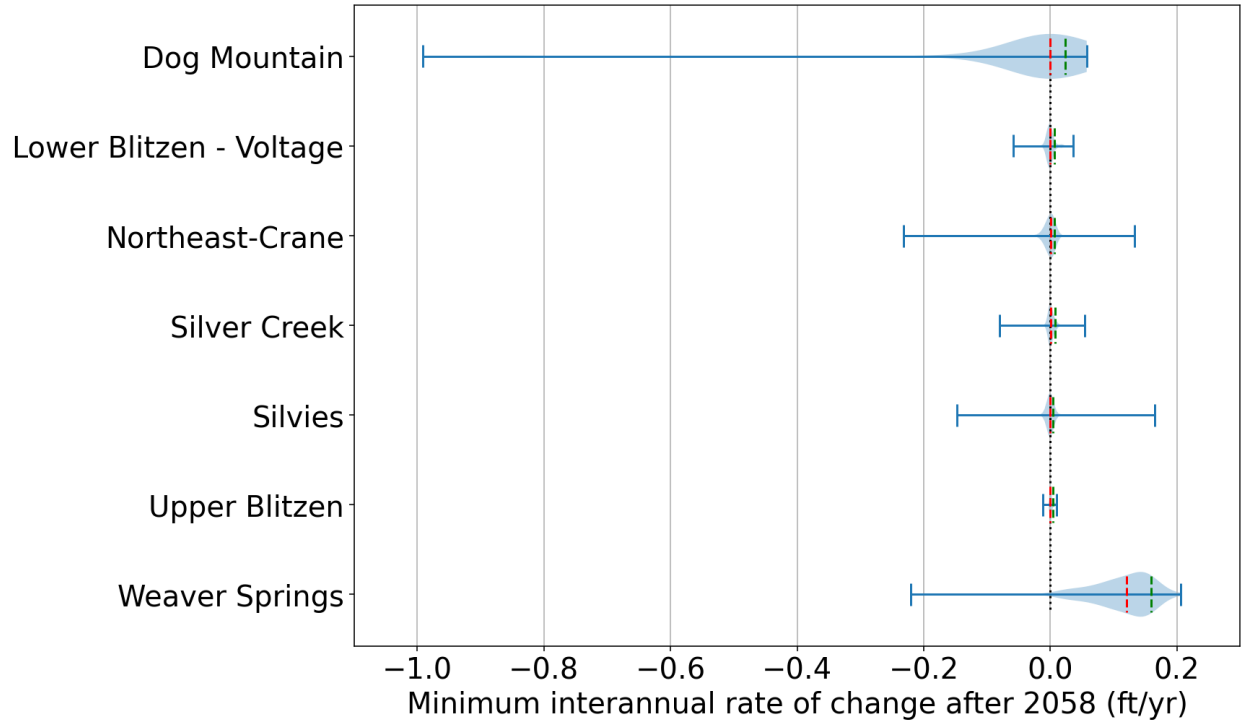

Figure 13: Violin plot showing the distribution of minimum interannual rates of change after 2058 for the OWRD Proposal aggregated over the 7 OWRD Proposal subareas. Red dashed line = median rate. Green dashed line 90th percentile rate. Black dotted line = 0.0 ft/yr.

The checkerboard plot in Figure 14 shows the median groundwater level rate of change after 30 years (2058) under the OWRD Proposal and Petition Proposal aggregated over the 7 OWRD Proposal subareas. The Full Pumpage scenario is included for comparison.

Under the OWRD Proposal the median groundwater level rate of change after 30 is stable in six subareas and rising in in the Weaver Springs subarea. This is a direct result of optimizing the model to determine PTW in those subareas to meet the goal of stability in 30 years and explicitly setting the PTW in the Weaver Springs subarea.

Under the Petition Proposal the median groundwater level rate of change after 30 years is stable only in the Upper Blitzen and Weaver Springs subareas but remains in a state of decline in all other subareas.

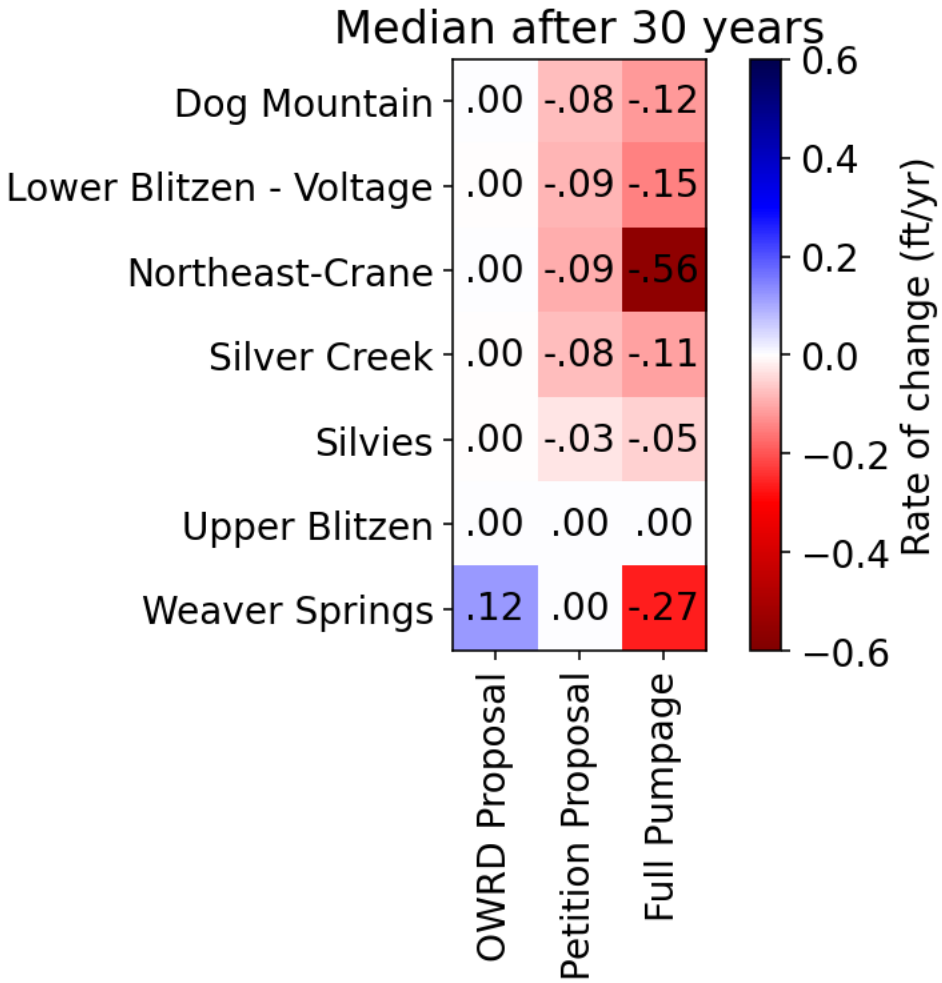

Figure 14: Checkerboard plot showing median rates of change after 30 years for the OWRD Proposal and Petition Proposal aggregated over the 7 OWRD Proposal subareas. Full Pumpage scenario included for comparison. Subareas are presented in alphabetical order from top to bottom. The color bar on the right shows how increasing interannual rates are represented by shades of blue, and decreasing rates by shades of red.

The two maps in Figure 15 show the groundwater level rates of change after 30 years (2058) under the OWRD Proposal (left) and Petition Proposal (right) in layer 2 of the model. Shades of blue on the map indicate rising groundwater levels, shades of red indicate declining groundwater levels, and white indicates approximately stable groundwater levels. The corresponding subarea boundaries and CGWA boundaries are shown for the OWRD Proposal and Petition Proposal for reference. Note that the areas of rising groundwater levels (blue) around the margins of the map area reflect the influence of consistent recharge in those upland areas.

Under the OWRD Proposal (left) groundwater level rates of change after 30 years are stable or rising nearly everywhere. An area of rising groundwater levels is centered around the Weaver Springs subarea as the cone of depression in that area continues to recover. Small, localized areas of groundwater level declines also remain, primarily in the Dog Mountain subarea and in the northern and southern parts of the Crane-Buchanan subarea.

Under the Petition Proposal (right) groundwater level rates of change after 30 years are still declining across most of the GHVGAC. An area of rising groundwater levels is centered around the Weaver Springs subarea as the cone of depression in that area continues to recover.

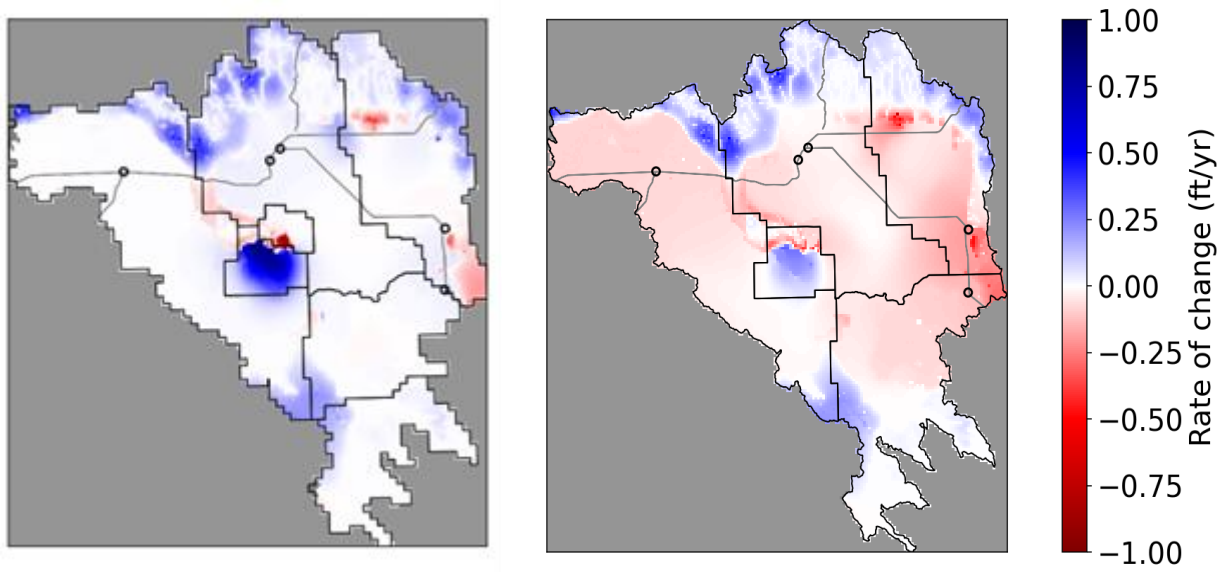

Figure 15: Maps showing the interannual rates of change in groundwater levels under the OWRD Proposal (left) and Petition Proposal (right). Both maps show rates in year 2058, 30 years after the onset of reductions in pumpage, and in layer 2 of the model. The black lines depict the two sets of geographic divisions used to distribute water; the right subfigure shows the 5 CGWAs in the Petition Proposal, and the left subfigure shows the 7 subareas in the OWRD Proposal. Gray lines indicate major roads, and black circles indicate select towns.

Groundwater Levels

The differences in groundwater levels between the OWRD Proposal and Petition Proposal 30 years after reductions begin (2058, left) and at the end of the modeling scenario (2098, right) are shown in Figure 16. Shades of blue indicate areas where groundwater levels in the Petition Proposal are higher than the OWRD Proposal. Shades of red indicate areas where groundwater levels in the OWRD Proposal are higher than the Petition Proposal. White indicates areas where there is no difference in groundwater levels between the two proposals.

In nearly all areas groundwater levels in the Petition Proposal are lower than the OWRD Proposal (red) at 30 years and at the end of the model period. The areas of equal groundwater levels (white) around the margins of the map area reflect the influence of consistent recharge in in those upland areas. The small, localized area of higher groundwater levels under the Petition Proposal (blue) near the center of the map area reflects differences in the boundary placement between the two proposals and the scale of pumping reductions in neighboring areas. In the Petition Proposal, this area falls within the Weaver Springs CGWA, which faces greater pumping reductions than the Dog Mountain subarea, where it is located under the OWRD Proposal.

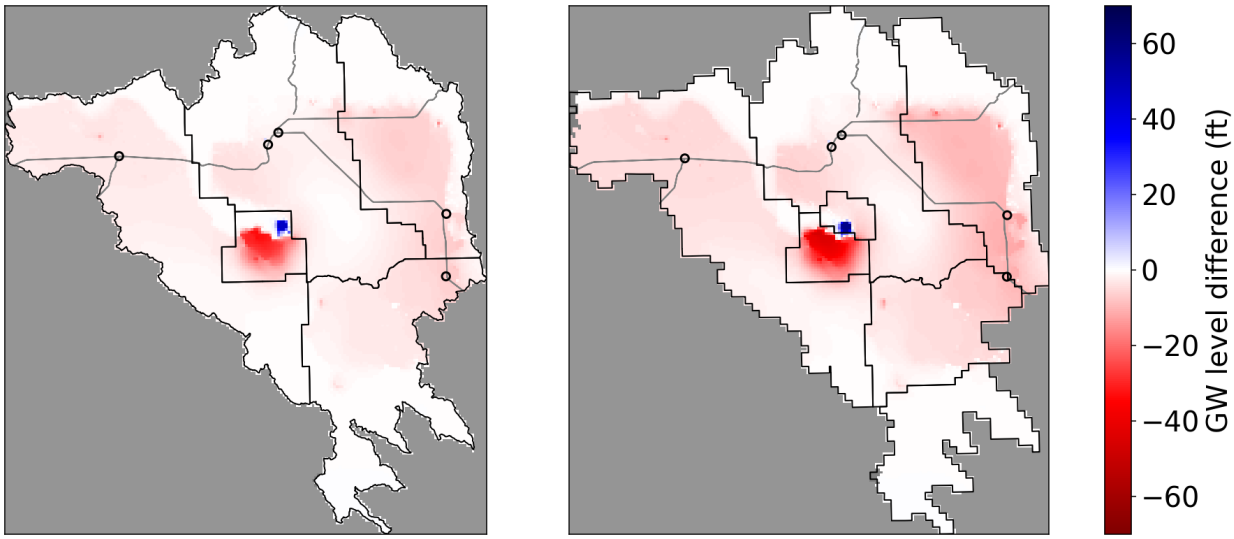

Figure 16: Maps showing the differences in groundwater levels between the Petition Proposal and the OWRD Proposal 30 years after reductions begin (left) and at the end of the modeling scenario (right). Blue colors indicate where water levels in the Petition Proposal are higher, and red colors indicate where the OWRD Proposal is higher. Both maps show differences in layer 2 of the model. The black lines depict the two sets of geographic divisions used to distribute water; the left subfigure shows the 5 CGWAs in the Petition Proposal, and the right subfigure shows the 7 subareas in the OWRD Proposal. Gray lines indicate major roads, and black circles indicate select towns.

Impacts to Dry Domestic Wells

The number of dry domestic wells in 2058 under the OWRD Proposal and the Petition Proposal are presented in Table 7 as aggregated over the 7 OWRD Proposal subareas. The number of dry domestic wells modeled in 2018 is included for comparison. A well is considered dry in the model if the modeled water levels drop below the bottom of the well.

Under both the OWRD Proposal and the Petition Proposal additional domestic wells are modeled to go dry by 2058 as compared to the number of domestic wells modeled to go dry in 2018. The number of dry domestic wells in 2058 under the Petition Proposal is equal to or greater than under the OWRD Proposal in all subareas. Overall, an additional 25 domestic wells are modeled as dry in 2058 under the Petition Proposal as compared to the OWRD Proposal.

Table 7: Counts of number of domestic wells that lose access to water due to modeled water levels dropping below the bottom of the well. The results of the Petition Proposal are aggregated over the 7 OWRD Proposal subareas for comparison.

Subarea	**Historic Model**	**OWRD Proposal**	**Petition Proposal**
Year	2018	2058	2058
Dog Mountain	4	7	7
Lower Blitzen-Voltage	7	9	13
Northeast-Crane	27	46	61
Silver Creek	4	4	4
Silvies	23	25	25
Upper Blitzen	1	1	1
Weaver Springs	11	9	15
All	**77**	**101**	**126**

Impacts to Springs and Streams

Modeled annual groundwater discharge to springs and streams in lowland areas in 2058 under the OWRD Proposal and the Petition Proposal is presented in Table 8 as aggregated over the 7 OWRD Proposal subareas. Modeled values in 1980 from the historic model are included for comparison.

Under both the OWRD Proposal and the Petition Proposal modeled groundwater discharge to springs and streams decreases by 2058 as compared to the modeled 1980 values. Modeled discharge to springs and streams in 2058 under the Petition Proposal is equal to or less than under the OWRD Proposal in all subareas. Overall modeled discharge to springs and streams in 2058 under the Petition Proposal is 2.4 thousand acre-feet per year lower than the OWRD Proposal.

Table 8: Annual groundwater discharge to springs and streams in lowland portions of each subarea, in units of TAF/yr (thousand acre-feet per year). The results of the Petition Proposal are aggregated over the 7 OWRD Proposal subareas for comparison.

Subarea	**Historic Model**	**OWRD Proposal**	**Petition Proposal**
Year	1980	2058	2058
Dog Mountain	0.0	0.0	0.0
Lower Blitzen-Voltage	9.2	3.5[1]	2.9
Northeast-Crane	4.0	2.0	1.8
Silver Creek	17.8	9.6	8.5
Silvies	8.9	3.4	2.9
Upper Blitzen	11.6	10.6[1]	10.5
Weaver Springs	0.2	0.0	0.0
All	**51.8**	**29.1**	**26.7**

[1] Values in 2058 under the OWRD Proposal in the Lower Blitzen-Voltage and Upper Blitzen subareas differ from those presented in Scandella (2025), because the values presented in that memorandum were summarized using a restricted portion of the Lower-Blitzen Voltage subarea that was focused on discharge from springs. Lifting that restriction redistributed 0.6 thousand acre-feet per year of discharge from Springs and Streams from Upper Blitzen to Lower Blitzen but did not change the qualitative results presented in that memorandum. All results presented here use the full lowland extents of all subareas.

Impacts to Natural Evapotranspiration (ET)

Modeled annual natural evapotranspiration in lowland areas in 2058 under the OWRD Proposal and the Petition Proposal is presented in Table 9 as aggregated over the 7 OWRD Proposal subareas. Modeled values in 2018 from the historic model are included for comparison.

Under both the OWRD Proposal and the Petition Proposal modeled annual natural evapotranspiration decreases by 2058 as compared to the modeled 2018 values. Modeled annual natural evapotranspiration in 2058 under the Petition Proposal is equal to or less than under the OWRD in all subareas. Overall modeled annual natural evapotranspiration in lowland areas in 2058 is 6,200 acre-feet lower under the Petition Proposal as compared to the OWRD proposal.

Table 9: Annual natural evapotranspiration in lowland portions of each subarea, in units of TAF/yr (thousand acre-feet per year). Results are presented from 2018 under the historical pumpage scenario, as well as in year 2058 from the OWRD Proposal and Petition Proposal. The results of the Petition Proposal are aggregated over the 7 OWRD Proposal subareas for comparison.

Subarea	**Historic Model**	**OWRD Proposal**	**Petition Proposal**
Year	2018	2058	2058
Dog Mountain	0.3	0.2	0.2
Lower Blitzen-Voltage	4.8	4.1	3.1
Northeast-Crane	2.0	0.4	0.3
Silver Creek	17.9	14.7	13.1
Silvies	21.8	17.5	14.0
Upper Blitzen	1.5	1.5	1.5
Weaver Springs	0.7	0.6	0.5
All	**49.0**	**38.9**	**32.7**

Summary and Discussion

The Department evaluated and compared the hydrologic outcomes of the Petition Proposal and the OWRD Proposal for groundwater management in the Harney Basin using the Harney Basin Groundwater Model (Gingerich and others, 2024). Both the Petition Proposal and the OWRD Proposal represent reductions from current groundwater pumping. The differences in the modeled outcomes between the two proposals reflect how each proposal defines the management areas and implements pumping reductions across the basin. Model results show that each proposal influences groundwater levels, rates of decline, and related impacts in different ways over time.

Under the Petition Proposal, the model results indicate that pumping reductions are successful at slowing the rate of groundwater level decline after 30 years as compared to the Full Pumpage scenario. The maximum median rate of decline across all subareas after 30 years was less than 0.1 feet per year. Despite these reductions, the Petition Proposal results in continued long-term groundwater level declines in most areas, lower overall groundwater levels, and greater impacts to domestic wells, springs and streams, and natural evapotranspiration.

Under the OWRD Proposal, the model results indicate long-term groundwater stability at 30 years. This outcome reflects optimized pumping reductions necessary to meet this goal. The OWRD Proposal leads to higher overall groundwater levels across the basin and less impacts on domestic wells, springs and streams, and natural evapotranspiration.

Key model results include:

- In nearly all areas groundwater levels in the Petition Proposal are lower than the OWRD Proposal at 30 years and at the end of the model period. By the end of the model period, median groundwater level changes under the Petition Proposal are between 2.9 to 25.1 feet lower than under the OWRD Proposal in most subareas.

- Under the Petition Proposal, the maximum median rate of decline in 2058 in all subareas was less than 0.1 feet per year. However, more than 90% of wells continue to decline in 2058 or later. Under the OWRD Proposal, median groundwater level rates of change across all subareas stabilize or begin to recover by 2058.

- By 2058, the number of modeled dry domestic wells is higher under the Petition Proposal than under the OWRD Proposal, with an additional 25 domestic wells modeled to go dry.

- Modeled groundwater discharge to springs and streams in 2058 is 2.4 thousand acre-feet lower under the Petition Proposal as compared to the OWRD Proposal.

- Annual natural ET is lower under the Petition Proposal in 2058, with an overall reduction of 6.2 thousand acre-feet per year compared to the OWRD Proposal.

References

Gingerich, S.B., D.E. Boschmann, G.H. Grondin, and H.J. Schibel, 2024. Groundwater Model of the Harney Basin, Southeastern Oregon. U.S. Geological Survey. doi:10.3133/sir20245017. https://pubs.usgs.gov/publication/sir20245017

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