Harney Groundwater RAC: Discussion Group Materials
Model Scenario Results by Subarea

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Prepared for Discussion Purposes Only

This document includes summary tables of the model scenarios (described below) developed with input by the Harney Rulemaking Advisory Committee (RAC) at their October meeting alongside a hypothetical "no reduction" scenario and two scenarios developed by the Department. The model results are summarized by scenario for each of the 6 subareas identified by the RAC for Scenarios B, C, and D. The model results are for discussion purposes only. All scenarios assume a 2030 start date for phasing in pumpage reductions. The modeling period for all scenarios is 2018-2098. The Discussion Group will discuss the results by subarea and further discuss the variables that can be considered through the next round of modeling, which will "optimize" the outputs around desired goals or outcomes.

Table 1. Overview of model scenarios

Model Scenarios	How much: Volume of pumping reductions	When: Start time and intervals of reduction	Where: management areas
Full pumpage (no reductions)	No reductions	NA	1
A: OWRD focused reductions	Pumping reductions for 6 subareas; 9 subareas with no reduction from 2018 estimated pumpage	2030 start; no phasing	15
B: Balanced reductions, maximize agricultural production, economic transition period	Weaver Springs/Dog Mtn (54%); Northeast/Crane (30%); Silver Ck (9%); Silvies (0%); Lower Blitzen/Voltage (0%); Upper Blitzen (0%)	2030 start; phased reductions over a 30-year period	6
C: Balanced reductions, minimize impacts to ecosystem and exempt uses, economic transition period	Weaver Springs/Dog Mtn (75%); Northeast/Crane (45%); Silver Ck (24%); Silvies (9%); Lower Blitzen/Voltage (9%); Upper Blitzen (0%)	2030 start; phased reductions over a 30-year period	6
D: Balanced reductions, recover supply for ecosystem and exempt uses as quickly as possible	Weaver Springs/Dog Mtn (65%); Northeast/Crane (40%); Silver Ck (18%); Silvies (5%); Lower Blitzen/Voltage (5%); Upper Blitzen (0%)	2030 start; no phasing	6
E: Reduce back to 1990 levels	Reduce pumping to 1990 estimated pumpage	2030 start; no phasing	1

Table 2. Data definitions for summary tables

Data Definitions	
Allowable use (amount [kaf/yr])	This numeric value represents the allowable use in "thousand acre feet/year" for the entire subarea after all pumpage reductions have been implemented
Reductions in use (from modeled 2018 levels)	This is a percent reduction in pumpage between 2018 pumpage amount and the end of pumpage reductions for each scenario for the entire subarea
Was stability achieved between 2030 and 2098? If so, when did it begin? - median (50th percentile) value (measured from 2030)	A "No" means that there is a negative trend (any % change in groundwater levels below 0%) in groundwater levels, at all points during the period 2030 to 2098.
Was there evidence of recovery between 2030 and 2098? If so, when did it begin? - median (50th percentile) value (measured from 2030)	A "Yes" means there is some positive (any % increase above 0%) trend in groundwater levels, at some point during the period 2030 to 2098.
Magnitude of change in groundwater level from 2030 to 2098: median (50th percentile) in each subarea (feet)	This is the feet of change between 2030 and 2098 as an average across 50% of wells in the subarea. Positive = higher / shallower. Negative = lower / deeper.
Magnitude of change in groundwater level from 2018 to 2098: median (50th percentile) in each subarea (feet)	This is the feet of change between 2018 and 2098 as an average across 50% of wells in the subarea. Positive = higher / shallower. Negative = lower / deeper.
Magnitude of change in groundwater level from 2030 to 2098: 80th percentile decline in each subarea (feet)	This is the feet of change between 2030 and 2098 as an average across 80% of wells in the subarea. Positive = higher / shallower. Negative = lower / deeper.
Change in number of wells between 2030 and 2098 that have access to water at their current depth	This is a reasonable estimate of the change in number of domestic wells that lose or gain access to water in September between 2030 and 2098. In the model, losing access to water means that the depth of the groundwater falls below the depth of the well. Negative = wells that can no longer access water. Positive = wells where access is restored.
Change in number of wells between 2018 and 2098 that have access to water at their current depth	This is a reasonable estimate of the change in number of domestic wells that lose or gain access to water in September between 2018 and 2098. In the model, losing access to water means that the depth of the groundwater falls below the depth of the well. Negative = wells that can no longer access water. Positive = wells where access is restored.
Change in natural discharge (flow from springs and streams) from 2030 to 2098 (in %)	This is the percent increase or decrease in the combined flows from springs and streams for the entire subarea between 2030 and 2098. Negative = reductions in discharge. Positive = recovery in discharge.
Change in irrigated acres	Percentage reduction in irrigated acres approximately matches percent reduction in allowable use.
Priority date for regulation	Will provide this information from optimization results when available.

Table 3. Silver Creek Subarea Model Results

Silver Creek Subarea Model Results (Scenarios A-E)						
Scenario/Result	**Full Pumpage (no reductions)**	**A (15 subareas)**	**B (6 subareas)**	**C (6 subareas)**	**D (6 subareas)**	**E (1 subarea)**
Allowable use (amount [kaf/yr])	21	Upper Silver Creek: 20 Harney Lake: 1	19	16	17	Not specified by subarea
Reductions in use (from modeled 2018 levels)	0%	Upper Silver Creek: 0% Harney Lake: 1%	9%	24%	18%	59% over GHVGAC
Was stability achieved between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No, not by 2098	No, not by 2098	No, not by 2098	Yes after about 25 years	No, not by 2098	Yes, immediately
Was there evidence of recovery between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No, not by 2098	No, not by 2098	No, not by 2098	No, not by 2098	No, not by 2098	Yes, immediately
Magnitude of change in groundwater level from 2030 to 2098: median (50th percentile) in each subarea (feet)	-8	-7	-6	-2	-3	6
Magnitude of change in groundwater level from 2018 to 2098: median (50th percentile) in each subarea (feet)	-13	-11	-10	-7	-8	2
Magnitude of change in groundwater level from 2030 to 2098: 80th percentile decline in each subarea (feet)	-8	-7	-6	-3	-3	5
Change in number of wells between 2030 and 2098 that have access to water at their current depth	-2	-1	0	0	0	0
Change in number of wells between 2018 and 2098 that have access to water at their current depth	-2	-1	0	0	0	0
Change in natural discharge (flow from springs and streams) from 2030 to 2098 (in %)	-29	-14.9	-18.5	-6.4	-8.9	26.5
Change in irrigated acres	0	Percentage reduction in irrigated acres approximately matches percent reduction in allowable use				
Priority date for regulation	Will provide this information from optimization results when available					

Table 4. Weaver Springs-Dog Mountain Subarea Model Results

Weaver Springs-Dog Mountain Subarea Model Results (Scenarios A-E)						
Scenario/Result	**Full Pumpage (no reductions)**	**A (15 subareas)**	**B (6 subareas)**	**C (6 subareas)**	**D (6 subareas)**	**E (1 subarea)**
Allowable use (amount [kaf/yr])	23	8	11	6	8	Not specified by subarea
Reductions in use (from modeled 2018 levels)	0%	66%	54%	75%	65%	59% over GHVGAC
Was stability achieved between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No, not by 2098	Yes, immediately	Yes, beginning within 10 years	Yes after about 5 years	Yes, immediately	Yes, immediately
Was there evidence of recovery between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No, not by 2098	Yes, immediately	Yes, beginning within 10 years	Yes after about 5 years	Yes, immediately	Yes, immediately
Magnitude of change in groundwater level from 2030 to 2098: median (50th percentile) in each subarea (feet)	-17	15	2	15	14	32
Magnitude of change in groundwater level from 2018 to 2098: median (50th percentile) in each subarea (feet)	-33	0	-7	3	2	13
Magnitude of change in groundwater level from 2030 to 2098: 80th percentile decline in each subarea (feet)	-44	-2	-3	4	2	10
Change in number of wells between 2030 and 2098 that have access to water at their current depth	-6	13	0	14	12	16
Change in number of wells between 2018 and 2098 that have access to water at their current depth	-14	5	-8	6	4	8
Change in natural discharge (flow from springs and streams) from 2030 to 2098 (in %)	No modeled springs or streamflow in this subarea	No modeled springs or streamflow in this subarea	No modeled springs or streamflow in this subarea	No modeled springs or streamflow in this subarea	No modeled springs or streamflow in this subarea	No modeled springs or streamflow in this subarea
Change in irrigated acres	0	Percentage reduction in irrigated acres approximately matches percent reduction in allowable use				
Priority date for regulation	Will provide this information from optimization results when available					

Table 5. Silvies Subarea Model Results

Silvies Subarea Model Results (Scenarios A-E)						
Scenario/Result	**Full Pumpage (no reductions)**	**A (15 subareas)**	**B (6 subareas)**	**C (6 subareas)**	**D (6 subareas)**	**E (1 subarea)**
Allowable use (amount [kaf/yr])	25	Silvies: 16 Malhuer Lake: 5 Poison / Rattlesnake Creek: 14	25	22	23	Not specified by subarea
Reductions in use (from modeled 2018 levels)	0%	0%	0%	9%	5%	59% over GHVGAC
Was stability achieved between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No, not by 2098	No, not by 2098	No, not by 2098	Yes after about 10 years	Yes, immediately	Yes, immediately
Was there evidence of recovery between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No, not by 2098	No, not by 2098	No, not by 2098	Yes after about 10 years	Yes, immediately	Yes, immediately
Magnitude of change in groundwater level from 2030 to 2098: median (50th percentile) in each subarea (feet)	-3	-2	-1	1	0	6
Magnitude of change in groundwater level from 2018 to 2098: median (50th percentile) in each subarea (feet)	-4	-3	-2	0	0	5
Magnitude of change in groundwater level from 2030 to 2098: 80th percentile decline in each subarea (feet)	-6	-4	-3	1	-1	4
Change in number of wells between 2030 and 2098 that have access to water at their current depth	-1	-1	0	0	0	4
Change in number of wells between 2018 and 2098 that have access to water at their current depth	-2	-2	-1	-1	-1	3
Change in natural discharge (flow from springs and streams) from 2030 to 2098 (in %)	-2.8	0.6	1.5	4.8	4.5	20.6
Change in irrigated acres	0	Percentage reduction in irrigated acres approximately matches percent reduction in allowable use				
Priority date for regulation	Will provide this information from optimization results when available					

Table 6. Northeast/Crane Subarea Model Results

Northeast/Crane Subarea Model Results (Scenarios A-E)						
Scenario/Result	**Full Pumpage (no reductions)**	**A (15 subareas)**	**B (6 subareas)**	**C (6 subareas)**	**D (6 subareas)**	**E (1 subarea)**
Allowable use (amount [kaf/yr])	53	Poison Creek - Rattlesnake Creek: 14 North Harney: 2 Rock Creek: 1.4 Crane-Buchanan: 19 Crane: 4 Lawen: 1.4 Windy Point: 9	37	29	32	Not specified by subarea
Reductions in use (from modeled 2018 levels)	0	Poison Creek - Rattlensake Creek: 0% North Harney: 64% Rock Creek: 43% Crane-Buchanan: 0% Crane: 60% Lawen: 60% Windy Point: 0%	30%	45%	40%	59% over GHVGAC
Was stability achieved between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No, not by 2098	No, not by 2098	Yes, beginning within 30 years	Yes, after about 20 years	Yes, immediately	Yes, immediately
Was there evidence of recovery between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No	No	Yes, beginning within 30 years	Yes, after about 20 years	Yes, immediately	Yes, immediately
Magnitude of change in groundwater level from 2030 to 2098: median (50th percentile) in each subarea (feet)	-35	-11	-10	2	2	17
Magnitude of change in groundwater level from 2018 to 2098: median (50th percentile) in each subarea (feet)	-46	-22	-23	-10	-9	6

Magnitude of change in groundwater level from 2030 to 2098: 80th percentile decline in each subarea (feet)	-45	-16	-14	-1	-1	12
Change in number of wells between 2030 and 2098 that have access to water at their current depth	-85	-28	-29	0	1	13
Change in number of wells between 2018 and 2098 that have access to water at their current depth	-95	-38	-39	-10	-9	3
Change in natural discharge (flow from springs and streams) from 2030 to 2098 (in %)	-4	-0.08	1.3	4.8	5.1	10.7
Change in irrigated acres	0	Percentage reduction in irrigated acres approximately matches percent reduction in allowable use				
Priority date for regulation	Will provide this information from optimization results when available					

Table 7. Lowe Blitzen Subarea Model Results

Lower Blitzen Subarea Model Results (Scenarios A-E)						
Scenario/Result	**Full Pumpage (no reductions)**	**A (15 subareas)**	**B (6 subareas)**	**C (6 subareas)**	**D (6 subareas)**	**E (1 subarea)**
Allowable use (amount [kaf/yr])	14	14	14	13	13	Not specified by subarea
Reductions in use (from modeled 2018 levels)	0%	0%	0%	9%	5%	59% over GHVGAC
Was stability achieved between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No, not by 2098	No, not by 2098	No, not by 2098	Yes after about 40 years	No, not by 2098	Yes, immediately
Was there evidence of recovery between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No	No	No	Yes after about 40 years	No	Yes, immediately
Magnitude of change in groundwater level from 2030 to 2098: median (50th percentile) in each subarea (feet)	-11	-7	-7	-4	-4	6
Magnitude of change in groundwater level from 2018 to 2098: median (50th percentile) in each subarea (feet)	-17	-13	-13	-9	-9	0
Magnitude of change in groundwater level from 2030 to 2098: 80th percentile decline in each subarea (feet)	-14	-10	-9	-4	-4	2
Change in number of wells between 2030 and 2098 that have access to water at their current depth	-6	-5	-5	-3	-3	2
Change in number of wells between 2018 and 2098 that have access to water at their current depth	-8	-7	-7	-5	-5	0
Change in natural discharge (flow from springs and streams) from 2030 to 2098 (in %)	-26.3	-18	-20.3	-6	-5.7	32.7
Change in irrigated acres	0	Percentage reduction in irrigated acres approximately matches percent reduction in allowable use				
Priority date for regulation	Will provide this information from optimization results when available					

Table 8. Upper Blitzen Subarea Model Results

Upper Blitzen Subarea Model Results (Scenarios A-E)						
Scenario/Result	**Full Pumpage (no reductions)**	**A (15 subareas)**	**B (6 subareas)**	**C (6 subareas)**	**D (6 subareas)**	**E (1 subarea)**
Allowable use (amount [kaf/yr])	76	76	76	76	76	Not specified by subarea
Reductions in use (from modeled 2018 levels)	0%	0%	0%	0%	0%	59% over GHVGAC
Was stability achieved between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	Yes, immediately	Yes, immediately	Yes, immediately	Yes, immediately	Yes, immediately	Yes, immediately
Was there evidence of recovery between 2030 and 2098? If so, when did it begin? - median (50th percentile) value	No	No	No	No	No	No
Magnitude of change in groundwater level from 2030 to 2098: median (50th percentile) in each subarea (feet)	0	0	0	0	0	0
Magnitude of change in groundwater level from 2018 to 2098: median (50th percentile) in each subarea (feet)	0	0	0	0	0	0
Magnitude of change in groundwater level from 2030 to 2098: 80th percentile decline in each subarea (feet)	0	0	0	0	0	0
Change in number of wells between 2030 and 2098 that have access to water at their current depth	0	0	0	0	0	0
Change in number of wells between 2018 and 2098 that have access to water at their current depth	0	0	0	0	0	0
Change in natural discharge (flow from springs and streams) from 2030 to 2098 (in %)	-0.2	0.07	-0.01	0.4	0.4	1.1
Change in irrigated acres	0	Percentage reduction in irrigated acres approximately matches percent reduction in allowable use				
Priority date for regulation	Will provide this information from optimization results when available					