Responses to RAC Member Questions

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The following are answers to some of the questions submitted by Rules Advisory Committee (RAC) members as part of the Division 512 rulemaking process. Additional questions will be answered during the May 30 RAC meeting and in writing at a later date. Questions are being answered in stages to provide answers to the over 50 questions asked as quickly as possible. The questions are organized by topics.

RAC Process

What is the role of the RAC in a rulemaking process?

The Water Resource Department (Department) organizes a Rules Advisory Committee (RAC) to consult and involve stakeholders who are most likely to be affected by the adoption of the rules. RAC members provide valuable input that will help the Department consider various perspectives to develop rules that are fair, workable, and consistent with statutory authority and the State's policy goals. The RAC will also help the Department better understand the fiscal impact and cost of compliance of proposed rule changes. The Department reviews and considers the input from the RAC to determine rule language the department then recommends to the Water Resources Commission for adoption.

Past Decisions of the Department

What was the reasoning behind the Water Resource Department of allocation on excess of water rights above the study done in the 1960's for the basin recharge rate?

The Department issues rights by following the statute and rules for allocating groundwater. The 1968 Robison Water Budget Study was not known to the Department until the USGS identified it in the early stages of the groundwater basin study. During the early 2000s, water level data was used as an indicator of over-appropriation. Previously, to issue new groundwater rights in the absence of data in the vicinity of a water right application, with conditions requiring future data collection to inform future allocation decisions in that location. This "default to yes" design of the rules, as well as the rapid increase in new groundwater right applications that outpaced actual groundwater development, led to a situation where the Department continued issuing groundwater rights beyond the basin recharge rate until groundwater level trends made it clear that over-allocation had likely occurred. The Department is continuing to work to update the groundwater allocation rules to prevent this type of situation from occurring in the future.

Definitions

How does OWRD define reasonably stable?

The RAC indicated that they want the groundwater resource in Harney County to be sustainable and capable of supporting future generations. The Department shares this goal and aligns with state statutes (ORS 537.525) that require the Department to "determine and maintain reasonably stable groundwater levels." In portions of the Harney Basin, groundwater levels have declined excessively and therefore cannot be reasonably stable. A rate of change that is reasonably stable should result in no change over a period of years, recognizing that on a year-to-year basis there will be some variance in water levels. The Department recognizes that there will be much work to do to stabilize groundwater levels and it will require sizeable reductions in water use.

What does "groundwater level trend" mean?

The change in groundwater levels within an area over a period of time (i.e., the rate of change) is the groundwater level trend. Trends are determined by comparing measurements taken during the same season over several years. The Department generally compares annual high-water levels, which typically occur each spring, just before the irrigation season begins.

What does "target water level trend of zero" mean?

A target water level trend is a goal rate of change in groundwater levels within an area. A target water level trend of zero (0) feet per year, means that there should be no change in overall groundwater levels within that area over several years. Groundwater level declines should not occur below a stable range otherwise it is inherently not stable.

Data and Analysis

Could you provide a publicly available description of the information used and decision process rules used to identify proposed administrative areas with an explanation of why the designation of administrative areas seems important for the Department?

For the purposes of this question, we assume the term "administrative areas" is synonymous with the term "Critical Groundwater Area subareas". A Critical Groundwater Area (CGWA) subarea is a portion of a groundwater reservoir that shares similar groundwater properties and conditions that may include, but are not limited to:

- Similar water level elevations.
- Seasonal and annual water level trends.
- Response to natural and human stresses.

The intent of dividing a CGWA into subareas is to group wells that have similar local impacts on the groundwater reservoir and where reducing groundwater pumping through voluntary or regulatory action will have a timely, efficient, and similar groundwater response.

By grouping wells into subareas, the Department will be able to target regulatory action to the areas of most severe decline. Without subareas, regulation of groundwater use would be broad and generalized across the entire CGWA. This would result in more users being curtailed, even in areas where declines are not as severe, to have the same impact on the areas of the most severe declines.

The Critical Groundwater Area subarea boundaries were drawn using three primary criteria:

1. Hydraulic gradient – the driving force of groundwater flow

2. Groundwater level trends
3. Subsurface materials

These criteria were discussed in RAC meeting #2 and draft boundaries were presented in RAC meeting #3.

Is there a table of all wells (with well log ids) used for the analysis in each proposed administrative area? Please provide well logs for those well. Need to go through all the administrative areas again and work through the different well that were used for magnitude of decline and rate of decline compared to those used for the contour lines.

The Department will provide an update to the Groundwater Level Trends in the Proposed Harney Basin Critical Groundwater Area document. This update will include the list of wells used in the trends analysis. The wells used in the analysis can also be viewed in the Harney Basin Critical Groundwater Area Process Interactive Map.

The list of wells and misc. elevations used for the contours in the groundwater study are a part of this data release: https://www.sciencebase.gov/catalog/item/605b6f55d34e189488343a0b.

The water level data for most wells used to develop the contour maps was collected by measuring the groundwater level at those wells from February-March 2018 when groundwater levels were near their annual maximum elevation and were largely recovered from the 2017 irrigation season drawdown. No magnitude of decline nor rate of decline analysis was done as part of the creation of the contour maps. The contour map is intended to be a point-in-time snapshot of the groundwater system. This helps understand the flow system. It does not provide information about trends in groundwater levels. To understand groundwater level trends, wells that have consistent data over a period of years must be used.

Will you provide a description of the selection process used to determine which wells were included in the analysis for each proposed administrative area, noting any wells that were measured for the study that were not used?

This information will be provided in an update to the Groundwater Level Trends in the Proposed Harney Basin Critical Groundwater Area document. Please note that some of the wells measured in the 2018 summary for drawing water level contours do not have sufficient data (in some cases only one measurement) to use for water level trend analysis.

What is the reason for using only the worst well report or drawdown as a guide for each administrative area and not an average of multiple wells since the aquifer is hydrologically connected.

The document Groundwater Level Trends in the Proposed Harney Basin Critical Groundwater Area provided before, and discussed in, RAC meeting #4 provides the details of the analysis of groundwater level trends performed by Department staff. In the tables summarizing the groundwater level trends, an "n" value is provided for each subarea denoting the number of wells used in the analysis. In all subareas, more than one well was used for the analysis and the minimum, maximum, average, and median were provided for all subareas.

The most severe decline in each subarea is important to understand. Since the distribution of available data within a subarea is not uniform and the pumping within each subarea is not uniform, it's critical to consider the most severe impacts along with the average and median rate and magnitude of decline occurring. Since subareas group wells with similar water levels and water level trends together, wells with the most severe declines are indicative of the extent and severity of cones of depression forming in that subarea.

Why are some Points of Diversion excluded from some of the proposed 15 administrative areas that are the same distance or less from the outside contour line than some PODs that are included?
The distance of a POD from an administrative boundary is not in itself a factor that was considered when determining if a subarea boundary was properly positioned. Criteria for subarea boundary delineation was discussed in RAC meeting #2 and then the application of that criteria was presented in RAC meeting #3. These boundaries were drawn using three primary criteria:

1. Hydraulic gradient – the driving force of groundwater flow.
2. Groundwater level trends.
3. Subsurface materials.

By strictly using these criteria, the Department is attempting to identify wells that have similar impacts on the groundwater reservoir. As an example, there are likely many cases where two wells may be the same distance from a subarea boundary, but one well is in a high permeability subsurface material and the other well (on the other side of the boundary) may be in a low permeability subsurface material. Pumping in each well would result in different groundwater level trends and therefore would be justified to be delineated into two different subareas. Additionally, the subarea boundaries are delineated based on the Public Land Survey System section-level boundaries. There may be some instances where an individual POD falls on one side or the other of the subarea boundary due to its position relative to the section line.

The Department said they noticed the decline on static water levels started in 1992, what has been the annual precipitation for each year from 1992-2019/2020 when the study was finished?
Concerns about groundwater declines in the Harney Basin were first noted by Leonard in his 1970 USGS groundwater report. Leonard specifically recommended that the Crane area be monitored for future groundwater level declines. Severe declines in the Weaver Springs subarea can be seen starting in the early 1990s. The Department received complaints about groundwater level declines from individuals in the Harney Basin starting in the early 2000s.

As for precipitation, Figure 1 shown below is from the groundwater study (Garcia and others (2022)) and displays the measured, estimated, and mean precipitation at several sites across the Harney Basin Study Area. Garcia and others (2022) describe the variation in annual precipitation in the Harney Basin as follows:

"Comparisons between study-period (1982–2016) and longer-term (1900–2016) annual precipitation highlight the temporal and spatial variability within the Harney Basin. To facilitate these comparisons, relations between measured precipitation at five sites (representative of the range of conditions, geographic location, and measurement years in the Harney Basin) and estimates from the PRISM (Parameter-elevation Relationships on Independent Slopes Model; PRISM climate group, 2019) climate model for those locations extending back to 1900 were used to extrapolate the short-term measurements (fig. 3) (see app. 1 for more information about PRISM). In the northern uplands at the Seneca site (fig. 2; table 1), mean precipitation during the study period was 7 percent higher than the 116-year mean. Study-period mean precipitation at sites in the central lowlands (Burns Federal Building) and on the lowlands of the western basin (Northern Great Basin Experimental Range) was within 1 percent of the 116-year mean. Near the center of the Harney Basin just west of Harney Lake (Double O Ranch, also referred to as OO Ranch), precipitation over the previous century exhibited greater decadal-scale variability than other sites with few wet or dry periods lasting more than a decade. Study-period mean precipitation at the Double O Ranch site was equal to the 116-year mean. On Steens Mountain to the south, study-period mean precipitation at Fish Creek, the highest elevation site, was 9 percent below the 116-yr mean (fig. 3). The 1980s and 1990s generally were wetter than the 2000s. Excluding the Fish Creek site, the 1980s and 1990s were some of the wettest periods during the 116-yr record (fig. 3)"

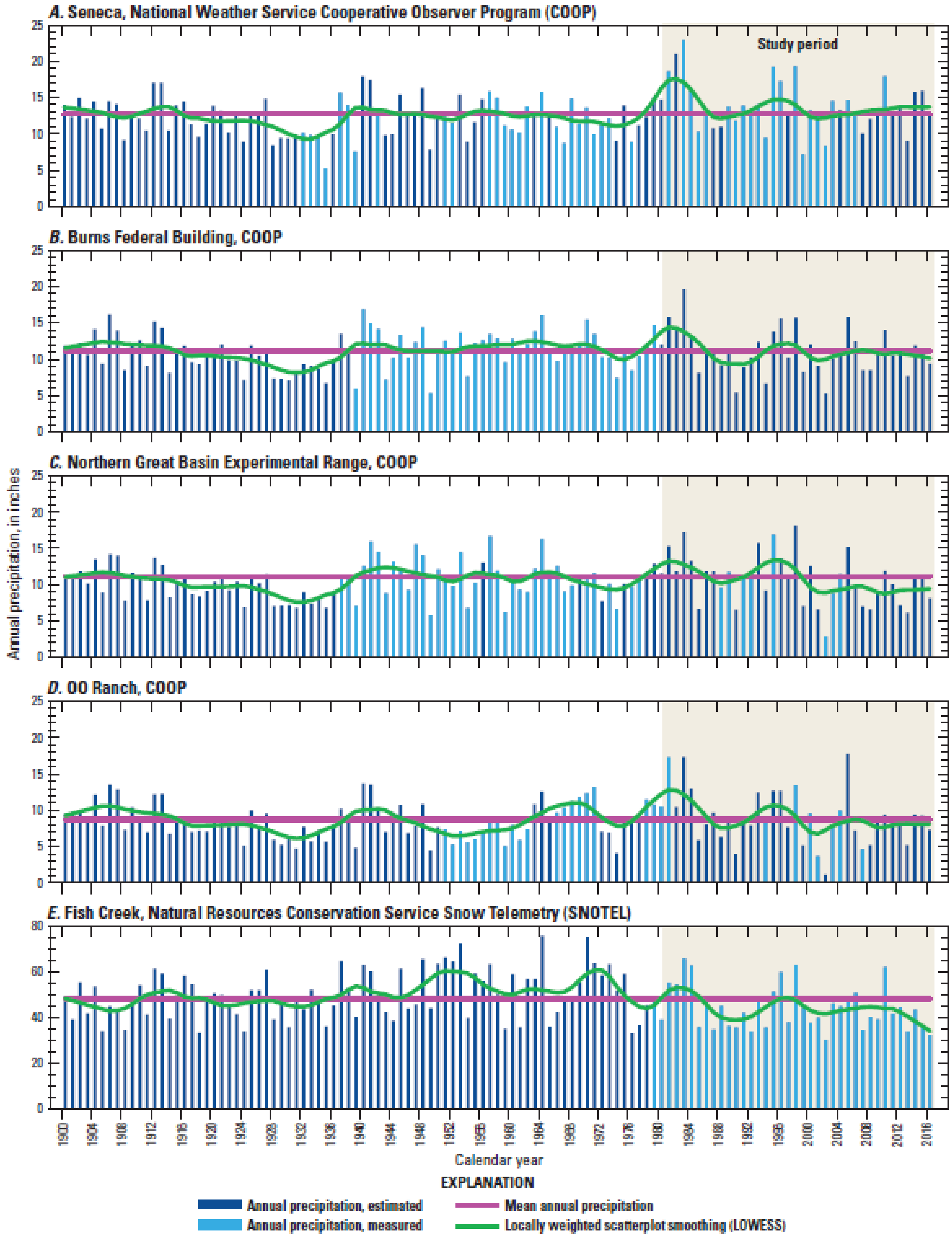

Figure 3. Measured and estimated annual precipitation at selected sites, Harney Basin, southeastern Oregon, 1900–2016.

Figure 1: From Garcia and others, 2022.

How quickly does the Department expect groundwater level trends to respond to management changes?

Groundwater levels are declining across the basin due to over pumping and over allocation. Reductions in groundwater use will need to occur to slow the groundwater level declines. These reductions can occur through several ways: enroll in conservation programs like the CREP; form a group and enter into a voluntary agreement to reduce groundwater use; the Department can assess and enforce permit conditions to reduce groundwater use; and the Department has a regulatory process in critical groundwater areas that can require reductions in groundwater use following a contested case hearing process. The response of the groundwater system to reductions in pumping will be variable across the basin depending on the timing and magnitude of the reduction in use, proximity to groundwater recharge sources, local geologic setting, and location within the regional groundwater flow system. At this time, it is not known with certainty how long specific areas of the basin will take to respond to reductions in annual pumpage. The USGS numerical groundwater flow model will be used to assess these and other questions related to the timing and magnitude of response within the groundwater flow system.

Groundwater Reservoir

What is the Department's current understanding of or assumptions about the "saturated thickness" of the groundwater reservoir in the Harney Basin?

The USGS Groundwater Study did not directly attempt to address this question. Available data suggests that the total thickness of the basin filling deposits could be up to and exceeding several thousand feet. However, the saturated thickness of the groundwater reservoir will not affect the changes needed to stabilize groundwater levels.

We have been told that the basin is all hydraulically connected, please explain how GW is specifically hydraulically connected in that reduction of use or increase in use in Silvies, Silver Creek or Donner Blitzen areas would affect the GW rate of decline or magnitude of decline in the area that the change is not occurring in.

Groundwater in the Harney Basin occurs within a single hydraulically connected groundwater flow system. The groundwater flow system includes several distinct, yet hydraulically connected areas distinguished by local geology, location in the basin-wide groundwater-flow system, and local rate and magnitude of recharge and discharge.

The surface water drainage divides that define the three main surface water sub-basins within the Harney Basin (Silvies; Silver Creek; Donner und Blitzen) have minimal to no influence on the flow of groundwater in the subsurface - particularly in the lowland areas, where minimal direct groundwater recharge from precipitation occurs to drive the hydraulic gradient, and the surface water drainage divides are topographically subtle. Groundwater pumping on one side of a surface water divide has the potential to impact groundwater levels on the other side of the surface water divide. With greater distance from the surface water divide, the magnitude of the impact will be smaller and the timing of the impact across the divide will be longer, just as pumping impacts within a single surface water sub-basin are reduced and delayed with increasing distance.

Groundwater Study Related

Please provide a map with the well locations and depths that were used to draw the Deep contour lines.

A map of the well locations and water level elevations used to draw the contour maps was published as plate 3 in the groundwater study. Water level elevations are used to draw contour maps so that water levels can easily be compared to each other regardless of the land surface topography.

The water level data for most wells used to develop the contour maps were collected by measuring the groundwater level at those wells during February–March 2018, when groundwater levels were near their annual maximum elevation and were largely recovered from the drawdown that occurred during the 2017 irrigation season.

What were the methods used in the groundwater study for groundwater pumpage estimates?

Since the early 1990's many groundwater permits in the Harney Basin included a condition that requires measuring and reporting of water use. Groundwater permits that were authorized prior to this are generally not required to measure or report water use. Given this lack of consistent water use data across the basin, alternative methods of estimating groundwater pumpage were used. Groundwater pumpage for irrigation for select years from 1991 – 2018 were estimated by coupling field level evapotranspiration (ET) estimates with groundwater pumpage data reported to the Department. Field level ET was estimated using the satellite-based ET model METRIC scaled to ET measurements from an alfalfa field in the basin, GridMET precipitation data, and mapped agricultural fields. Estimated pumpage volumes associated with each ET estimate were determined using reported pumpage volumes from OWRD's Water Use Reporting database and literature-reported irrigation efficiencies. The methods and results for estimating historical irrigation water use and groundwater pumpage estimates 1991 - 2018 are described in OWRD Open File Report No. 2021-02 (Beamer and Hoskinson, 2021).

Groundwater pumpage estimates for irrigation from 1930 – 1990 were estimated by decade using water rights information corrected based on the relationship between the METRIC pumpage estimates and water right-based estimates over that period when both datasets are available. The methods and results for estimating historical irrigation water use 1930 – 1990 and non-irrigation water use 1930 – 2018 are described in OWRD Open File Report No. 2023-01 (Schibel and Grondin, 2023) and OWRD Open File Report No. 2021-03 (Grondin, 2021).

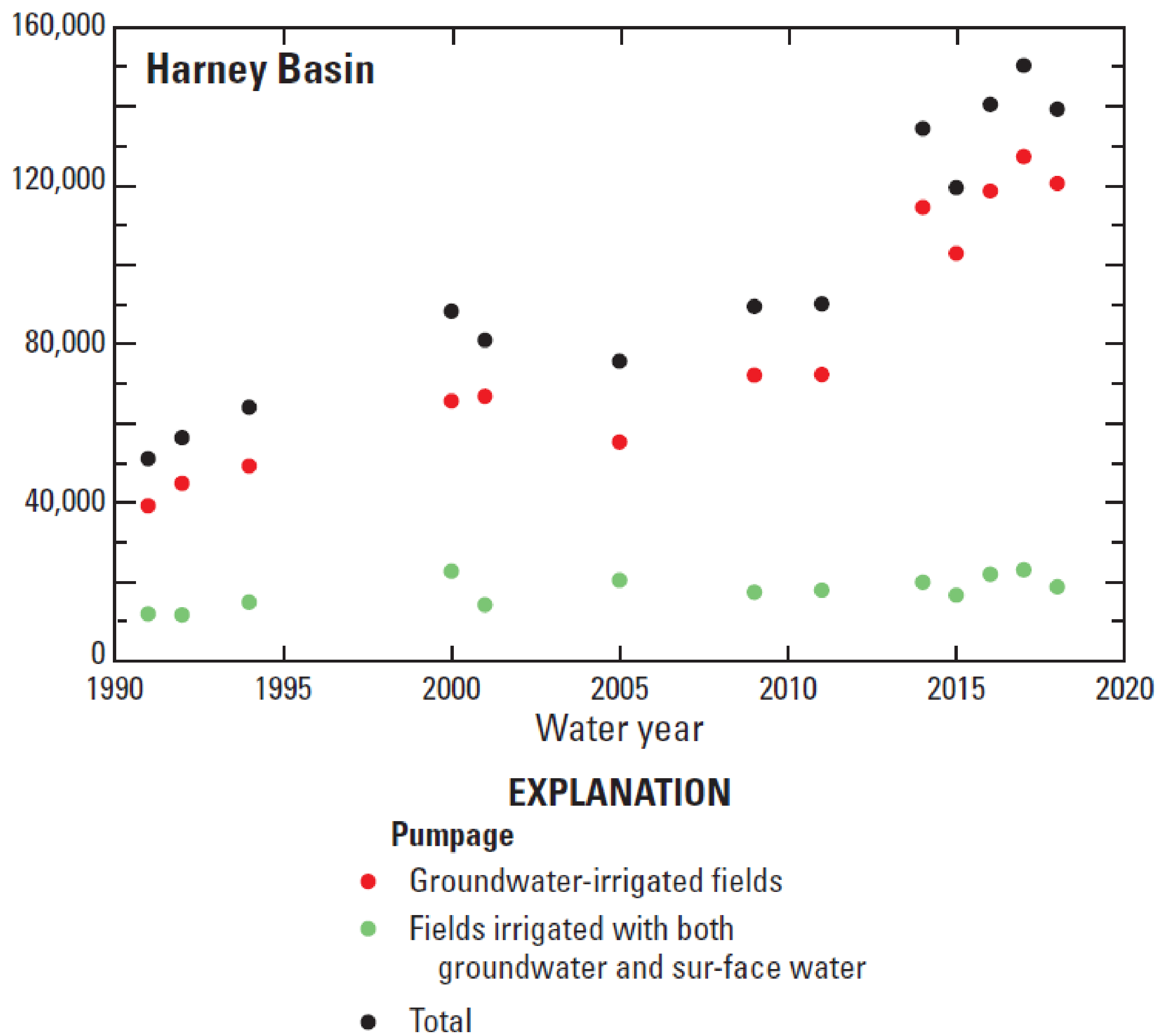

Figure 1: Estimated annual groundwater pumpage for irrigation in the Harney Basin. From Garcia and others, 2022.

What types of groundwater level data were used in the groundwater study and Division 512 rulemaking?

Static groundwater level measurements provide the basis for many of the findings described in the groundwater study reports and discussed in the ongoing Division 512 rulemaking process. These groundwater level measurements are housed in the OWRD Groundwater Information System (GWIS) database. Groundwater level data in GWIS comes from a variety of sources including measurements made by OWRD staff, U.S. Geological Survey staff, and measurements reported to the Department from water rights holders as a part of the permit condition reporting program. Field data-collection procedures used by OWRD staff parallel those outlined in Groundwater Technical Procedures of the U.S. Geological Survey (Cunningham and Schalk, 2001). Data from sources other than the OWRD or the U.S. Geological Survey may not have been collected using these protocols. The Groundwater Section periodically reviews recent data collected by OWRD staff and classifies the quality and accuracy of individual data elements; however, much historic data collected by the Department has not been thoroughly reviewed. Data from outside sources is only reviewed and classified as time permits. These data include static water level measurements from dedicated observation wells, domestic wells, livestock wells, and irrigation wells. These groundwater level data can be explored in the OWRD Groundwater Information System (GWIS).

Critical Groundwater Area Designation

Which of the 15 subareas have crossed a threshold authorizing the designation of a Critical Groundwater Area?

There are two different thresholds under ORS 537.730 that have been crossed in the Harney Basin that authorize the designation of a Critical Groundwater Area.

1. Groundwater levels in the area in question are declining or have declined excessively (ORS 537.730(1)(a)). Per OAR 690-008, excessively declining is defined as a rate of decline of 3 or more feet per year for 10 years and declined excessively is defined as a total decline of 50 feet or more from the highest known water level. These definitions apply to a groundwater reservoir or part thereof, meaning if any well crosses this threshold, then the threshold has been crossed for the groundwater reservoir.
2. The available ground water supply in the area in question is being or is about to be overdrawn (ORS 537.730(1)(e). Per OAR 690-008, overdrawn is defined as occurring when pumping from a groundwater reservoir or part thereof over a one-year period exceeds the annual recharge to that groundwater supply.

Five of the six high priority subareas have at least one well that have met the definitions of excessively declining or declined excessively. Without water use reductions, the Dog Mountain subarea is expected to meet the definition of excessively declining or declined excessively in the next 2-3 years. The high priority subareas are:

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

The northern water budget region lowland from the Harney Basin Groundwater Study has met the definition of being overdrawn. The northern water budget region includes all or part of the following 10 subareas:

- Crane
- Crane-Buchanan
- Dog Mountain
- Lawen
- North Harney
- Rattlesnake Creek-Poison Creek
- Rock Creek
- Silvies
- Windy Point
- Malheur Lake

The western water budget region lowland from the Harney Basin Groundwater Study has met the definition of "about to be overdrawn" with 2017/2018 mean pumpage totaling a little over 90% of total recharge and the total of the authorized water rights exceeding recharge. The western water budget region includes all or part of the following 3 subareas:

- Harney Lake
- Upper Silver Creek
- Weaver Springs

The following subareas have not crossed any thresholds for designation of a Critical Groundwater Area, but are experiencing declining groundwater level trends:

- Lower Blitzen - Voltage
- Upper Blitzen

Why designate the entire basin a CGWA when not all subareas have crossed a threshold for CGWA designation?

Some of the reasons the Department has proposed the Critical Groundwater Area boundary to include the majority of the lowland areas of the Harney Basin are:

- The entire Harney Basin is a single groundwater reservoir and groundwater levels are declining in all 15 proposed subareas.
- The primary source of recharge to the high priority subareas is groundwater flow from nearby lower priority subareas.
- Any increase in pumping within the proposed boundaries will result in an increase in the rate of decline within that area.
- Basin-wide estimated groundwater use in 2018 was about 50% of authorized use. Designating the CGWA and restricting use will help prevent further investment in developing under used rights.
- Setting a permissible total withdrawal (PTW) in lower priority subareas creates a water use target for users not to be exceed and a threshold for further action by the Department in those areas. These thresholds incentivize voluntary reductions in use.

Could you develop a publicly available description of the proposed or potential application of critical groundwater area designation and special water problem management area designation in the Harney basin?

There are a range of ways these tools could be applied. OWRD plans to consult the RAC on key aspects of how these tools should be implemented.