

OAR 690 Division 512 Public Comments Received

Below is a tabulation of the written comments received during the public comment period for the OAR 690 Division 512 Harney Basin Groundwater Rules. Recordings of the public hearings can be found on the [Division 512 webpage](#).

Name
Margaret Wallis
Margarita White
Mario Patrelie
Mark Owens
Mary Jo Davies
Matt Stashin
Michael Martin
Mike Peila
Mindy Sheley
Neal Hadley
Patty Dorroh
Patty Pratt
Paul Jacobsen
Paul Schlegelmann
Penelope Kaczmarek
Peter Paquet
Philip Kimbal
Richard Stoltze
Richman, Bixby

Riddle Ranch
Robert Bumstead
Robert Long
Robert Wolfskill
Roger Sheley
Ross Ketscher
Ryan Krabill
Sabrina Maki
Sara Pritt
Scott W Houck
Silvies Subareas Comments
Simmone Landau
Stephanie Bowen
Steve Rickman
Steven Patten
Sue Arbuthnot
Susan Otley
Susan Ramsay
Terry Keim
Tom Davis
U.S. Fish & Wildlife Service
Water League
Will Bentz
Zach Freed

MEINZ Kelly A * WRD

From: M Zimmerman <bellesfolk@yahoo.com>
Sent: Thursday, August 7, 2025 1:49 PM
To: WRD_DL_rule-coordinator
Cc: Sen McLane; Rep Owens
Subject: Public Comment on Division 512 Rules, OWRD

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Thank you for extending the public comment period, I was unable to make the public meetings.
I submit three ideas regarding the Division 512 Rules amendments:

- 1) Appoint a local advisory committee along the lines of the Steens Mountain Advisory Committee to benefit both the OWRD with 'boots on the ground' information from the Basin as well as a co-operative preservation of groundwater resources.
- 2) Use current data gathered from pertinent locations to gain a much more accurate evaluation of groundwater management efficacy. Computer models are helpful for envisioning effects but not establishing facts. The OWRD is addressing water, the lifeblood of our Basin's agricultural economy. Employ real-time measurements for reports, and work in conjunction with the local advisory committee proposed in comment #1 above.
- 3) Respecting landowners' rights is vital. OWRD personnel make appointments with stakeholders when on-site evaluations are required. These farmers and ranchers work hard to steward the land. They will be valuable partners if treated with the respect in the process of groundwater recovery.

Thank you for your care and considerate evaluations of the impact the OAR 690, Division 512 rules will have upon the people of Harney County and all of Eastern Oregon.

Sincerely,
Margaret Wallis
Burns, Oregon
bellesfolk@yahoo.com
Phone: 541-573-2195

MEINZ Kelly A * WRD

From: Margarita White <wmargarita02@yahoo.com>
Sent: Thursday, August 7, 2025 7:05 AM
To: WRD_DL_rule-coordinator
Subject: 512 rulemaking comment

You don't often get email from wmargarita02@yahoo.com. [Learn why this is important](#)

Harney Basin only needs to use the system already in place- the DATE on the water right of each well. That right should not transfer to allow the drilling of other wells, especially clear across the basin not near the original right.
Thank you for your time.

Margarita White
Seven T Ranch
Hines, Oregon

**AN INDEPENDENT IN COUNTY STATISTICAL ANALYSIS OF RULE 512
ECONOMIC IMPACTS ON HARNEY COUNTY
1997 to 2022 SURVEY PERIOD**

KEY POINTS

RULE 512 does not impact livestock production if numbers are limited to 112,000 to 118,000 at the end of implementation. 2022 NASS estimate total grazing livestock number is 88,000. Historic numbers have been 122,000 to 133,000 head.

County alfalfa self sufficiency may end sometime between the third and fourth PTW in 18 to 24 years after RULE 512 implementation if livestock counts exceed 118,000 when variable livestock / groundwater production margins become thin.

RULE 512 does impact crop sales. Crop gross income may be -8.52% lower in 2017 to 2022 mean dollars. Agriculture real GDP may decline -6.86% around Year 24 in 2017 “chained or real” dollars. Non-government Industrial RGDP declines -3.12%. However, weak cattle replacement rates and the lack of future sales may make a -2.84% RGDP decline immediately after the first PTW proposed for 2028 if livestock numbers remain at 2022 levels.

RULE 512 will have minimal impacts on county employments and incomes. A total \$1,008,726 to \$1,346,408 worth of worker income in 2022 dollars is at risk of loss. ACS estimates 2022 total county incomes at \$100,836,241. Secondary indirect and induced losses are difficult to estimate at Year 24.

An annual 42.6 man days per pivot farm worker loss or an equivalent 8.57 FTEs by Year 24. These and the four to eight FTEs lost during the same period would be 12 to 16 equivalent jobs eliminated. Perhaps another five to seven due to secondary job losses. Harney County has low monetary velocity rates.

RULE 512 may impact county population. -5.62% or to 7,008 residents by Year 24 from the 2023 USCB ACS estimated 7,402 if livestock numbers remain at 2022 levels.

There has been a rather rapid population expansion and now contraction.

Perhaps the industrial category which future income and employment is most impacted is electric power and distribution.

RULE 512 will have some impact on county government revenues. \$144,144.03 to \$145,167.95 in property taxes will be at risk three years after implementation from the Weaver Springs sub-area which is proposed to be “regulated off” in Year 6. Beyond then is difficult to estimate with accuracy. Too many internal variables.

Property tax rates are high and tax assessments are low.

An estimated annual 10% to 20% by volume reduction of available surface water flows into the SWMPA is due to 50% over consumption and 75% over retention in the Bear and Silvies sub-Basins above the 1924-26 Silvies River Water Decree. The River is now tributary to Emigrant Creek by a near 40/60 ratio. If those sub-basins had been regulated, then in 2022 this may have induced a minimum 5% to 10% livestock number increase in a drought year.

This is an independent in county statistical analysis of RULE 512 economic impacts on Harney County. Source numbers are from the USDA including the Commerce Department, United States Census Bureau, Treasury, Federal Reserve, Oregon Department of Agriculture and other collaborative sources including the Harney County Assessors' Office.

Survey period is between the USDA 1987 and the NASS 2022 agri censuses. A 25 year look back to predict where and how much RULE 512 may impact agri production 25 years forward.

I am Mario Petrilli. A "townie" and a "newbie". I attended the April Division 512 RAC meeting and read the PowerPoint OWRD presented on future economic costs to the local economy. EconW prepared the analysis from a distance and with an ecological lens. Their estimates were ridiculous:

OWRD economic forecasts use alfalfa at \$273 a dry ton worth \$58,000,000 in 2023 dollars.

Forecast assumes a 1 to 1 relationship in alfalfa and livestock production declines.

80% of alfalfa production is exported and 20% is consumed in county.

County has a \$200 million dollar a year recreational industry.

Department economic estimates are available at https://www.oregon.gov/owrd/Documents/ECO_Harney_County_Report_Final.pdf and <https://www.oregon.gov/owrd/Documents/CGWA%20Fiscal%20Impact.pdf>.

An in-county for the county analysis is needed.

Numbers and statistics presented in this report are for Harney County, not the SWMPA alone.

Methodology measures the economic and demographic deltas or rates of change and apply them to well irrigated crop production with 30% less 24 years after RULE 512 implementation.

Statistics are reported in percentages, not in dollars. Dollars inflate.

Dollars and Real Gross Domestic Product percentages are "chained" to 2017 dollars except when noted.

All dollar amounts are corrected with CPI and PPI inflation rates except USDA and ODA published numbers from each census.

Census survey numbers may be corrected by the next census. Numbers are verified using the census numbers published five years later.

Averages or *means* are the sum of numbers divided by the number of sums. Medians are the same but with extreme high and low "outlier" numbers omitted. Report uses means whenever possible.

This report is a difficult read. There are many numbers. There are many ifs. There IS statistical analysis in ENGLISH for each category and comparisons to regional counties and state means. There are three agriculture sections; crops, irrigation and livestock.

In Harney County, cattle, sheep and horses eat the most hay / alfalfa and drink the most water. Future groundwater restrictions will restrict future livestock farm numbers, head counts and incomes. This Report will present an estimate of by how much in near identical formats for crops and livestock. Report also estimates RULE 512 impacts on population, gross domestic product and county property taxes.

Report also relies upon *Advancing Sustainable Groundwater Management with a Hydro-Economic System Model: Investigations in the Harney Basin, Oregon* published in October 2024 by OSU (W. K. Jaeger, et al). Available at <https://agupubs.onlinelibrary.wiley.com/doi/pdf/10.1029/2023WR036972>. However, base numbers and some assumptions are wrong.

According to the USDA and NASS from 1997 to 2022, Harney County, not the SWMPA alone, **farm and or ranch** numbers decline -11.17% through consolidation and abandonment. **Farm acres** incline +8.89%. **Farm average or mean size** increases +15.06% yet estimated median size decreases -42.34% indicating farms are growing larger. **Land in farms** by +12.11% with a -58.61% decrease in **Land in house lots, ponds, roads, wasteland, etc.** Harney County farms have become more efficient with the best improvements occurring between 2012 and 2022.

ESTIMATED MARKET VALUE OF LAND AND BUILDINGS increase +379.49%. Consumer Price Index [CPI] core inflation also increases by +82.32%. Corrected MAV is an impressive +65.68%. Corrected or real **Average per farm** value is a more impressive +76.11%. **Average per acre** value increases by +57.80%.

Increases are due in large part to irrigated pivot alfalfa farms. Within the five county southeast Oregon area, Lake County has the highest valuation numbers from 2007 forward. Total 25 year property valuations there in 1997 dollars increase a most impressive real +229.03%, surpassing Harney County in the 2012 USDA census.

ESTIMATED MARKET VALUE OF ALL MACHINERY AND EQUIPMENT, corrected for the Producers Price Index [PPI] 88.04% inflation rate, increases +45.32%. **Average per farm** real increase is +46.32%. Again, increases are due in large part to irrigated pivot alfalfa farm equipment.

County +75.48% **Average per acre** is highest in southeast Oregon and higher than state mean by +15.61%. Only Lake County exceeds the Harney County average per farm machinery and equipment valuation increase by +22.35%.

NASS 2022 Census estimates the 2017 total asset value at \$81,222,000 and the 2022 total at \$106,160,000 for a +30.70% gain. Lake County has \$97,159,000 and \$146,545,000 for +50.83%. Malheur County declines from \$232,904,000 to \$208,737,000 or by -10.38%.

Farm numbers receiving **GOVERNMENT PAYMENTS** double by +104.03% in the 25 year period. **Average per farm** inclines a real +151.52% and **payments** by 428.04% in then dollars.

Farms reporting **TOTAL INCOME FROM FARM-RELATED SOURCES, GROSS BEFORE TAXES AND EXPENSES** increase a real +167.37%. They report a +96.82% increase in total income for a +50.76% **Average per farm** increase. Larger producers and operators have larger increases. Only Grant County has a lower mean total income percentage and ratio.

TOTAL FARM PRODUCTION EXPENSES increase a real PPI corrected +22.40% and **Average per farm, dollars** increase a real +26.50% in 1997 dollars. State mean per farm expenses are up +25.09%.

In 2022, mean core expenses per farm are **Feed purchased** (14.26%) followed by **Livestock and poultry purchased or leased** (11.45%) then by **Hired farm labor** (9.88%), **Repairs, supplies, and maintenance costs** (9.49%) and **Gasoline, fuels, and oils purchased** (8.99%).

In 1997, mean core expenses per farm are **Livestock and poultry purchased or leased** (13.94%) followed by **Feed purchased** (13.40%) then by **Hired farm labor** (11.79%), total **Interest expense** (9.68%) and **Repairs, supplies, and maintenance costs** (8.43%). **Gasoline, fuels, and oils purchased** was 6.37% of core farm expenses.

NET CASH FARM INCOME OF OPERATION incline a real +51.00% and **Average per farm, dollars** incline a real +57.65%. State mean net income per farm is +21.66% and average per farm is +3.98%. Harney County net gains are due in large part to irrigated pivot alfalfa farms. Only Lake County has substantially higher numbers and percentages in the 2007 USDA census and thereafter. Another factor is while county livestock counts decrease, beef cattle market prices increase more at higher All Urban CPI (housing, food and fuel) inflation rates.

MARKET VALUE OF AGRICULTURAL PRODUCTS SOLD INCLUDING DIRECT AND ORGANIC gain by a real +29.29%. State gains +21.74%. **Average per farm dollars** gain by +35.19%. State gains +26.65%. County mean gains are higher than state due to county mean farm acreage size ratio is larger, 3,102 to 430 acres. Harney County may have the largest mean farm sizes in the state due to large scale livestock operations.

FARMS WITH SALES OF \$500,000 OR MORE farm numbers increase +422.22% during the 25 year period. Sales amounts for these farms more than double with a real +105.05% increase. Both are far above state means. Only Lake County, with a +78.71% higher farm number increase with +85.97% higher sales for those farms with sales \$500,000 or more, is far above Harney County.

CROPS, INCLUDING NURSERY AND GREENHOUSE (vegetable) reporting farms decrease -30.26%. Crop farm % of total farms decreases from 36.31% in 1997 to 28.51% in 2022. However, vegetable crop sales increase a real +69.15% and crop sales % of total agri sales increases from 19.86% to 36.71%.

LIVESTOCK, POULTRY, AND THEIR PRODUCTS (animal) reporting farms decrease -30.73%. The same as vegetable crop farms. Livestock farms % of total farms decreases from 81.19% in 1997 to 63.31% in 2022. However, animal sales increase a real +21.68% while sales % of total sales decreases from 69.10% to 63.29-.31%.

Vegetable and animal sales will not sum to total agricultural sales estimates due to various factors such as government subsidies.

County total vegetable crop sales increase more than three times more than livestock sales from 1997 to 2022.

2022 total vegetable sales estimate is \$36,470,000. 2022 total animal sales estimate is \$62,867,000. Ratios are 1.72 to 1 or 0.58 to 1.

Farms reporting **TOTAL CROPLAND acres** decline by -40.25% and reported **acres** decline by -9.74%. **Farms** with **Harvested cropland** decline by -30.97% and **acres** incline to what appears to be at a stable +4.44%. Recall 2022 is the last year of the third most severe drought recorded since 1923. 2017, a wet year, reports a -13.86% decrease in farms since 1997 with +35.41% more harvested acres.

Drought and the national pandemic impact farm ratios. 2022 NASS has 477 reporting farms, 302 animal and 136 vegetable. Together, they are 91.82% of total farms. Others may have no production to report or are abandoned. 2017 NASS has 532 reporting, 360 animal and 174 vegetable. Together, they are 100.38% of total farms. Two farms report both animal and vegetable sales.

Between 2017 and 2022, farms with harvested cropland report 173,533 and 133,857 acres respective. However, harvested crop sales are between \$29,601,000 and \$36,470,000 in 2017 and 2022 dollars. -22.86% less net farms and +23.21% more gross incomes in five years.

CROPLAND ON WHICH ALL CROPS FAILED OR WERE ABANDONED or **CROPLAND ON WHICH ALL CROPS FAILED** number of farms increase +463.49% and acres by +1,153.50% between 1997 and 2022. Small number changes in small number pools make for large percentage changes.

LAND ENROLLED IN CONSERVATION RESERVE OR WETLANDS RESERVE PROGRAMS participating farms decline -68.63% while acres incline +54.96%. OO Ranch is an example. Ratios change after the Steens Mountain Cooperative Management and Protection Act of 2000.

IRRIGATION:

There are two droughts recorded in USDA and NASS censuses from 1997 to 2022. The 2002 USDA Census occurs during the final year of the second most severe drought recorded in a century. 1997 is a not so wet year. The 2022 NASS Census occurs in the final year of a 2 1/2 year drought, third most severe in a century. 2023 forward are wet years.

Comparing consecutive wet and dry census numbers, 1997 and 2002 to 2017 and 2022, failed farms between the first wet to dry census pair triple and acres more than double. Between the second census pair, failed farms begin at triple more than at the beginning of the first pair Both are near identical percentages. But failed acres increase by only +41.67%. The 2000-2002 drought period was more severe.

However, 34 of total 524 farms reporting in 2002 have failed crops for 6.49% of total. In 2022, 51 of total 477 farms reporting have failed crops for 10.69% of total. Major factor is surface water dependent grass, hay and alfalfa producers have significantly less access to flows during dry years. More so since the 2017 census.

USDA-NASS data does not allow for parsing irrigated cropland water sources between surface and groundwater or what crops are grown. Hay and alfalfa production and income from wells cannot be estimated.

FARMS WITH IRRIGATION Table 6 (1987-2012) and **IRRIGATED FARMS** Table 10 (2017-2022). **Irrigated farm** numbers decline -25.55% and **irrigated acres** incline by +29.40%. Harney County acre gains are due in large part to irrigated pivot hay and alfalfa farms. **Harvested cropland farms** decline -22.84% and **harvested acres** incline +13.48%. 2017 has peak production with 169,587 total acres. 2017 to 2022 change is -22.16% due to drought.

OTHER CROPLAND, EXCLUDING CROPLAND pastured farms incline +23.40% and **acres** by +252.94% with the largest increases between 1992 and 2002. In Harney County, other cropland excluding cropland pastured are irrigated pivot hay and alfalfa farms. In Lake County, such cropland has the largest increases between 2017 and 2022 of +70.98%.

PASTURELAND, EXCLUDING WOODLAND farm numbers decline -28.08% and **acres** incline +23.82%. Pastureland is developed with limited opportunities to expand. Yields are more sensitive to precipitation changes year to year.

PASTURELAND AND OTHER LAND, a small sub-set of the total, farms decline -57.73% and acres by -40.90%. Both numbers collapse in the 2022 NASS Census from 2017 by -53.93% and -15.12% respective. Yields are most sensitive to precipitation changes. Within southeast Oregon, Harney County has the largest farm decline due to consolidation and abandonment yet the smallest acre decline. Between 2017 and 2022, Grant County acres incline a more stable +0.83% as it again expands production.

Irrigated Land total acres decline -15.29% between 1997 and 2022 with the largest decline between 2017 and 2022 of -26.47%. 2017 has peak production with 166,501 total acres. NASS reports 2017 **harvested irrigated croplands** having peak production with 169,587 total acres. 2022 production is second smallest to 2002 with 133,001 and 122,421 acres respective due to drought.

HAY - ALL HAY INCLUDING ALFALFA, OTHER TAME, SMALL GRAIN, AND WILD (TONS, DRY) 1997 census numbers were in different categories than used in the 2002 census and thereafter. Those numbers are not presented but can be extracted.

Between 2002 and 2022, **farm numbers** decrease -29.25% and **acres** decline -3.86%. Recall both censuses occur during drought years. **Quantity** in dry tons improve +4.42% and tons per acre by +8.41%.

Between 1997 and 2022, **tons per acre** range from 1.91 to 3.06, Lake County ranges from 2.89 to 4.08 tons, Malheur County from 3.65 to 4.23 and the State mean ranges from 2.84 to 3.00 tons.

Between 2002 and 2022, **Irrigated ALL HAY** farm numbers decrease -22.27% and **acres** by -21.85%. In wet 2017, irrigated farms are 84.44% of total all hay farms and 81.72% of total acres. In very dry 2022, irrigated farms are 95.67% of total with much fewer all hay farms and 71.50% of total acres.

Reported acres per farm in 2017 is the record 601.67 acres, 375.64 and 377.65 acres in 2002 and 2022. Irrigated all hay acres decline a mean -34.40% and dry tons a mean -28.35% during severe drought years.

From 1982 to 2012, USDA tracts OTHER DRY, WILD HAY, SMALL GRAIN AND OTHER TAME HAY (other than alfalfa, wild hay and small grain) separate from ALFALFA. From 2017 forward, NASS reports HAY, HAY and HAYLAGE, HAY and ALFALFA, HAY excluding ALFALFA and ALFALFA.

OTHER DRY HAY (TONS, DRY), between a somewhat wet 1997 and a very dry 2002, **harvested farms** decline -30.06% and **acres** by -34.52%. **Dry tons** decline -26.36%. Reporting **irrigated harvesting farms** decline -27.01% and **irrigated acres** by -50.53%. USDA does not report irrigated dry tons.

In 1997, irrigated harvesting farms are 73.68% of total other dry hay farms and irrigated harvested acres are 93.48% of total. In 2002, irrigated harvesting farms are 85.07% and irrigated harvested acres 79.96% of total.

WILD HAY (TONS, DRY) farm numbers decline -37.04% and **acres** by -20.65%. **Dry tons** decline -34.66%. 1997 and 2002 reporting **irrigated harvesting farms** decline -28.68% and

irrigated acres by -14.74%. Reporting **irrigated harvesting farms** decline -27.01% and **irrigated acres** by -50.53%.

In 1997, irrigated harvesting farms are 79.63% of total wild hay farms and irrigated harvested acres are 83.44% of total. In 2002, irrigated harvesting farms are 90.20% and 89.67% respective of total. In 2002, wild hay is less affected by drought than other dry hay.

SMALL GRAIN HAY (TONS, DRY) small **farm numbers** between 1997 and 2002 decline -15.25% and **acres** by -25.80%. **Dry tons** decline -9.31%. Reporting **irrigated harvesting farms** decline -52.94% and **acres** incline +10.14%.

In 2002, the most reliable census between the two, irrigated harvested acres are 80.18% of total small grain hay (and alfalfa) farms.

OTHER TAME HAY (TONS, DRY) small **farm numbers** incline +17.54% and **acres** decline -27.02%. **Dry tons** decline -16.08%. Reported **irrigated harvesting farms** incline +35.71% and **acres** decline -37.58%. The mean irrigated harvested acres are 43.89% of total other tame hay acres.

ALL OTHER HAYLAGE, GRASS SILAGE, AND GREENCHOP (TONS, GREEN) **farm numbers** decline -47.83% within a much smaller farm sub-total. 1997 acres and dry tons are reported as (D), not disclosed due to low quantity and quality producer reports.

In 2002, irrigated harvesting farms are 100.00% of total other haylage (alfalfa) farms and irrigated harvest acres are +41.39% more than total. Often, haylage, grass silage and greenchop is cut from the same land as dry haylage. Acreage and production for both is reported in their appropriate categories. A double production count from the same acreage.

FORAGE - LAND USED FOR ALL HAY AND HAYLAGE, GRASS SILAGE, AND GREENCHOP **farm numbers** between 2002 and 2022 (1997 numbers are (NA), not available) decline -26.69% and **acres** incline +20.72%. Equivalent dry tons incline +20.66%. 2017 to 2022 tons per farm incline +5.80% and tons per acre by +6.28%. In 2022, 77.17% of forage land is irrigated and the 2.03 equivalent tons per is half Lake County with 4.07 tons per.

The 2017 NASS Census redefines hay, silage and forage into different sub-categories going forward in time. In the NASS **ALL HAYLAGE, GRASS SILAGE, AND GREENCHOP (TONS, GREEN)**, between 1997 and 2022, **farm numbers** incline +66.67% and **acres** incline by +9,139.24%. Dry tons incline +4,006.84%.

Irrigated haylage farm numbers incline +87.50% and **acres** by +4,230.68%. Dry ton 2002, 2012 and 2017 numbers are reported as (D). 2022 all reported haylage acres as irrigated.

Harney County ground and surface water distribution systems are developed. It has the largest acre number and percentage increases by far in the region. Only Lake County produces more haylage than Harney after the 2017 census.

ALFALFA ONLY: EXCLUDING HAY or ALFALFA HAY (TONS, DRY) reporting **farms** decline -18.29% and **acres** incline +7.69%. **Dry tons** incline +8.12%. **Irrigated alfalfa farm numbers** decline -12.80% and **acres** incline +17.94%. As near all alfalfa acres are irrigated, farms by acreage increase near 18% in 20 years.

Between 1997 and 2022, tons per acre range between 3.16 to 3.65. Lake County, with the highest percentage of pivot irrigation farms among all hay farms in the region, tons per acre range between 3.83 in 2002 to 5.03 in 2022.

HAYLAGE OR GREENCHOP FROM ALFALFA OR ALFALFA MIXTURES (TONS, GREEN) 1997 to 2022 farm numbers are very small, from one to five, and near all quantities are (D) or (NA). All reporting farms are irrigated.

In 2022, four farms report producing 1,932 bushels of winter / spring wheat for grain.

NASS 2022 Census numbers misrepresent nominal annual hay and alfalfa production. For example, between 1997 and 2017, Harney County alfalfa farms decline by -9.71% and acres incline by +56.84%. Dry tons by +53.77%. Irrigated alfalfa farm numbers decline -10.92% and irrigated acres incline +91.73%. Irrigated dry tons by +42.40%.

2017 has peak acres and production of 54,277 acres with 60,514 acres irrigated producing 193,255 dry tons. Between 2017 and 2022, acreage and production collapse. 37,230 acres with 37,224 irrigated producing 135,885 dry tons. According to this measure, drought and market instabilities impact alfalfa only acreage by -31.34% and production by -29.69%.

Another measure is the former USDA alfalfa only excluding hay from All Hay farms. Between 2017 and 2022, farms decline -17.34% and acres by -64.06%. Dry tons incline by +6.25%. Irrigated alfalfa farm numbers decline -2.05% and irrigated acres decline -38.49%. 2017 has peak acres and production of 52,447 acres with 60,054 irrigated acres producing 195,255 dry tons. Between 2017 and 2022, 37,230 acres with 37,224 irrigated producing 135,885 dry tons. By this measure, 2022 impacts alfalfa only acreage by -29.01% and production by -30.41%.

2017 total haylage 321,141 dry tons.	2022 total haylage 230,090 dry tons (-28.35%)
2017 total all hay only 127,866 dry tons	2022 total all hay only 94,205 dry tons (-26.33%)
2017 alfalfa only 193,255 dry tons	2022 alfalfa only 135,885 dry tons (-29.87%)
2017 60.17% alfalfa	2022 59.06% alfalfa

If RULE 512 restricts ground water usage to estimated 1998 levels or by 33.8% at the end of 25 years,

if as in 2022 92.31% of haylage produced using ground water is alfalfa,

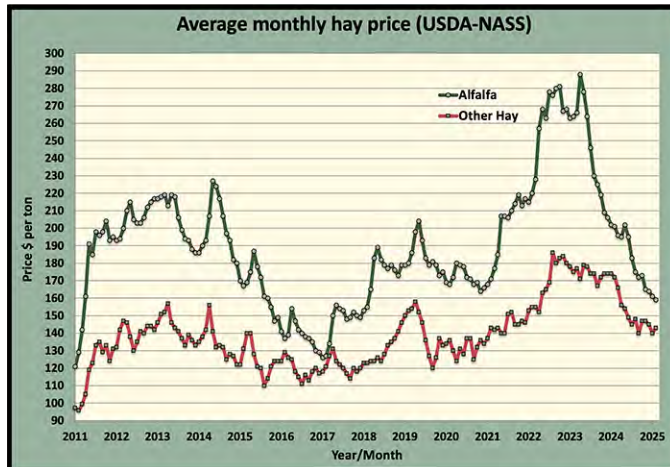
if as in 2017 and 2022 alfalfa is 60% of all haylage produced

and if future alfalfa production is reduced by 30% as from 2017 to 2022,

then RULE 512 will reduce total haylage production by 18%, 30% of 60% of the mean between 2017 and 2022 levels. The real world example would be similar to going from 2017 production levels to 2022 levels but over 24 years.

Median of 2017 and 2022 crop sales, adjusting 2017 to match 2022 inflated amounts by the core CPI 20.51% rate, is an annual \$36,069,602.50 in 2022 dollars during this five year period.

If the anecdotal 40% of hay and 60% of alfalfa is exported during the period,



Source: hayandforage.com/article 5288

(eastern Oregon \$245 and good quality pasture hay single small bale \$235) and fair quality \$250 (eastern Oregon), and

if the median national sales price between censuses for hay is \$141.25 per dry ton and alfalfa is \$202.12 per,

if the 2017 and 2022 five year mean of total producing forage pasture land is 151,929.5 acres,

if all hay including alfalfa mean is 136,467 producing acres,

if total irrigated all hay farm mean is 121,553.5 producing acres,

if harvested hay only mean is 90,713.5 acres with 22,657.5 (24.98%) irrigated pasture acres,

if all harvested alfalfa cropland is 45,753.5 acres with 48,869 irrigated acres (mix crop double count) producing,

and if the mean 48,869 irrigated alfalfa acres are reduced by 30% with RULE 512 and if good quality alfalfa selling for the NASS mean \$202.12 a dry ton is also reduced by 30%,

if total haylage dry tons are a mean 275,615.5,

if all hay only dry tons are a mean 111,035.5 or 40.29% of total haylage,

if alfalfa only dry tons are a mean 164,570.0 for 59.71% of total,

and if alfalfa production is reduced 30%,

then perhaps 115,199 alfalfa tons selling at \$202.12 or more is \$23,284,021.88 or more. The mean 111,035.5 hay only tons selling at \$141.25 or more is \$15,683,764.38 or more. 2017-2022 mean total is \$33,967,786.26 or more in crop sales. 2022 total crop sales are \$36,470,000.

Proposed Year 24 crop gross income may be -6.86% lower in 2017 to 2022 mean dollars.

If 60% of alfalfa 164,570 dry tons is not consumed by county livestock and exported, then \$13,305,155.36 or more is included in the county 2022 real gross domestic product of \$320,290,000 as estimated by the St. Louis Federal Reserve [FRED] in “chained or real” 2017 dollars or \$424,958,000 in unchained “real world” 2022 dollars (+32.68%).

If the mean between real and unreal GDP is \$372,624,000, then the 30% alfalfa production reduction may reduce county agri sales GDP -4.154% or more, not including the local low monetary velocity or multiplier effect. Impact will be felt sooner than later.

Although the different RULE 512 sub-areas have different PTW withdrawal reduction rates and current historically suppressed livestock counts may rebound in the future, county hay and alfalfa exports may end between the third and fourth PTW sometime between proposed years 2040 and 2046.

In 2022, the largest mean core expense among all farms, vegetable and animal, is feed (14.26%). If the anecdotal 60% of harvested hay and 40% of irrigated alfalfa is consumed by livestock within the county,

if 60% of hay only or 66,621.3 dry tons at \$141.25 per ton or \$9,410,258.63 is consumed or stored and if 40% of alfalfa only or 65,828.0 dry tons at \$202.12 per ton or \$13,305,155.36 is, then local haylage production and consumption by all livestock may be 7.092% of the mean county RGDP by 2054. Value added dollars per dollar spent or saved (profit) increases county GDPs.

LIVESTOCK:

CATTLE, INCL CALVES – INVENTORY, between 1997 to 2022, **farm numbers** decline -26.95% and **head count** by -38.97%. 2022 cattle and calves per farm is 281.71 head. Harney County has the lowest farm number decline in the region and is among the lowest in the state. Grant County has the largest head count decline of -44.13% in the region.

COWS AND HEIFERS THAT CALVED farm numbers decline -25.89% and **head count** by -24.45%. 2022 head per farm is 221.42. Cows and heifers that calved numbers are 73.72% of total. Highest percentage in the region and among the highest in the state.

CATTLE, COWS, BEEF – INVENTORY farm numbers and head counts are near identical to cows and heifers that have calved. **Farm numbers** decline -25.96% and **head count** by -21.45%. 2022 head per farm is 223.77. Beef cow numbers are 73.68% of total. Farm number changes are the most stable in the region if not the state. However, the highest reduction rate occurs between 2017 and 2022 (-24.65%) due to consolidation, abandonment and drought.

CATTLE, COWS, MILK – INVENTORY very small farm numbers decline from 26 to 12 **dairy farms** or by -53.85% and **counts** by -61.23%. 2022 head per farm is 2.92. Milk cow numbers are 0.04% of total. The highest reduction rate occurs between 2017 and 2022 (-51.39%) due to, for the most part, suspension of the Silver Sage dairy in Weaver Springs. Milk from cows sales are never reported except in the 2022 census by Silver Sage (\$0).

CATTLE, (EXCL COWS) or OTHER CATTLE - INVENTORY farms decline -28.32% and **head count** by -14.65% as county beef producers continue to reduce bull and steer counts. 2022 boy cow per farm is 88.36. Male cattle numbers are 26.28% of total. Since 2002, Harney County has the largest bull and steer number and percentage reductions in the state.

In 2022, Malheur County farms have the largest decrease in the region (-34.28%) yet numbers decline only -4.14% since 1997. Other cattle are 41.17% of its total head count.

CATTLE ON FEED - INVENTORY farms decline from 13 in 2002 to one feed lot in 2022 processing undisclosed (D) **head**. Lake and Grant counties farms and counts also decline but by less.

Malheur County is the regional meat market. Farms decline -42.11% due to consolidation, processing +17.47% more cattle than in 2002. 2022 feed cattle per farm is 4,788.82, state average is 1,580.65. Between 2017 and 2022, counts incline +92.76% due to high supply volumes. Between the previous 2012 and 2017 censuses, counts decline -19.84%.

SHEEP AND LAMBS - INVENTORY farms decline from 58 to 18 (-68.96) in 25 years and **counts** by -55.73%. 2022 head count is 3,968. 2022 sheep and lambs per farm is 220.44, still the highest in the region and above state mean. However, this is a long term systemic decline. State counts also decline a mean -46.08%.

2017 share of sheep sold to total inventory is 26.47%. 2022 share is 52.70% due to market prices and drought. Sheep, like cattle, are ruminants which graze on pastureland which acres were reduced by -30% and remaining acre yields were also reduced due to drought.

For comparisons, Grant County counts decline -83.41% with a rapid -53.34% decline between 2017 and 2022. Lake County counts incline +326.30% with a 1997 start base one tenth the count of Harney County (924 to 9,019) while farms decline -40.00%.

GOATS – INVENTORY 1997 to 2022 low numbers are often reported as (D). In 2022, 31 **farms** have a total 459 head **count** for 14.81 goats per farm.

For comparison, Grant County farm numbers incline from three milk goat farms to 34 total and inventories incline from 57 to 2,655 with rapid expansion between 2012 and 2017 (an estimated 1,346 head increase). In 2022, there are 76.91 goats per farm.

HORSES AND PONIES - INVENTORY AND SALES (excludes mules, donkeys and burros) **farm numbers** decline -16.61% and **counts** by -4.29%. 2022 horses and ponies count is 2,676 for 11.1 per farm, the highest in southeast Oregon and higher than state mean. Farms in the horse trading business decline -32.69% from 52 to 35 but sales numbers near double and numbers sold per farm incline to 15.14 head. Total sales more than double +113.81% or by +20.12% in inflation adjusted dollars. Recall core CPI inflation during the period inclines +82.32%. A \$1,000 horse in 1997 sells for a mean \$1,111.32 in 2022 adjusted dollars. Malheur County and state mean sale prices per are \$4,097.40 and \$4,218.40 respective.

2022 is COVID year three. The 2020 national pandemic brought a brief recession followed by high inflation and uncertain markets. 2022 is also year two and a half of a severe drought.

COVID impacts on county agriculture produces record haylage and near record beef market prices with lower acres and numbers. COVID impacts livestock production more than alfalfa. Hay and alfalfa production impacts livestock more than COVID. Drought impacts haylage production more than livestock. Between 2017 and 2022, haylage production declines -30% while market prices for hay incline by near two-thirds and alfalfa more than doubles. Historically extreme market prices for both products.

CATTLE AND CALVES SOLD farms selling decline -32.99% and **counts** sold by -13.97% due to increasing cattle sales between 2017 and 2022 with a +4.09% incline in farms selling. 2022 sales amount is \$61,523,000 and mean sale price per is \$998.76, the lowest unit price in the region and -24.40% below the state mean unit price. Malheur County high \$1,534.54 price per is due to value added processing such as feed and slaughter.

Between 1997 and 2022, Harney County cattle sale amounts doubles by 102.99% in then current dollars with 2022 sale amounts +18.48 above 2017. Recall FRED estimates 2017 to 2022 chained and unchained dollar difference is an +32.68% inflationary decrease to real dollar values. Cattle are sold at losses.

Lake County sale numbers decline -1.12% and amounts incline +153.62% with 2022 sale amounts +20.20% above 2017. The integration between robust cattle and alfalfa industries through ground water irrigation is undeniable.

SHEEP AND LAMBS SOLD farms numbers decline from 52 to 8 and counts decline from 8,915 to 2,091 head in 25 years. 2022 sheep and lamb numbers sold per farm is 261.375, the largest in the region and larger than state mean by near five times. Sales amounts incline +118.39%. 2022 total sales amount is \$487,000 and mean sale price per is \$232.90, again the highest in the region and higher than state.

EQUINE SOLD farm numbers decline from 52 to 39 and counts near double to 530 by 2022. Horse and pony numbers sold per farm is 15.14, the highest in the region and five times the state mean. Sales amounts double by 113.81%. 2022 total sales amount is \$589,000 and mean price per is \$1,111.32, near four times less than Malheur County and mean state prices of \$4,097.40 and \$4,214.40 respective. BLM wild horse sales.

2022 total livestock sales excluding pigs and goats, chickens and quail is \$62,599,000. 2022 total vegetable sales estimate is \$36,470,000.

County livestock production and sales numbers intermix with Malheur County numbers. It is the region's market place. Sales numbers and amounts are often recorded in the county of transaction. Especially during the 2020-2022 high market prices and drought. Some Harney ranches sell direct to feed lots while others maintain livestock contract during "finishing" in Malheur then sell on delivery. By how much is undisclosed.

2017 to 2022 Harney and Lake county sale numbers incline +18.48% and +20.20% respective. Malheur County inclines +71.44%. If county also has +20% more sales numbers from its own cattle, then 50% comes in from Southeast Oregon and Southwest Idaho.

Harney 2022 cattle sales is \$61,523,000, Malheur is \$290,492,000. Malheur County 1997 to 2022 cattle sale numbers are the same but incline +11.01% between 2017 and 2022.

If 30% pastureland reduction due to drought and if 30% of remaining 70% has less yield due to the drought (-49% total loss of edible vegetation) induces a 15% decrease in cattle numbers, if the annual 10% to 20% by volume reduction of available surface water flows into the Malheur sub-basin due to over consumption and retention in the Bear and Silvies sub-Basins is regulated, then this may have induced a 5% to 10% cattle number increase in 2022. However, the -38% beef cattle count and -23% of bulls and steers in the total -13% -16% inventory loss may be due more to high market and very high feed prices than lack of productive pastureland.

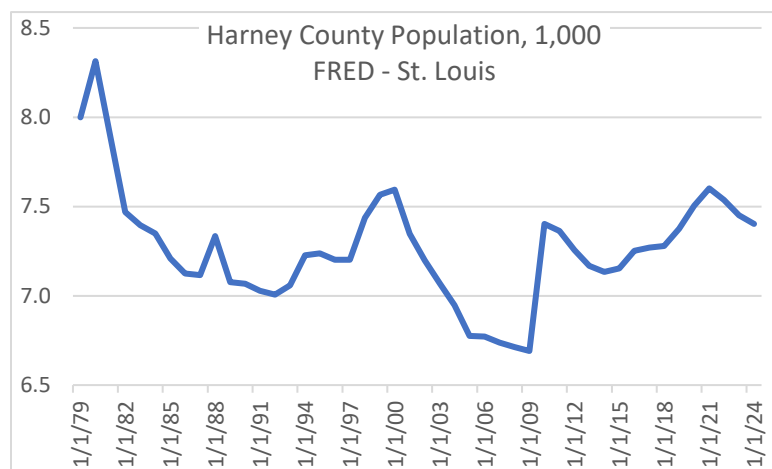
A proposed 33.8% reduction of available ground water for crops, and alfalfa being the primary cash crop, and if this implies a 30% reduction of irrigated crop yields due to continuing distribution improvements and 40% of current county produced alfalfa is consumed in county by current historic low grazing livestock counts, RULE 512 does not impact local alfalfa consumption with 2022 livestock inventory numbers.

If the anecdotal 60% of 2022 alfalfa production is exported due to lower local demand,

if major exporters are much more regulated and local consumption demands are relatively higher,
 if the historically suppressed 2022 total livestock 88,341 head count rebounds to a more historic 120,000,
 then alfalfa may have to be imported between the third and fourth PTW proposed to be 12 to 18 years after RULE 512 implementation of -31% to -34% reductions to sub-Basin ground water usage.

Ground water reduction limits on future livestock inventories may be reduced by near half if unlawful Silvies River surface water use upstream is regulated. This impacts natural pasture irrigation and availability to natural haylage and grasses in the Malheur Lake Administrative Basin. In particular, the West and East Forks from Wright's Point to Saddle Butte south to the Lake.

POPULATION:



Harney County population from 1978 to 2023 derived from Census Bureau decennial censuses and the American Community Survey [ACS] one year surveys with five year estimates beginning in 2000. 1980 has the highest number of residents (8,315) and 2008 has the lowest (6,691).

However, that year is estimated from the 2005 ACS. ACS and Portland State University Population Research Center

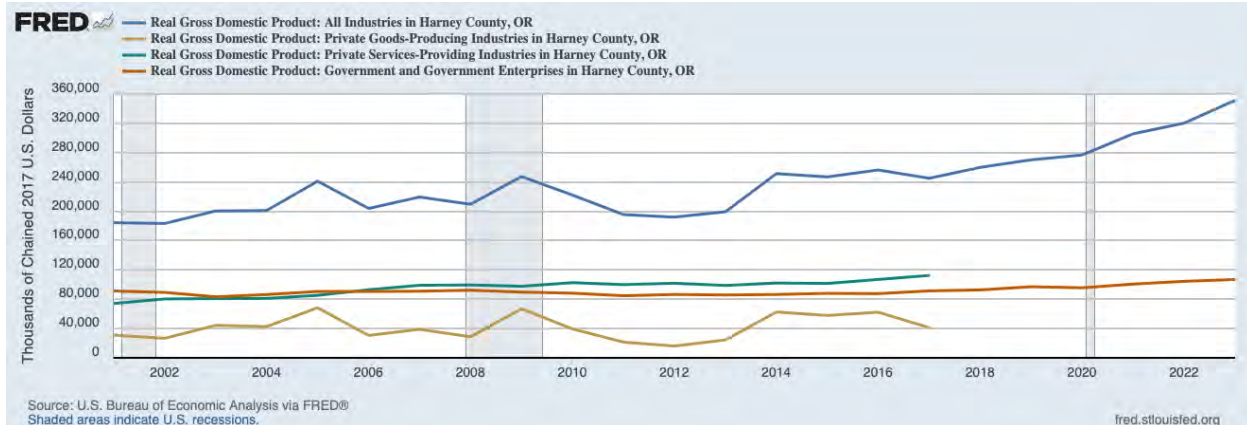
estimates are known to under estimate rural and frontier populations. Actuary tables do not match the older age demographic for not dying when and where other people do. ACS estimates are corrected or “reset” every 10 years by the census counts.

The estimated 2023 7,402 residents is an under count. “Vintage” PEP tables estimate 7,440 people with 2020 being the modern high of 7,602. Then, the COVID era 162 total person loss. 2023 ACS five year estimate is 7,515 which may have been without the 72 or so COVID related deaths.

Between the 2000 and 2020 U.S. Censuses, Harney County population declines -1.45%. However, between the ACS 2008 estimate 6,691 and the 2020 estimate 7,601, population inclines +13.60%. Between 2013 and 2020, by +6.56% for a mean annual +0.82% increase during those eight years.

Since 2000, ACS estimates Harney County population declines from 7,601 (or 02) to 7,402 for -2.62% by 2023 for a mean annual -0.65% decrease during those four COVID and post-COVID years. Rather rapid population expansion and now contraction.

GROSS DOMESRIC PRODUCT:



Harney County real gross domestic product [RGDP] in thousands of “chained” 2017 dollars from 2000 to 2022. Private Goods and Public Services annual RGDP after 1 January 2017 are not shown but data is available in other formats. FRED does not publish RGDP estimates prior to 1 January 2000 in this format. 2000 sub-category sums exceed all industries RGDP by \$11,928,000. All other years sum. 2020 Goods and Services amounts in parenthesis are not published and are estimates. The major private goods producing industries are beef and haylage.

	Real Gross Domestic Product: Chained 2017 dollars				Percentage of All Industries RGDP		
	All Industries	Private Goods	Private Services	Government	Private Goods	Private Services	Government
\$1,000							
2000	184,380	30,977	74,161	91,210	16.79%	40.22%	49.49%
2016	245,012	41,169	112,450	91,323	16.80%	45.90%	37.30%
2020	276,842	(88,894)	(92,382)	95,575	(32.11%)	(33.37%)	34.52%
2022	351,439	117,732	121,994	106,910	33.49%	34.71%	30.42%
2000-2020 change	150.15%	286.97%	124.57%	104.78%	191.24%	82.97%	69.75%
2016-2022 change	143.44%	285.97%	108.49%	117.07%	199.35%	75.62%	81.55%
2020-2022 change	126.95%	132.44%	132.05%	111.86%	104.30%	104.02%	88.12%

From 2000 to 2020, non-government All Industries RGDP inclines +50.15%, Private Goods +86.97% and Private Service +24.57%. Government and Government Enterprises share of county RGDP decreases from 49.49% to 34.52%

From 2020 to 2022, county RGDP inclines +26.95%, Goods and Services an identical +32.44% and +32.05% respective. Equal local economic investment and growth in goods and services during the Goods (beef and haylage) increase +85.97% from 2016 to 2022.

The phenomenal 2016-2022 +43.44% county all industries growth rate, near six percent per year is due to the high demand and record market prices for haylage and high volume at lower than then record market prices for beef and cattle. The main catalysts are the long term drought in the West and the national pandemic.

If 36% of total 2022 USDA-NASS agricultural sales are vegetable, then a -30% irrigated farm vegetable sales reduction (all 143 2022 irrigating farms report as irrigating all but six of 37,224 acres harvested) reduces \$9,979,000 from 2022 Goods \$117,132,000 (-8.52%) and from All Industrial \$351,439,000 (-2.84%) RGDPs in 2022 dollars.

Direct haylage production employment losses should be measured in man days, not in full time employees [FTEs]. Livestock production is more labor intensive than irrigated crops. In 2022, there were three to four *braceros* working in the Weaver Springs sub-area, in part, “winding down” the research dairy. There is one at the end of 2024. This area may be “regulated off” by Year six.

For the most part, pivot farms are automated and do not require constant attention. Some cattle farm employees punch cows and adjust pivot drop lines. Many irrigated farm owner / employees also are FTEs in other industries.

OWRD published estimates include both crop and livestock job losses and are high. Recall, RULE 512 does not reduce livestock employment numbers while county counts rebound but does limit new jobs available above 112-115,000 head in 24 years.

Perhaps two to four full time jobs will end at the initial PTW and perhaps a like number will be lost by the fifth and final PTW. Man days may be reduced by near the same percentage as irrigation water use and yields decline or about 30%. This calculates to an annual 42.6 man days per 142 irrigated farm loss or an equivalent 8.57 FTE hours by year 24. These and the four to eight FTEs lost during the same period would be 12 to 16 equivalent jobs eliminated.

According the 2022 USCB American Community Survey, Harney County farming occupations account for 14.72% of total employment. 31.38% of county workers earn between \$25,000 to \$49,999. Income bracket percentage is the largest in the region and is more than twice the state mean. Median income for farm workers is \$38,400. Low wages.

Mean family household size is 3.17 persons and non-family size is 1.27. One worker household mean annual income is \$59,092 and households with two workers, both spouses working, is \$109,029. Employment parity between males and females is near equal (53% to 47%). FRED estimates median household incomes incline a phenomenal +30.62% between 2018 and 2022 or above six percent per year in non-inflation adjusted dollars.

If half of those lost jobs are single householders or are in unmarried multiple worker households and the other half are married two worker households, then the first household group income risk is between \$354,552 - \$472,736 in 2022 dollars by PTW Year 24 and the second, whom may change occupations or relocate elsewhere, is between \$654,174 - \$ 873.672. A total \$1,008,726 to \$1,346,408 of income in 2022 dollars is at risk of loss. ACS estimates 2022 total county incomes at \$100,836,241.

Secondary indirect and induced losses are difficult to estimate for Year 24. Too many external variables. However, there may be an All Industries RGDP decline of -45.48% for all industrial sales and services. Primarily, in the heavy machinery and irrigation equipment sectors. If 12 to 16 agri workers are estimated to be lost, then secondary workers may decline by 5.46 to 7.28 or more.

Perhaps the industrial category most impacted, income and employment, is electric power and distribution. Perhaps four to five high pay jobs may be lost to attrition unless offset by higher delivery prices. This estimate is made without inclusion to total job loss numbers.

County agriculture monetary velocity or dollar “multiplier effect” on total economic activity is an estimated low 30 day .41-.45 to 1 depending on sector and category. RULE 512 will have minimal impacts on county employments and incomes.

\$144,144.03 to \$145,167.95 in county property taxes will be at risk three years after RULE 512 is implemented from the Weaver Springs sub-area which is proposed to be “regulated off” in Year 6. County 2023-24 Approved Budget requires \$3,300,000 in property taxes to balance.

Total budget expenditures are \$4,580,285. Harney County Health District 2023-24 Approved Budget requires \$1,399,127 in property taxes to balance.

According to the 2023 Harney County Tax and Assessor’s Office, sub-area Real Market Value is \$40,250,300 to \$40,647,310, Market Assessed Value is \$19,677,979 to \$19,770,739 and Assessed Value is \$11,866,858 to \$11,963,573. Property tax rates are high and tax assessments are low.

Beyond Year 6 is difficult to estimate. Low numbers of annual property sales or transfers and a rather antiquated state property tax system make annual adjustments cumbersome and slow.

Harney County services are now stressed dealing with the 2020-2023 high inflation rates for operational costs while county tax revenue increases lag for years. There is a 66.12% percent differential between 1987 and 2022 CPI national inflation rates (Oregon is higher) and total Harney County property tax increases. Gap is widening.

Perhaps there will be an immediate number of negative property sale prices resulting in lower RMVs and MAVs. Continuing price changes may tend to be less than inflation resulting in limiting or reducing real property tax revenues in the future. An accurate, more clean and clear estimate is not possible. Too many variables.

The question is not how much property tax revenues are lost, but how much taxable gains will be.

EcoNW economic analysis models for “less impact to groundwater dependent ecosystems.” Had OWRD provided for a local analysis, both would have known the often cited Warm Springs complex of permanent springs and ephemeral lakes as well as Weaver Spring and the spring at ephemeral Weaver Lake have never been close to being dry and for different reasons.

RAC recommends measuring spring flows to adapt management strategies. Another tool set are aerial photographs and space imagery beginning in 1986. From these observations, spring flows vary with long term precipitation variations. Weaver Spring more than most Warm Springs Valley springs. In fact, the Singhose place on Weaver Spring has been threatened by over flows a few times. RULE 512 does not impact SWMPA springs immediately after implementation.

FINAL ANALYSIS:

RULE 512 limits future livestock counts to an estimated 112,000 – 118,000 head or to NASS 2017 census numbers. The RULE also limits future economic and demographic expansion and risks continual stagflation and natural population attrition with the current cattle production mix. Crop income losses must be offset by livestock production numbers and sales gains.

There is not enough water. There is less and less. In particular, from declining snows and inclining surface water use in the Bear and Silvies valleys. An annual mean of 20% of available upper Silvies River flows are no longer available to lower River farms and the Lake.

Everyone needs to take at least a ten percent “haircut”. ALL ground and surface water permittees. The 100 year old Silvies River Water Decree no longer fits. One foot is too tight while the other’s shoe laces have been very loose. New Silvies River, Silver and Sage Hen creek water decrees are necessary for the SWMPA moving forward in time.

The opportunity for a relative low cost dam storing near 34,000 acre feet on private land is available at the location identified as “Silvies Dam” by the USACoE in 1956, the confluence of

the Silvies River and Emigrant Creek. But the State has an “open flow” policy for a long time now which effectively eliminates public-private partnerships for surface water storage facilities.

Harney Basin has attempted five times over a century and organizing three water districts to final conclusions. Organizations begin after severe flood and drought periods. Five times they fail. Most think others benefit more than they. The state is the water master AND de facto water district. A local water or water management district for a large irrigation dam is necessary for the SWMPA moving forward.

RULE 512 impacts will be bad. But, not as bad as some folks fear. The numbers are the numbers and they suggest reverting to pre-COVID crop / livestock ratios may be the best and only strategy. County RGDP will become more reliant again on lower profit margin livestock sales with volatile but increasing market prices. Industrial diversification is necessary for the SWMPA moving forward but is unlikely.

Allowing for RULE 512 employment and population attrition losses, businesses and employment will still exist at near below current numbers. However, profits and incomes will incline less than inflation. Stag-flation.

In essence, RULE 512 turns back the hands of time then the hands stop moving forward again.

This economic and demographic statistical analysis of RULE 512 is as valid as any other. But the numbers used and calculations made are more in context to actual local events and therefore perhaps more accurate.

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13 May 2025
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P.S.

The Department creates this problem by issuing ground water permits here when there are department records indicating serious ground water level issues in 2006-08. The Department over allocates ground water use in the Harney Basin. The Department does not enforce surface water regulations in other sub-basins. The Department is, for the most part, negligent and at fault.

As an engineer, wouldn't it be faster, easier and perhaps cheaper in 2022 to come here with a “bid” of \$12,000,000 or whatever the assigned price of ground water would be per acre foot and buy back the assigned water rights? Those to be regulated off would have three years to take their stuff and go away. Department has done this before in Malheur County. Imminent domain. This would require legislative action and approval. One can dream ...

STATISTICAL ANALYSIS OF THE SILVIES RIVER IN THE BEAR AND SILVIES SUB-BASINS

The OWRD July 2023 publication, *The Business Case for Water in Oregon*, available at www.oregon.gov/owrd/WRDPublications1/230721_FINAL_Business_Case_for_Water_in_OR.pdf, makes clear in its economic analysis that Harney Basin groundwater permit withdrawals must be supplemented by surface water flows. Makes sense. However, things have changed the past 100 years.

28 MAR 1991, the Oregon Water Resources Department grants Application Number S 71472, an in-stream permit to the Oregon Department of Fish and Wildlife, for the Silvies River. From .28 miles below Carson Springs (the Silvies River POS "source") in Grant County to the Silvies River – Trout Creek POD confluence in Harney County.

Permit allows for variable seasonal flows from 10 to 15 cfs along the 56 river miles. "The public use for this instream water right is based on is providing required stream flows for redband trout. ... Remarks: Redband trout is listed as "sensitive" (candidate species for listing under the Threatened and Endangered Species Act population declines from present level) by ODFW. Population maintenance and recovery depend on instream habitat the requested flow will provide." "Establish a gaging structure at or near the lower limit of the reach" (the OWRD SILVIES gauge in 2014). "Local ODFW personnel will assist the watermaster in establishing a monitoring plan and program". Not as of yet.

There are many months during the past ten years when flow measurements at the OWRD SENECA and SILVIES gauges are recorded that river flows fall below ODFW minimum standards due to little or no flow. However, there are many months when river flows will be below minimums at one flow gauge location and not at the other. There are days when gauges will "flip" due to more irrigation and storage occurring in the Bear Valley than in the Silvies. Ten year FEB-MAY daily and monthly flow rates always exceed ODFW standards but JUN-DEC most often do not. ODFW and OWRD planned for the "gaging structure" to be on the Trout Creek side of the River which now has been covered by a 20 foot wide earthen berm. SILVIES gauge measures initial and considerable flow differences from SENECA starting in 2015.

Argument and key rebuttal to any state mandated reductions in Harney Basin surface water usage is, "Don't make new rules and regulations. Enforce the one's on the books now." However;

Was the OWRD somewhat optimistic in 1991 in relation to 2024? Department relies on the USGS BURNS flow gauges above Five Mile Dam with reliable records since 1923. It measures the 1982-83 absolute record flows during the "Great Harney Flood". Long term observations made since 1909 by the OWRD and other state and federal land management agencies may be the basis for the allocated flow rates.

Is the reason state flow mandates to preserve habitat no longer apply is from the increasing surface water demand or from "Climate Change"? The answer is yes and maybe.

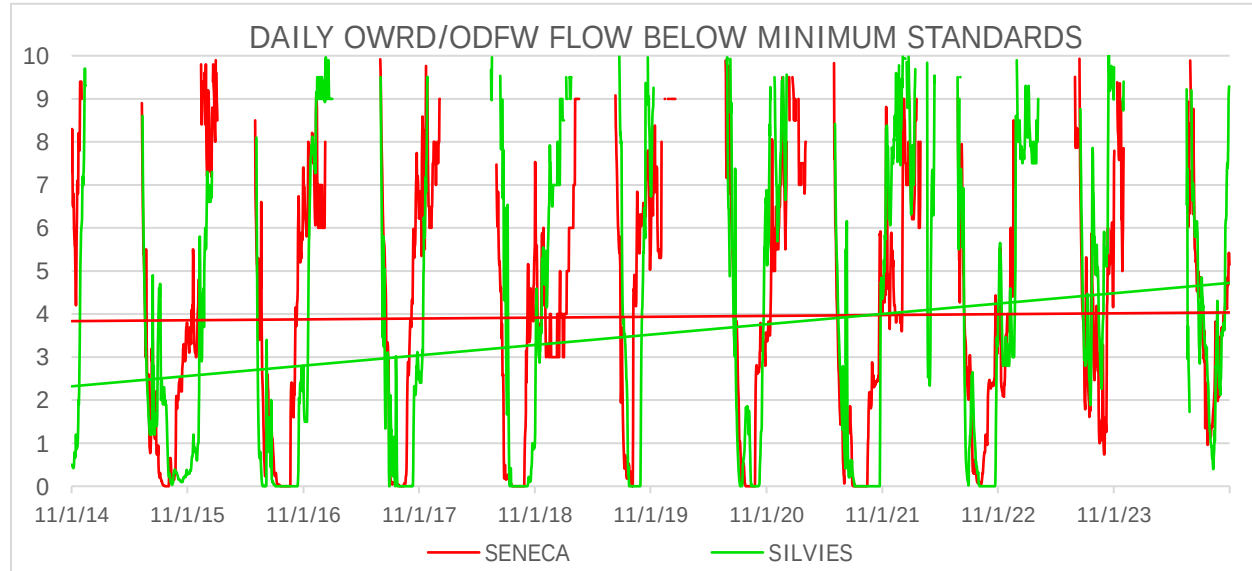
This research paper examines the Bear and Silvies sub-Basin drainage flows using the numbers from the three OWRD gauges on the Silvies River during the past ten water years when all three are operational. They are identified in this paper as SENECA located at the River's Bear Valley exit, SILVIES located at the River's Silvies Valley exit and BURNS located farther upriver from Five Mile Dam.

Paper also relies on the Author's *Statistical Analysis of Bear and Silvies Meteorology* published on 28 February 2025. Purpose is to supply more information to the local surface water planning board and the State during their considerations on how to be more efficient using Harney Basin surface flows while protecting species and habitat. This lack of information and facts may make decisions more uncertain or down right wrong. The numbers are the numbers. There are surprises.

The ten year Periods of Record is a "snap shot" in time and are not long enough to estimate long term trends. But, considerable changes during the past ten water years are measured.

Research paper begins by examining the current upper Silvies River base or minimal flows.

OWRD SENECA and SILVIES ten water year comparison of mean daily flows below OWRD/ODFW minimum monthly and seasonal flow mandates of 10 cfs. Note 2023-24 never run dry.



1 OCT 2014 to 30 SEP 2024 has 3,652 days. SENECA measures 1,909 days with below state mandate flows (52.27%). SILVIES measures 1,810 days (49.56%). During these days, SENECA total flow is 8,037.72 cfs. SILVIES is 6,742.96 cfs, -16.11% less flow than SENECA. SILVIES measures less days with minimal flows than SENECA but with less daily flow.

SENECA mean daily flows below state mandate is 3.936 cfs. SILVIES is 3.532 cfs, -0.404 cfs or -10.26% less flow than SENECA.

SENECA linear trend line begins at 3.836 cfs and ends at 4.036 cfs, a +0.201 cfs or a +5.24% increase for days below 10 cfs. SILVIES linear trend line begins at 2.324 cfs and ends at 4.717 cfs, a +2.374 cfs or a +101.41% increase.

SENECA measures 246 days with little to no flow at or below 0.1 cfs, 6.74% of 3,652 days. SILVIES measures 347 days (9.50%), +101 days or +41.06% more than SENECA.

Silvies Basin reservoir releases are measurable with small flow increases or "bumps". Release times are variable and tend to be during July to supplement and extend decreasing Silvies River flows but not every year. 2016 has the first definite bump.

Summer thunderstorm precipitations are also measurable as one to two day "pulses" and tend to be from late June through August. SILVIES tends to spike more than SENECA but SENECA measures larger event volumes and percentages.

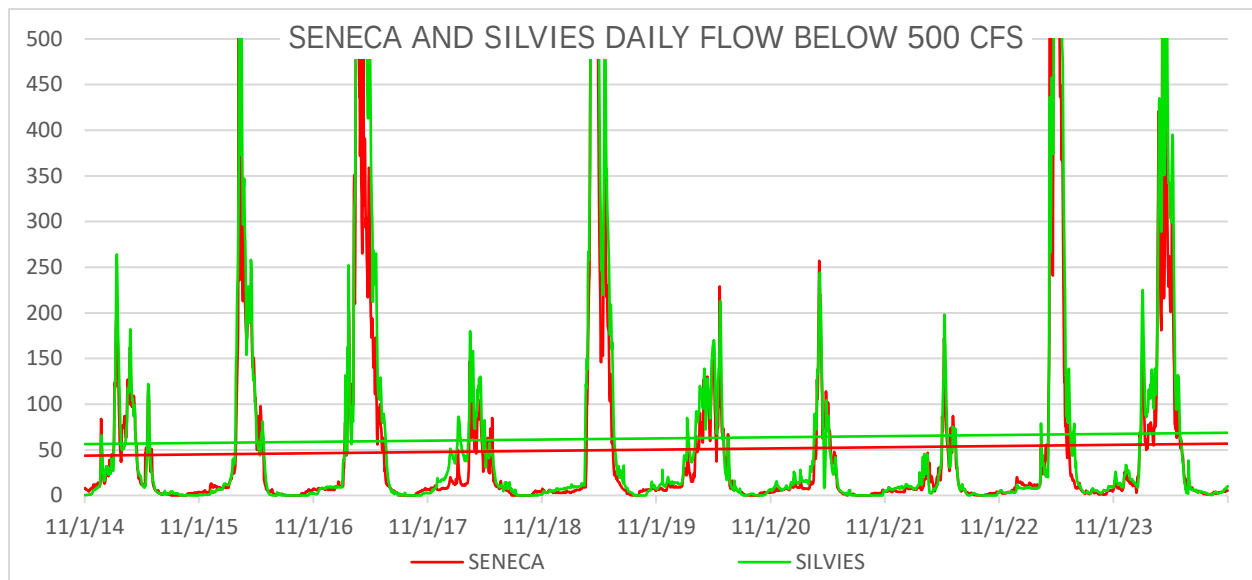
Longest little to no flow periods for both is from 5 and 6 JUN 2021 to 6 JAN 2022 (215.5 days) when SILVIES flows again surpass SENECA. 2020-2022 are drought years.

Second longest is from 26 and 27 JUN 2022 for both to 1 SEP 2022 for SENECA when SILVIES measures no flow while SENECA does. SILVIES has no flow until 23 OCT and does not match and surpass SENECA until 8 MAR 2023. SENECA has 182 consecutive days of sub-mandate flows and SILVIES has 254 consecutive days. 2023-24 are flood years.

Third longest low flow period is from 10 and 12 JUN 2015 for both to 6 DEC for SENECA (178 days) and 17 JAN 2016 for SILVIES (220 days). There are no days with no flow. Lowest measured flows are on 13 and 14 SEP with 0.18 cfs and 0.03 cfs respective. 2014-15 and 2015-16 are moderate and high flow years respective.

The upper and middle Silvies River has no base line flow.

The large percentages and rates of change below OWRD/ODFW minimum flow standards by short term climate changes and increasing agricultural usage must be considered in a taller context.

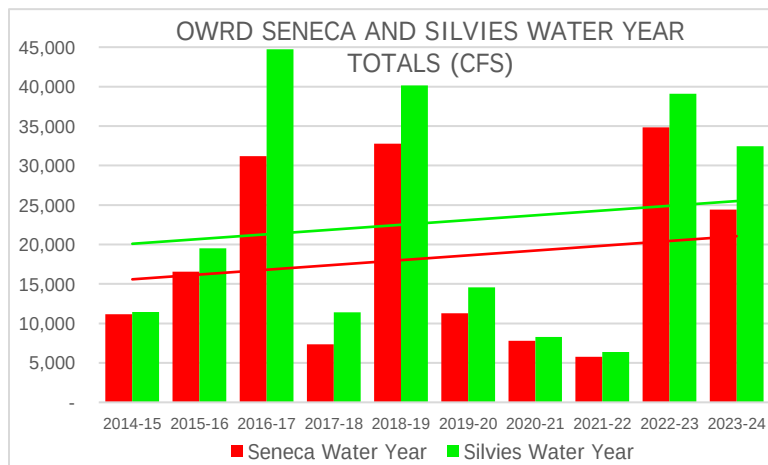


During the past ten years, SILVIES annual mean ultimate minimum flows are 6.0 days later and 9.6 days longer than SENECA. Summer flows from Bear and Silvies valley convective storms are seen. SILVIES has 132.9% more mean water year flow than SENECA and 124.43% more mean daily flow.

SENECA provides 80.37% of SILVIES total water year and total daily flows. In comparison to the Bear Valley with 15 days of 1.0 cfs or less flow in 2022-23, Silvies Valley has 53.

SENECA daily linear trend line begins at 43.63 cfs and ends at 56.92 cfs, a +13.29 cfs or a +30.46% annual and a +30.79% daily record increase during the past ten years.

SILVIES daily linear trend line begins at 56.17 cfs and ends at 68.82 cfs, a +12.65 cfs or a +22.52% annual and a +22.79% daily record increase during the past ten years.



SENECA annual linear trend line begins at 15,58 cfs and ends at 21,03 cfs, a +5.45 cfs or a +34.98% increase. SILVIES annual linear trend line begins at 20,08 cfs and ends at 25,51 cfs, a +5.43 cfs or a +27.04% increase.

During the past ten water years, total annual flows for both gauges are increasing. OWRD BURNS is also but at a lower delta or rate of change with +18.06% annual and +18.14% daily increases.

Emigrant Creek, which now is 52% to 64% of annual BURNS flows, has

an estimated -6.62% total mean daily decrease over the past ten years. NOAA SNOTEL Snow Mountain station, the designated primary surface water source for Emigrant Creek, records a -36.86% decrease in snow water equivalencies over the past 47 years.

There is insufficient surface water resources available to replace future Harney Basin ground water use reductions. According to USGS and OWRD published estimates of ground water replenishment or recharge by surface water which are lower than actual. These excellent studies use a 30 year record of one flow gauge. This paper uses ten and three.

The ODFW 1991 state instream permits for the upper Silvies River, Bear and Trout creeks are granted with limited information on the hydro-dynamics of the Bear and Silvies sub-Basins. The USGS BURNS gauge, with flow records since 1 JUN 1908, are the only measurements available and the River there rarely flows dry. USGS relocates its flow gauge much further upriver from the former location near Five

Mile Dam on 28 SEP 1991. Perhaps to assist in the state's enforcement efforts of this and the other similar permits granted in both sub-Basins. USGS ends operation 25 MAY 2007 when Federal interest in a dam ends. OWRD resumes control and operation of the BURNS gauge on 18 MAR 2008.

This type of permit and others throughout the state are issued over the next few years to ensure minimal flows for habitat preservation and specific aquatic species. These are in response to state executive public policy and legislative actions in response to the "inconvenient truth" of anthropogenic or human caused global warming now known as climate change.

However, local anecdotal knowledge was the River would meet these minimum standards for only six months during most years. Harney County aerial photographs of the Silvies sub-Basin taken May-June 1989 tend to support these opinions. At that time, the River had consistent flow and the West Canal was intermittent. Most irrigation development had occurred in the north sub-Basin above the Camp Creek confluence (in Grant County and not visible) near the current Silvies Valley Ranch and Resort golf course. Golf course does not withdraw water from Camp Creek. In the south valley, Trout Creek is no longer coherent at the SVR&R property line and makes no contact with the River.



Left image is the Silvies Valley lower two-thirds from USGS aerial photograph plates taken May-June 1989, a year with average temperatures and above average precipitation (43.28°F annual mean temperatures and 11.34" annual precipitation at the National Weather Service Burns Municipal Airport station). There are only two aerial plates from the Harney County Court records of the Silvies Valley as only the south half is in the county. Right image is the same area from USGS Earth Explorer satellite taken 30 June 2023, a half year with below average temperatures and above average precipitation. Both images are true color without enhancements.

Bear Valley to the north is also changing as property owners there extend similar surface water management practices. 34 year transformation is remarkable but at what price?

The ten year flow records are insufficient to establish long term trends. However, Silvies sub-Basin surface water retention and use changes are measurable beginning in the Spring of 2016 and increase until the 2022 drought year and state objections to certain practices. Flow measurements indicate practices change again to store more surface flows than in previous years. 2024-25 water year so far has not been researched or recorded. But February and March observations seem to indicate Silvies sub-Basin surface water retention practices continue with more flow entering the valley than exiting.

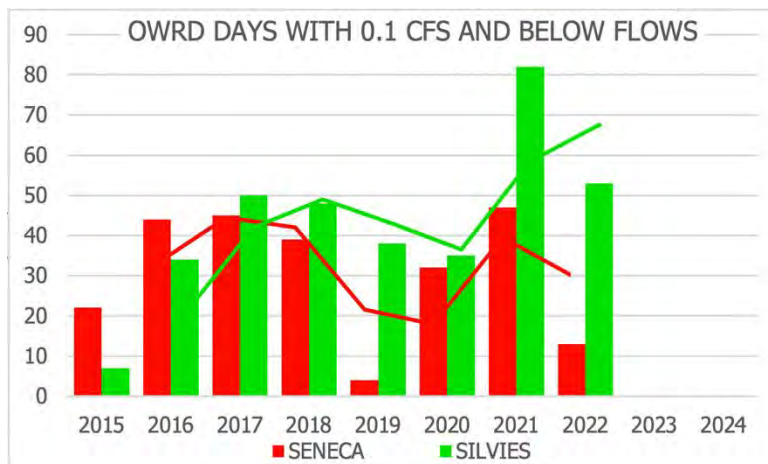


Chart shows a one year moving average. Water years 2023, 2024 and likely 2025 do not have mean daily flows of 0.1 cfs or less.

SENECA measures 246 total days and SILVIES measures 347, a +101 day or +41.06% difference.

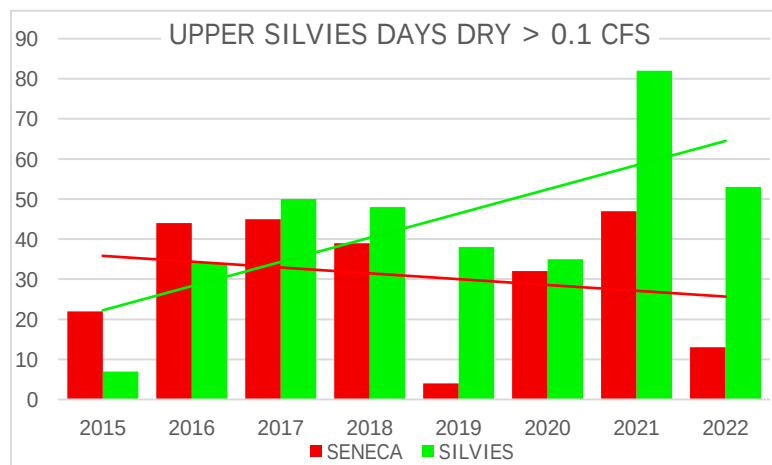
Silvies sub-Basin one year moving trend number of "dry days" accelerate during the 2020-22 drought periods while the Bear sub-Basin does not after the 2020-21 water year.

SILVIES also measures no minimum daily summer flows of 1.0 cfs or less in 2023 and 2024.

High water years 2023 and 2024 with no little or no flow days are omitted from the chart.

During this condensed eight year period, ratios between SENECA longest and shortest dry periods, 47 and 4 days, are 11.75 to 1 or 0.085 to 1. SENECA has 246 of 3,652 days with little to no flow (6.74%).

SILVIES ratios between longest and shortest dry periods, 82 and 7 days, are 11.71 to 1 or 0.085 to 1. Both ratios are identical but SILVIES has more days. SILVIES has 347 of 3,652 days (9.50%).



Mean days with annual minimal flows of 0.1 cfs or less for SENECA is 35.71 days and is 51.14 days for SILVIES. Median between highest and lowest number of days for SENECA is 37 days and SILVIES is 68 days. SENECA differential between mean and median is 0.965. SILVIES is 0.752. Means lower than medians indicate how variable and extreme low flows are in the Silvies sub-Basin.

SENECA linear trend line begins at 35.83 days and ends at 25.67 days, a -10.16 dry day or a -23.86% decrease. SILVIES linear trend line begins at 22.25 days and ends at 64.50 days, a +42.25 dry day or +289.89% increase. This may indicate expanding use of Silvies sub-Basin surface waters for agriculture and habitat restoration to an extreme, measurable since 2016.

SENECA dry day linear trend line begins at 38.19 days and ends at 33.23 days, a -4.96 day or -12.99% decrease. SILVIES linear trend line begins at 40.31 days and ends at 61.97 days, a +21.66 day or a +53.73% increase. Ratios between highest and lowest number of days with little or no flow for SENECA (50 / 13) is 3.85 to 1. SILVIES is (81 / 13) is 6.23 to 1. Twice SENECA.

SILVIES at the exit of the Silvies Valley has 1.43 times more number of days with little to no flow than SENECA at the Bear Valley exit. It also has 1.24 times more annual and mean daily flow than SENECA during the past ten years. Silvies sub-Basin flows are variable to an extreme. More in-stream flow is now

distributed and retained for agriculture and habitat, livestock and recreation. Also, Silvies sub-Basin mid to late summers are much warmer than the Bear and evaporation is a factor.

Consumption is significant during the four low flow years of 2018 and 2020 to 2022. During MAY-OCT 2022, only near two cfs more water each day leaves Silvies Valley than enters. Between JUN 2014 and SEP 2022, SENECA records a +38.46% increase while SILVIES records a +9.38% increase in flow.

The additional Silvies sub-Basin 2023-24 water year 552 acre feet may be from reservoir releases and or from precipitation from the previous water year more than needed in the current. 2023-24 water year is close to 2016-17 in positive flow percentages but not in amounts. True Silvies River hydro-dynamics are only seen during high precipitation melt high flow periods.

Bear sub-Basin cannot be estimated. There is no flow gauge upstream nor is there a location of value for one.

SILVIES records a total 228,137.83 cfs during the past ten years after SENECA records 183,340.34 cfs. The additional 44,797.49 cfs (19.64%) is from precipitation, snow and rain, within the sub-Basin

The Water Decree grants both Bear and Silvies sub-Basins instream and spring waters for 1,638.9779 provisional max ac/ft of storage and 377.7532 provisional max cfs day of flow during the irrigation season on or soon after 20 MAR until on or soon after 1 SEP for most permits every year. The 166 day irrigation season is impractical now and most often is ignored. Most Bear sub-Basin grants and near all reservoirs are allowed annual flows without seasonal restrictions.

In general, the 1924 Circuit Court Decree allocates a one cubic foot per second rate for every 60 acres of land under title by allocatee for near all claimants upriver of Gordon Curry Creek near one mile above of the current Five Mile Dam. All Poison Creek and near all Silvies River flow to Malheur Lake was allocated a one cubic foot per second rate for every 80 acres, -75% less volume than above Gordon Curry or +33% more allocated volume above Gordon Curry than below.

Larger allocations are made for parcels and lots without natural flow irrigation with provisions to deliver water to those areas. E. Hines Co. 1933 grant is for 1.01 cfs day on eight acres at Silvies and 1.33 cfs day on ten acres at Seneca for industrial / manufacturing use. There are four grants found at the lower one cfs per 80 acre rate. A. Wintermeir 1904 claim on Spring Creek at the River now within the Silvies Valley Ranch and two, perhaps three, Southworth 1885 and 1905 claims on Bear Creek perhaps due to purchased property is adjacent to owned.

Such provisional conditions are domestic water use any time of year, an additional one cubic foot per second for each one thousand head of stock, that during the irrigation season the amount of water (cfs) diverted for irrigation purposes shall not increase by any amount but quantity (ac ft) may with diversion canals for the purpose of getting the water to the stock providing winter season river ice is not used, losses by seepage, evaporation or other causes are considered and the limit of double the amount of water (cfs) allocated at the point of diversion (IS-POD) to reach the place of use (IS-POU) for stock purposes. If it appears that during the spring and early summer there is a large flow of water in [the] Silvies River and its tributaries, all lands irrigated by the River are permitted to continue the use of more than 1/60th of a cubic foot per acre [daily] flow rate up to two acre feet per acre volume.

In the Matter of the Determination of the Relative Rights of the Various Claimants to the use of the Waters of the Silvies River and its Tributaries, Section 24, pages 131-134, Oregon State Supreme Court, Salem – Oregon.

OWRD SILVIES RIVER PERMIT ALLOCATIONS

Sub-Basin	Rate CFS	Max Rate CFS	Rate acre/feet	Max Rate acre/feet
Bear	130.8547	170.9936	111.3995	111.7290
Silvies	147.0496	206.7596	1,288.0739	1,527.2489
Total	277.9043	377.7532	1,399.4734	1,639.0079

Data is accumulated from <https://apps.wrd.state.or.us/apps> tables.

Note most Silvies sub-Basin surface water permits are more for storage than irrigation.

FLOW TO VOLUME CONVERSION RATES

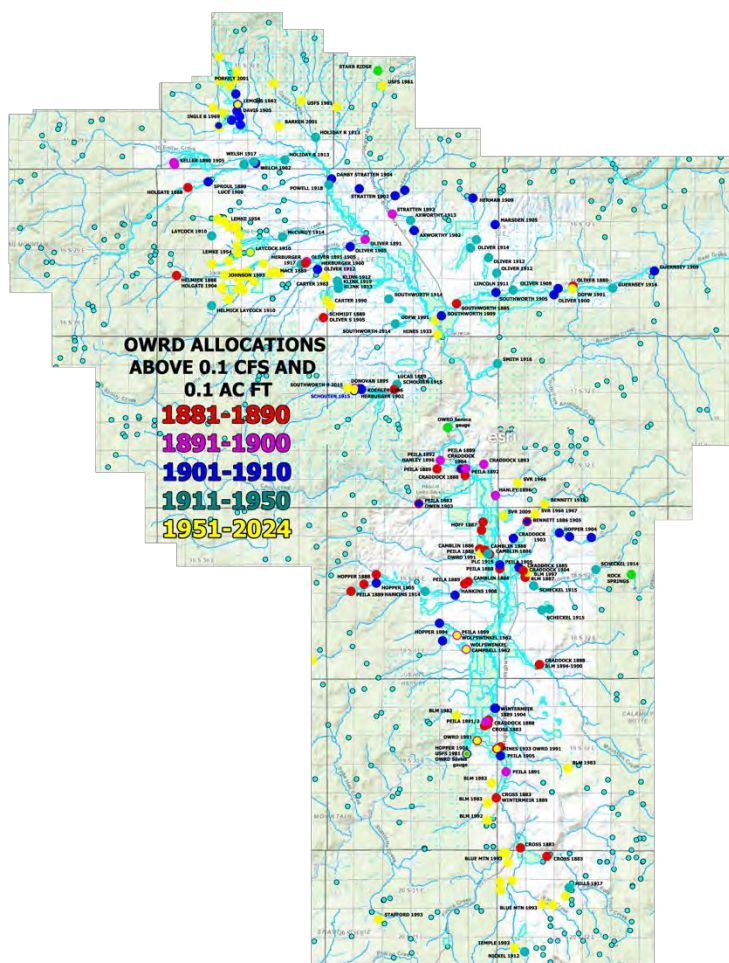
1 cfs (all day) = 1.983 acre-feet per day = 2,447 cubic meters of water. 1 cfs day will produce 724 acre-feet of water per year or 329.0435 acre-feet during the 166 day irrigation period. For example, 277.9043 cfs day * 1.983 = 551.0842 ac ft day. * 166 days = 1,214.2272 acre-feet per year.

640 acres = 1 mile. 1 acre = 43,560 square feet. 1 acre-foot = 43,560 cubic feet. 1 acre-foot = 1,233 cubic meters of water. 1 acre-foot = 0.504 cfs / day. For example, 1,399.4734 ac ft * 0.504 = 705.3346 cfs day. <https://www.coloradoriverdistrict.org/water-measurement/>

Note Bear PODs irrigation to retention ratio between day cfs rate and ac ft as cfs storage, 130.8547 and 56.1453 cfs, is 2.33 to 1. Ratio between maximum day cfs rate and maximum storage as cfs, 170.9936 and 56.3114 cfs, is 3.04 to 1. More maximum use of flows for immediate irrigation than for retention. However, tributaries in the north and west Bear Valley are now built for retention with little or no flow reaching the River.

Silvies POD ratio between 147.0496 day cfs rate and 649.1892 ac ft cfs, is 0.226 to 1. Maximum day cfs and maximum storage as cfs, 206.7596 and 769.7334 cfs, ratio is 0.269 to 1. More maximum use of flows for retention than for immediate irrigation.

29 DEC 1966, Peila Ranches exchanges one reservoir permit on Cottonwood Creek in the Bear sub-Basin with an allocated but unusable 192.5439 ac ft capacity for another on Bridge Creek in the Silvies sub-Basin with a 303.1401 ac ft allocation.



Bear sub-Basin OWRD POD applications, permits and newer certifications outnumber Silvies sub-Basin 232 to 103. Silvies outnumbers Bear in decrees only, 72 to 43 respective. Bear allocated sum cfs rate is 88.99% of Silvies and allocated maximum sum cfs is 82.70%. Allocated sum ac ft is 9.07% and maximum sum ac ft is 7.32% of Silvies.

For comparison with all OWRD permits of record above Five Mile Dam, excluding most federal springs, Bear and Silvies sub-Basins account for 78.17% of all PODs (36.92% + 41.58%), 82.74% by decree (51.80% + 30.94%), 73.44% by certificate (50.00% and 23.44%), 100% by application (66.66% in the east Bear and 33.33% in the south Silvies sub-Basins) and Bear alone has 77.78% by permit (44.44% in the west and 33.33% in the east sub-Basin).

Bear and Silvies also account for 86.48% of allocated cfs, 82.21% of allocated maximum cfs, 96.77% of allocated ac feet and 92.86% of allocated maximum ac feet above Five Mile Dam.

The upper Silvies River, Scotty, South Scotty, Eddington, Keller creeks in the Bear sub-Basin and the Silvies River in the Silvies sub-Basin surface water distribution systems are built for

retention. These critical areas of concern use volume, not flow, to irrigate.

Three modern mid-size five sluice gates regulate distribution within the Silvies Valley. On 8 March 2025, the upper and middle gates are observed with four of five sluice gates open while the lower gate had four of five closed. No OWRD certificate or waiver are found but must exist.

Surface water retention practices far exceed the allocated acre feet. Retention on the upper Silvies River inside U.S. 395 and Izee Ranch Road is also above allocations as more surface flows are retained for storage by the many flow control devices. The extent cannot be estimated due to no up river gauge to

compare in-out flow. However, observations on the ground and from space with the USGS / Oregon Department of Mining Industries elevation maps with 30 centimeter or one foot elevation resolutions show west Bear sub-Basin surface water use and retention exceed the nominal one cfs per 60 acre flows allocated by decree and permit.

1924-26 Silvies River Water Decree adjudicates ground and surface water amounts in acre feet and inches after converting some claims from miner's inches. The "Oregon Water Method" converts acre feet volume into cubic feet per second and per day flow. Measures are analogous. However, acre feet infer volume and cfs infers flow. Current water retention and usage practices and amounts must be measured using the original Water Decree context and intent. Acre feet and inches.

OWRD cfs permits are converted to acre feet for analysis. Recall, most Silvies sub-Basin instream water permits (IS-POD) are restricted to the 166 day irrigation period while most Bear sub-Basin permits are not. A one cfs day rate will produce 329.0435 acre feet in 166 days.

Silvies sub-Basin 147.0496 cfs rate and 206.7596 provisional maximum cfs rate is, in allocated annual acre feet;

$147.0496 \text{ cfs all day} * 1.983 = 291.5994 \text{ ac ft} * 166 \text{ days} = 48,405.4932 \text{ ac ft annual rate. Adding the } 1,288.0796 \text{ ac ft allocated for storage, the sum of total annual consumption is } 49,693.5728 \text{ ac ft.}$

$206.7596 \text{ cfs all day} * 1.983 = 410.0043 \text{ ac ft} * 166 \text{ days} = 68,060.7116 \text{ ac ft annual maximum rate. Adding the maximum } 1,527.2489 \text{ ac ft in storage, the sum of total maximum annual consumption is } 69,587.9605 \text{ ac ft.}$

An 174.7297 cfs per day rate of consumption during the irrigation period over ten years is estimated using the SILVIES and SENECA flow differentials. The mean between the allocated rated and maximum rated is 176.5 cfs.

$174.7297 \text{ cfs day} * 1.983 = 346.4890 \text{ ac ft day} * 166 \text{ days} = 57,517.1732 \text{ ac ft yr.}$

Silvies sub-Basin SILVIES flow gauge records the past ten year daily mean as 62.4522 cfs for an annual mean sum of 22,810.6661 cfs, or 45,233.5509 ac ft per year. $62.4552 \text{ cfs all day} * 365.25 \text{ days} = 22,810.6661$ to 22,813.7830 mean annual cfs $* 1.983 = 45,233.5509$ to 45,239.7317 total mean annual ac ft.

1926 Silvies River Water Decree now over allocates available annual surface water resources by 4,460.0219 ac ft yr or by 7.01% and by an estimated actual 12,283.6223 ac ft yr or by 27.16% on a past ten year basis.

Silvies sub-Basin stores much more surface water outside the irrigation period and tends to be a buffer and sponge during early melt periods. This decreases flood impacts in the Harney Valley now more dependent on Emigrant Creek flood flows. However, this increases low flow impacts and drought in the Valley.

SILVIES also records the 110.2034 cfs day mean during the ten year MAR 20 to SEP 1 (166 day) irrigation season. $110.2034 \text{ cfs day} * 329.0435 = 36,261.7124 \text{ ac ft } 166 \text{ days. SENECA records a } 89.8294 \text{ cfs day mean, } 81.51\% \text{ of SILVIES. BURNS records a } 243.7818 \text{ cfs day mean during the somewhat impractical irrigation season. SILVIES is } 45.2058\% \text{ of BURNS flow during the period.}$

Silvies sub-Basin mean annual consumption is 80.37% of total gauge flow. Omitting wet 2023 and 2024, Silvies sub-Basin mean annual consumption during this eight year period is 78.84%. Retention and consumption rates increase in the 2022 to 2024 water years. Reservoir and retainment allocations, 1,288.0739 ac ft and 1,527.2489 max ac ft, are 2.661% and 2.244% of respective total allocated surface water flows. Unlike the Bear sub-Basin, most retainments are not in or make direct contact with the River and are meant more for livestock at distant locations. Most creeks, perennial and ephemeral, also do not have direct contact with the River. Evapotranspiration losses are in the numbers and are a factor.

When the climatology of the past ten years is the consideration, surface water rights in the Silvies sub-Basin are now if not over allocated then over used within the 1924-26 Silvies Water Decree. Recall this is two years before the 1928-1933, and by extension 1935 drought, the most severe in the past century, which prompts amendments to the Decree and similar decrees on the Silver and Sage Hen creeks and

large sloughs during or soon after until 1936. Also recall more reliable weather and river flow records start in 1923. From what meteorological records which exist and observations before then, including tree rings, Harney Basin was colder and wetter.

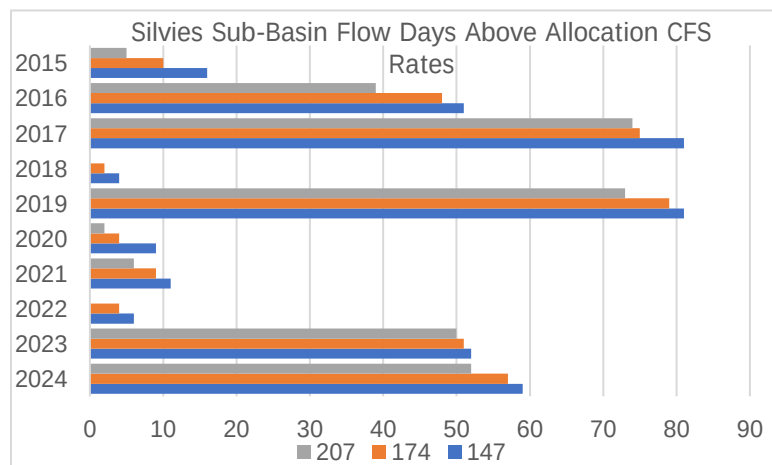
Still the numbers are the numbers and the allocated 48,405 ac ft yr exceeds the mean available 45,223 ac ft yr flow and the allocated 147 cfs day exceeds the mean 110 cfs available during the irrigation season.

Flows above allocated consumption rates do occur. Often during high flow periods and flood events. Days with SILVIES flow above rated, estimated and max cubic feet per second consumption rates have considerable annual variations. The estimated 174.73 cfs actual rate is used as the mean.

SILVIES GAUGE DAYS ABOVE OWRD ALLOCATED ANNUAL CONSUMPTION RATES

Allocated Annual ac ft	2015	2016	2017	2018	2019
	Dates	Dates	Dates	Dates	Dates
48,405.49	FEB 7-17, MAR 24-28	FEB 24-APR 20	FEB 10-14, MAR 9-MAY 24	MAR 15-18	MAR 26-JUN 14
57,517.17	FEB 7-14, MAR 26-27	MAR 1-APR 18	MAR 9-MAY 23	MAR 16-17	MAR 27-JUN 13
68,060.71	FEB 9-13	MAR 2-APR 18	MAR 10-MAY 23		MAR 28-JUN 9
	Days	Days	Days	Days	Days
	16	51	81	4	81
	10	48	75	2	79
	5	39	74	0	73
	2020	2021	2022	2023	2024
	Dates	Dates	Dates	Dates	Dates
48,405.49	MAY 1-3, MAY 21-26	APR 2-12	MAY 9-14	APR 9-MAY 31	MAR 19-MAY 15
57,517.17	MAY 22-26	APR 3-11	MAY 10-13	APR 10-MAY 31	MAR 20-JUN 13
68,060.71	MAY 23-24	APR 5-10		APR 10-MAY 30	MAR 22-MAY 13
	Days	Days	Days	Days	Days
	9	11	6	52	59
	4	9	4	51	57
	2	6	0	50	52

During the past ten water years, there are 370 days of flow at and above the allocated use rate, 345 days at the estimate actual use rate and 301 days at the allocated maximum use rate. Mean annual durations are near one-tenth or from 30.5 to 37 days.



For Harney Valley, these are the days with meaningful flow amounts from the Silvies sub-Basin for dry irrigation and livestock use for the year. Emigrant Creek supplements these flows but not their durations most years.

On an annual basis, very dry 2021 has highest percentage of consumption (60.25%) and very wet 2023 has lowest (18.87%). Recall the Silvies sub-Basin annual percentages of BURNS gauge flows range from 48% to 35% while Emigrant Creek supplies the remainder. The Silvies is now

tributary to Emigrant.

This is historic. All maps of the Harney Basin show the River as dominant. USACoE 1957 Silvies Dam study estimates the River is dominant by a 75/25 ratio. Maps from the 1860s-1880s also show the now somewhat dysfunctional East Fork as the main channel to Lake Malheur and the defunct Malheur Slough as another until irrigation and infrastructure change annual flow characteristics for both.

Except for precipitation and springs within the Silvies sub-Basin (19.64% of SILVIES total flows), the Bear sub-Basin determines flows into the Silvies Valley. However, Bear sub-Basin consumption cannot be estimated with accuracy. There is no other flow gauge above SENECA nor is there a good place for one.

The USDA Risk Management Agency supports PRISM, the Parameter-elevation Regressions on Independent Slopes Model program. The Northwest Alliance for Computational Science and Engineering at Oregon State University manages. PRISM uses the 30 year 1991-2020 precipitation records from five Harney County weather stations to estimate rain and snow water equivalencies in 300 by 300 meter and 2 by 4 kilometer quadrangles.

PRISM estimates the west Bear Valley receives at total of 437.54 inches mean annual precipitation or 11.87 inches per quadrangle. East Bear Valley receives 470.92 inches or 19.62 inches per quadrangle. Bear Valley total mean is 15.40 inches.

North Silvies Valley receives 500.69 inches or 18.25 inches per. South Silvies Valley receives 337.66 inches for an identical 18.25 inches per quadrangle.

Burns Municipal Airport quadrangle 30 year mean annual precipitation is 10.49 inches.

The numbers for the Bear sub-Basin;

SENECA flow gauge measures a mean 50.1890 cfs day during the past ten water years, 80.36% of SILVIES measured flow. $50.189 \text{ cfs day} \times 1.983 = 99.525 \text{ ac ft day} \times 365.25 \text{ days} = 36,351.4284 - .5063 \text{ ac ft yr}$. SENECA also records a 89.8294 cfs day mean for 29,569.8622 ac ft in 166 days although there are no seasonal consumption restrictions for most permits. 81.34% of SENECA measured flow occurs between MAR 20 and SEP 1.

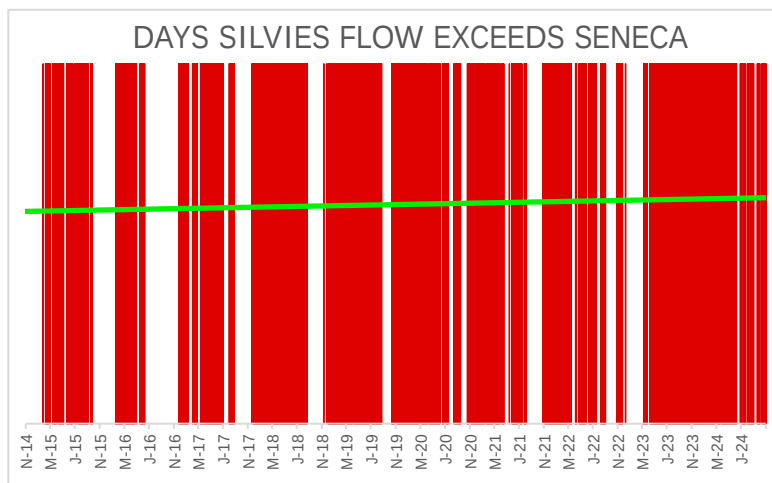
OWRD allocates Bear sub-Basin 130.8545 and maximum 170.9936 cfs day rate flows along with 111.5 ac ft in storage.

Rate $130.8545 \text{ cfs day} \times 1.983 = 259.4845 \text{ ac ft day} \times 365.25 \text{ days} = 94,776.7039 \text{ ac ft yr} + 111.3995 \text{ ac ft storage} = 94,888.1034 \text{ total ac ft yr}$.

Maximum rate $170.9936 \text{ cfs day} \times 1.983 = 339.0806 \text{ ac ft day} \times 365.25 \text{ days} = 123,849.0828 + 111.729 \text{ ac ft storage} = 123,960.8118 \text{ total ac ft yr}$.

Bear sub-Basin is now over allocated.

Sums of total consumption and waste are between $36,351.4284 + 94,888.1034 = 131,239.5318 \text{ ac ft yr}$ and $36,351.5063 + 123,960.8118 = 160,312.3181 \text{ ac ft yr}$. OWRD allocated surface water points of use would be 72.30% to 77.32% of the total available on a past ten year basis. Evapotranspiration is less than the Silvies sub-Basin but is a factor. Recall Silvies sub-Basin mean annual consumption is 80.37% of total SILVIES gauge flow. Consumption percentages for both are comparable when considering evaporation and absorption losses. Consumption amounts are not.



SILVIES flow exceeds SENECA 2,218 of 3,652 days or 60.73% during the past ten years. SENECA tends to flow more than SILVIES from mid-October to mid-March or when melt run-offs begin (once in MAY) then from July in to September or when precipitation initiates river flows again (once in OCT). But not always every year. Longest period SILVIES has more flow is 261 days from 29 APR 2023 to 17 JAN 2024, a high snow flow period. Longest period SENECA has more flow is 169 days from 9 JUN to 24 NOV 2016, a moderate snow flow period.

Linear trend line begins at 0.590

days and ends at 0.627 days, a +6.27% increase. Silvies sub-Basin surface water users have become somewhat more efficient with flows received from Bear during high flow years.

Unknown with precision the Harney Basin's climate conditions 100 years ago. For certain, weather was wetter and colder but by how much is difficult to ascertain. Records indicate weather was as variable as now. Traditional western water law suggests land owners may take half the surface waters flowing through their property. If the 1924 Harney District Court Decree which the 1926 Oregon State Supreme Court ratifies with amendments follow this tradition, and current water consumption is now near 75%, then there has been a 50% consumption increase, a 50% precipitation decrease or combinations thereof. A 25% increase of use with a 25% decrease of snow and rain over 100 years may be a reasonable guesstimate.

The National Weather Service Burns station, which relocates three times in the past 117 years from near east of the current Burns Municipal Airport to the Federal Building / Post Office downtown then back to the Airport, records a +4.02% precipitation trend increase. NOAA National Center for Environmental Information calculates a +2.70% increase from 1923 to 2023. Compensating for the three NWS station locations (Burns city is wetter and cooler than the airport), both adjusted mean annual and mean decadal precipitations decrease -1.01%.

However, BURNS WSO AP is not in the Bear and Silvies sub-Basins which are more dependent on snow levels and higher elevation NRCS SNOTEL stations record alarming snow/water equivalency decreases of a suspect mean -35% between 1982 and 2024.

The Silvies River Water Decree is no longer efficient nor equitable for **today's Harney Basin**. The end and terminus of the River system above and at Lake Malheur are under considerable stress as diminishing surface water resources continue to decline due to up river water management practices and climate change. Current irrigation and storage practices are limited to short and sometimes intense flows to extreme floods which to manage with minimal to no supplemental flows the rest of the year.

The Silvies River Water Decree is an old pair of shoes that doesn't fit anymore. One is too tight for current water supplies and demands and the other's laces have been too loose. There is little to no enforcement. What enforcement of water rights there is appears to be local within each sub-Basin.

Within the Water Decree, mandates and measures to reduce surface water usage and waste to deliver more Silvies River flow to Lake Malheur will fail. There is not enough due to increasing and unregulated usage above the OWRD SILVIES gauge as measured the past ten water years.

Best solution is new court decrees for the Silvies and Silver Creek, which has some PODs consuming more than allocated more than most upper Silvies permittees. Everyone needs to take a "haircut" and reduce surface water irrigation rates but not reservoir storage. A 20-25 percent reduction in Bear and Silvies sub-Basin use and over use would provide 10% or more to upper Harney Valley permittees within the Decree's one cfs per 60 and 80 acre ratios between above and below Gordon Curry Creek. A one cfs per 75 and 100 acre ratio is now more appropriate. Adherence and enforcement of the current Decree will help accomplish the same. But, there is little infrastructure to regulate flow except for the private dams and gates on public land. District 10 Watermasters have been reticent to enforce the Decree's allocations without the necessary tools (gates) and state support.

For Harney Valley water consumers, -10% is not much when there is a lot. But, -20% of a little is a lot during low flow years.

On its own initiative, the Oregon Water Resources Department along with local stakeholders would recommend POD and POU day flow rates, where, when, why and how based on various agreed upon matrices. A new Collaborative Surface Water Planning Board would submit its findings to both Harney and Grant County Circuit Courts for judicial review and adjudication.

Start the entire process again with a shorter time limit to focus on equitable surface water allocation and more reservoir capacity.

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31 March 2025
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MEINZ Kelly A * WRD

From: Chico Baravelli <cbaravelli@mail.com>
Sent: Thursday, June 12, 2025 5:43 PM
To: MEINZ Kelly A * WRD; Chico Baravelli
Subject: Public Comments #4
Attachments: SILVIES BASIN METEOROLOGY A.docx

The Microsoft Corporate / GitHub link sent last week doesn't work for me. Although I lived five miles from the Redmond – WA headquarters and it was comfortable living in the belly of the beast, I do not Microsoft. I know better.

Sent to the *wrd_dl_harneyreportcomments@water.oregon.gov* smtp address is SILVIES BASIN METEOROLOGY research report in three sections. Assembly is required.

Also sent in a separate electronic message are the *BS_Anal* and *According to the USDA* research papers.

Please confirm recording and posting. I find no address or link to view posted written comments. Where are they? Documents are compressed. I wanna see what the graphics look like.

<https://www.harneyswcd.org/files/5205c1899/OAR+690+Divison+512+Notice+of+Proposed+Rulemaking.pdf>., the final Final Draft:

OAR 690-512-0020, Exhibit 2, Malheur Lake Basin nap is incorrect. No Way are the Catlow and Alvord Basins nor the Hart Mountains [National Wildlife Refuge] and Guano Hills part of Harney – Malheur Lake Basin. We can quibble over Riddle Creek / Dry Reservoir sub-basin. It's separate. There is a well there so inclusion into the SWMPA is administrative.

Once again, Thank You, sir (he/him)

STATISTICAL ANALYSIS OF NORTH HARNEY BASIN METEOROLOGIES AND FLOWS



"Buy Land. They don't make it anymore." 1928
"Land ain't worth nothin' without water." 1933
Will Rogers
Middle 20th Century American Media Blogger

28 FEBRUARY 2025

MARIO PETRILLI
BURNS - OREGON

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INTRODUCTION

This introduction begins with the same two five word sentences as the conclusion ends. There is not enough water. There is less and less. The where, why and how are examined in this analysis.

Report concentrates on the upper Harney Basin above the Silvies River Five Mile Dam northwest of Burns – Oregon. It must. Since Kit Carson, the lower Basin has been studied to death. Federal and State bureaus and agencies publish excellent geology and hydrology studies since 1909 but not for the upper Basins. Exempting the very few surveys and technical papers, there has been nothing published in 25 years on the Bear and Silvies valley physiology, meteorology and climate.

Report analyzes 30 year Periods of Record for precipitation in the forms of snow and rain, temperatures and 10 years of Silvies River flows from five federal and state sources. Government agencies can report different temperatures from the same thermometer. Report presents all and the differences between them.

Both upper and lower Basins share much. Climates are changing slowly. However, weather is very volatile from year to year and decade to decade. This makes future climate predictions difficult. Report presents long term precipitation and temperature projections provided by these short term records. There are a few. Report further divides the Silvies Basin into four sub-Basins; Bear, Silvies, Silvies Canyon and Emigrant for more precise analysis.

Government agencies are limiting lower Basin ground water use and are attempting to limit or reduce surface water use believing global warming is an existential threat. Ground water aquifers must recharge and the Malheur Refuge must be preserved. Much of the enclosed information is of common knowledge and local summations. But now, we all have the numbers to know by how much or by how little. Readers will draw their own conclusions. There are surprises.

There are other near term challenges facing both Basins. Over retention and consumption of surface waters by some private property owners. The immediate need and now availability of a reservoir and dam with a gate. The 2024 summer fires which burn 25% of the watersheds and 20% of the timber.

Author is not a meteorologist although he has worked with many. He is not a climatologist and couldn't describe what one is. He is an engineer with experience supervising large projects and facilities and who has authored many economic and demographic research and analysis reports. Engineers process information and problem solving differently than most folks. Numbers don't have biases unless rounding them up or down. Data is data but the numbers are the numbers. Microsoft Excel spread sheets with 12 gigaBytes of numbers.

This research paper presents technical data in colorful graphic forms to make them more understandable. Author presents facts and analysis to answer the questions required to help make better decisions.

Harney and Grant counties are lands of extreme and, at times. severe weather. Takes special kinds of people to call this place home.

28 February 2025
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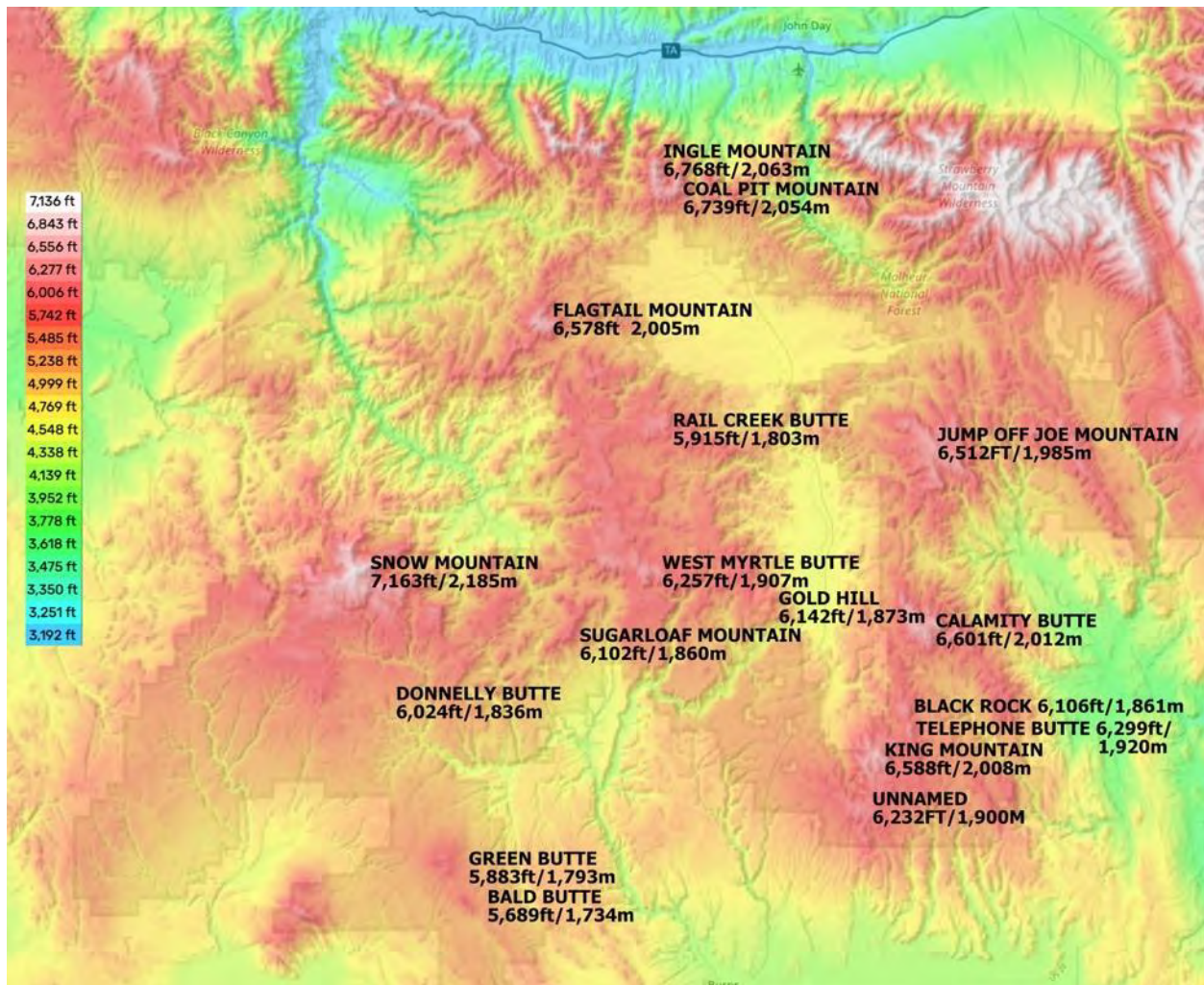
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SNOW



Map and list do not identify all mountains, buttes or mesas above 6,000 feet of which there are many. Only those with prominences 300 feet or higher above average local terrain.

Upper Harney Basin peak mountain and butte elevations in rank:

1. SNOW MOUNTAIN at 7,165 feet above sea level. It is the 223rd tallest and 22nd most prominent in Oregon. It is the snow source for three basins, the John Day, the Harney and the Upper Deschutes – Crooked. <1/2 drains northwest toward the South Fork John Day River, >1/3 drains east southeast toward Emigrant Creek and the Silvies River, <1/3 drains south toward Silver Creek and Harney Lake. USDA SNOTEL station 767 is located southwest of the peak at 6,230 feet. Utley Butte at 6,343 feet and Whiskey Mountain at 6,071 feet east of Snow Mountain both drain 50/50 toward the South Fork John Day River and Emigrant Creek. Snow Mountain has no tree cover.
- 2 and 3. INGLE MOUNTAIN at 6,768 feet and neighbor COAL PIT MOUNTAIN at 6,739 feet drain 50/50 into the John Day River and the north Bear Valley.
4. CALAMITY BUTTE at 6,601 feet. <1/2 drains north and east on Calamity Creek toward the North Fork Malheur River. >1/2 drains west on Mountain Creek toward the Silvies River. It has limited tree cover.
5. KING MOUNTAIN at 6,588 feet. >2/3 drains east then south on Cow Creek and south on Rattlesnake Creek toward the lower Harney Basin. <1/3 drains northwest toward Trout Creek and the Silvies Valley. It has no tree cover.

6. FLAGTAIL MOUNTAIN at 6,578 feet. $>1/4$ drains west and northwest toward Dear Creek and the South Fork John Day River and $<3/4$ drains south east toward Snowshoe Creek and the Silvies River into the Bear Valley.

7. JUMP OFF JOE MOUNTAIN at 6,512 feet. $<1/2$ drains south and east on Schurtz and Wolf Creeks toward the North Fork Malheur River. $>1/4$ drains west on Bridge Creek toward the Silvies River. $<1/4$ drains north on Antelope Creek and Little Bear Creek to Bear Creek and the Bear Valley.

8, 9. TELEPHONE BUTTE at 6,299 feet and BLACK ROCK at 6,106 feet. $>1/4$ toward Pine Creek and the North Fork Malheur River. $<3/4$ to the South Fork Trout Creek and shared Cow Creek drainage with King Mountain. It has no tree cover to the north, west and south.

10. WEST MYRTLE BUTTE at 6,257 feet. 100% drains east and south on the Myrtle and Yellowjacket creeks to Emigrant Creek then to the Silvies River.

11. UNNAMED Mountain at 6,232 feet. $1/3$ drains north to Trout Creek toward the Silvies River. $2/3$ drain south on Soldier and Mill Creeks toward the lower Harney Basin. As with northern neighbor King Mountain, it has no tree cover.

12. GOLD HILL at 6,142 feet. $>1/3$ drains west to Gold Creek toward Myrtle Creek then the Silvies River. $<2/3$ drains east to Flat, Thorn and Hall Creeks toward the Silvies Valley.

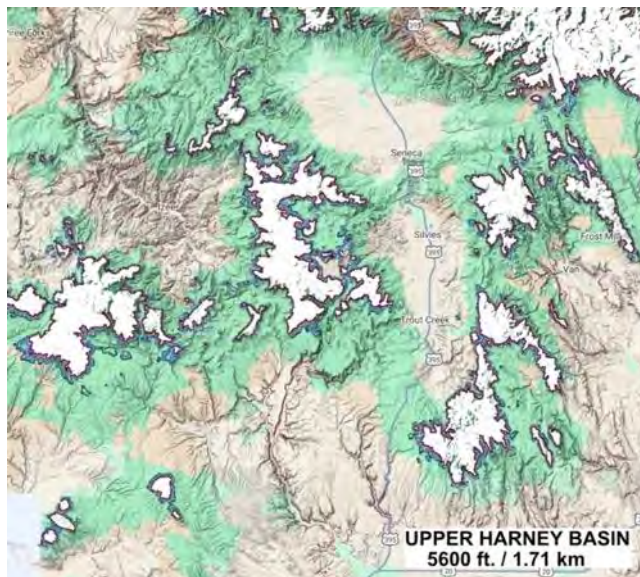
13. SUGARLOAF MOUNTAIN at 6,128 feet. $<1/3$ drains east and south on Hay Creek toward Emigrant Creek and the Silvies River. $<2/3$ west and south toward Sawtooth Creek to Yellowjacket Creek then to Emigrant Creek then to the Silvies River. It has limited tree cover.

14. DONNELLY BUTTE at 6,024 feet. $<1/3$ drains west to Mutton and Dodson Creeks toward the North Fork John Day River. $1/6$ th drains south on Wickiup Creek to Silver Creek. $1/2$ drains east toward Bear Canyon Creek then south to Emigrant Creek.

15. RAIL CREEK BUTTE at 5,915 feet. $1/2$ drains south to Camp Creek then east to the Silvies Valley. $1/2$ drains north and east to Rail Creek then Shirttail Creek toward south Bear Valley.

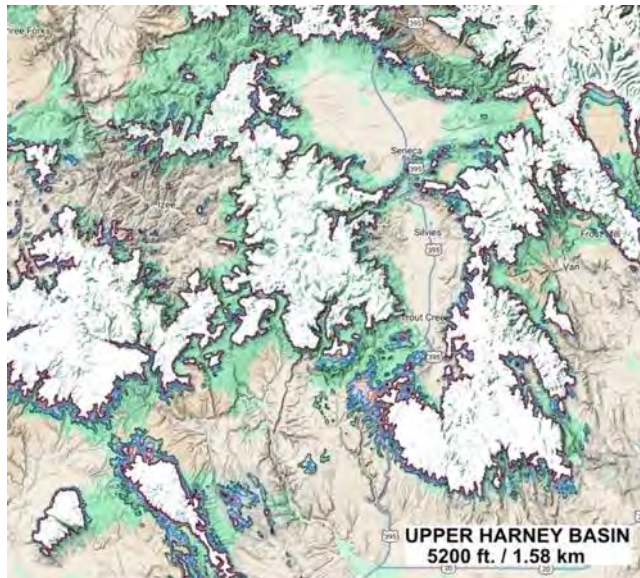
16, 17. GREEN and neighbor BALD BUTTES at 5,883 and 5,689 feet, respective. $>2/3$ drain west to Egypt Creek to Wickiup Creek then to Silver Creek. $<1/3$ drains east to Cricket Creek then north to Emigrant Creek. Both buttes have limited tree cover and are ephemeral with only spring flows.

Only #10 West Myrtle Butte, #12 Gold Hill, #13 Sugarloaf Mountain, #14 Donnelly Butte and #15 Rail Creek Butte drainages are complete within the Silvies Basin. Note that all are at lower elevations.

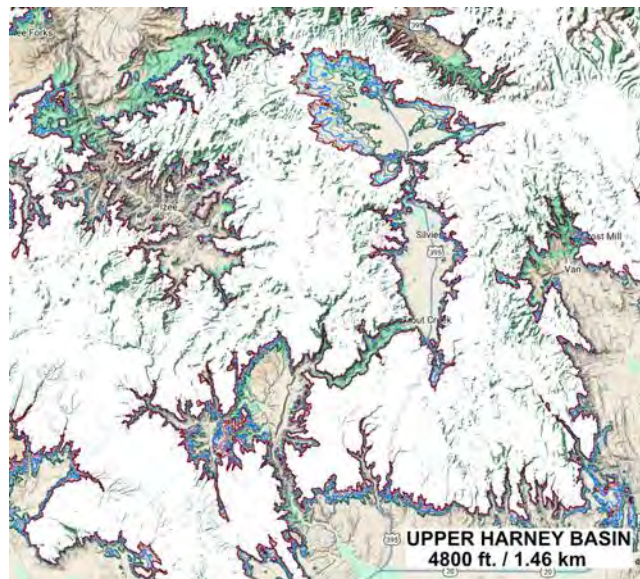


The above map and list of upper Harney Basin mountains and buttes are shown on this map from another perspective. When elevation determines precipitation, this map shows a snow level at 5,600 feet above the current sea level. Most peak summit prominences and cap rock tables are barren with definite glacial erosion with some scouring and plucking during glacial advances.

These are the Bear and Silvies basin's snow magnets.



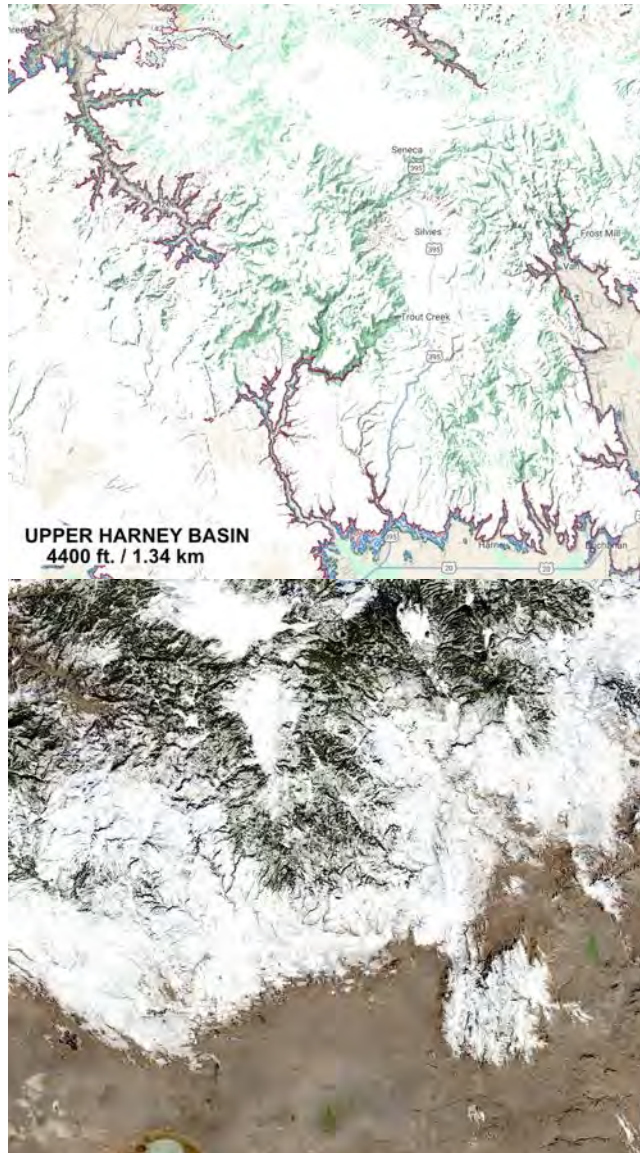
Map shows the 5,200 foot snow level. Topography at this elevation has more definite glacial erosion with several very large cleft scours for long distances in the Silvies River / Myrtle Creek watershed and King Mountain areas with northwest to southeast shears.



Map shows the 4,800 foot snow level. Area includes the large and flat mesas in the High Lava Plains (Brothers Fault Zone) of the Columbia Plateau in the western upper Basin. Topography has more definite glacial erosion from advances and retreats.

During the three North American Ice Ages, as the enormous weight retreats north, underlying ground surface areas uplift and fracture, forming many of the canyons in the south Silvies and the middle and lower Emigrant sub-Basins.

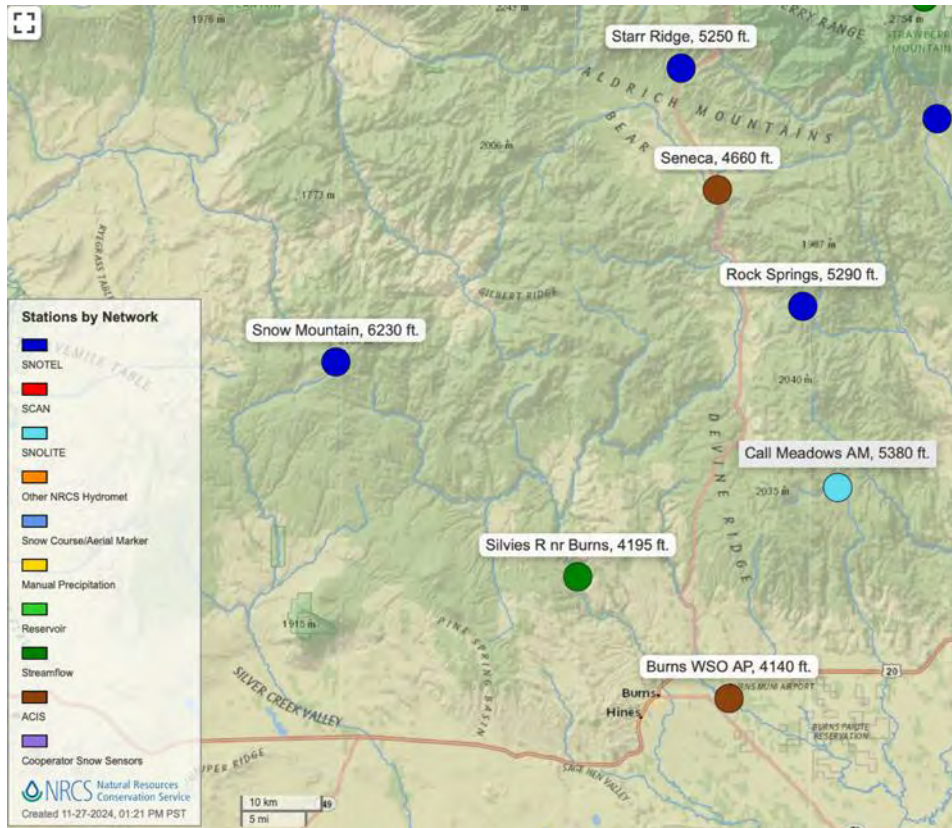
The Sugarloaf Hay Creek drainage, Emigrant Butte Spring Creek drainage, Burnt Mountain Hay and Myrtle creek drainages, between the Silvies River and Poison Creek east of the Lower Silvies Canyon and the King Mountain Trout creek drainages are ground flat at or near this elevation.



Map shows the 4,400 foot snow level. Note Canyon Creek and South Fork John Day River in Grant County, the North Fork Malheur River in both Malheur and Harney counties and the middle Silvie River – lower Hay and Emigrant creek channels are bereft of snow packs above this elevation.

Image shows an actual 4,000 foot snow level taken 11 FEB 2025 by the European Space Agency Copernicus SL-2A earth observatory in natural color. Notice Harney Lake has more surface water than Lake Malheur and it is warmer. This has become more common during Harney Basin winters.

2024 fire season burn areas southwest of the Silvie Valley (Falls Campground Fire) and south then east of King Mountain (Telephone Butte Fire) are also visible.



U.S. Department of Commerce National Oceanic and Atmospheric Administration's [NOAA] Natural Resources Conservation Service [NRCS] maintains and coordinates four different intra-agency "meteorological stations" in and around the two basins that measure snow. These are the primary sources for numbers and data for this Report's meteorological and climate analyses.

U.S. Department of Agriculture [USDA] Western Regional Climate Center [WRCC] operates the Remote Access Weather Station

[RAWS] at Crow Flat left of the Call Meadows AM station name tag just east of U.S. 395 among many others in and around the Harney Basin. It is used for comparisons.

Weather stations by elevation:

SNOW MOUNTAIN SNOTEL station 767 at 6,230 feet is located southwest of the summit since 1 OCT 1978. 1/3 of measured snows drains toward the South Fork John Day River, 1/3 towards Silver Creek and 1/3 towards Emigrant Creek.

STARR RIDGE SNOTEL station 789 at 5,250 feet since 1 OCT 1979. It is located less than one mile north of the Starr National Forest campground on U.S. 395 below the Aldrich Ridge divide and drains complete into the Bear Valley.

ROCK SPRINGS SNOTEL station 721 at 5,290 feet since 1 OCT 1979. It is near the Malheur National Forest Rock Springs campground. 1/2 drains east toward Whiskey Creek and the North Fork Malheur River. 1/2 drains west on House and Newell Creeks toward the Silvies River.

SENECA COOP station 7675 at 4,660 feet records limited weather information since December 1908 and more reliable data from June 1950 until October 2020 for precipitation and July 2021 for temperature. It records Oregon's lowest temperature of -54°F on 10 FEB 1933.

SILVIES RIVER NEAR BURNS at 4,195 feet is the USGS then the Oregon Water Resources Department [OWRD] 10393500 flow gauge and provides the longest best data sets for Silvies River flows.

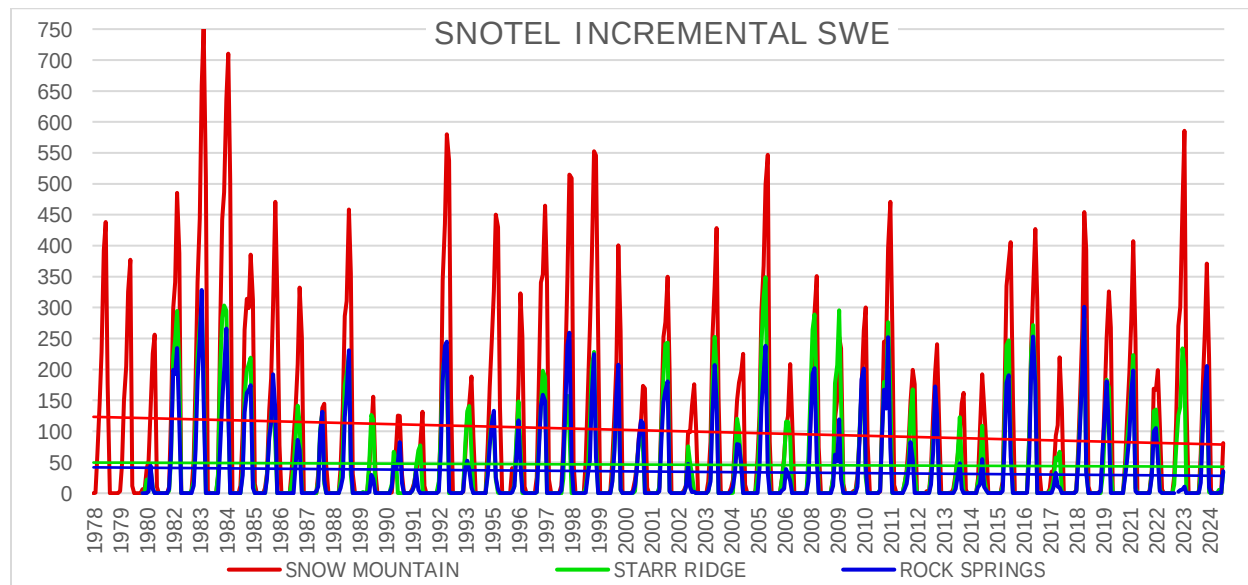
BURNS WSO AP (ACIS 1175) at 4,160 feet is the National Weather Service [NWS] station at the Burns Municipal Airport.

CALL MEADOWS AM SNOLITE station 1289 at 5,380 feet is located five miles east of King Mountain and provides excellent weather information since 13 APR 2018.

SNOW MOUNTAIN is 33.3 miles west of Rock Springs and 32.2 miles southwest of STARR RIDGE. STARR RIDGE is 27.1 miles northwest of ROCK SPRINGS. ROCK SPRINGS is 5.25 miles northeast of CALL MEADOWS. The four SNOTEL and SNO-LITE stations provide weather data between 6,230 and 5,250 foot elevations.

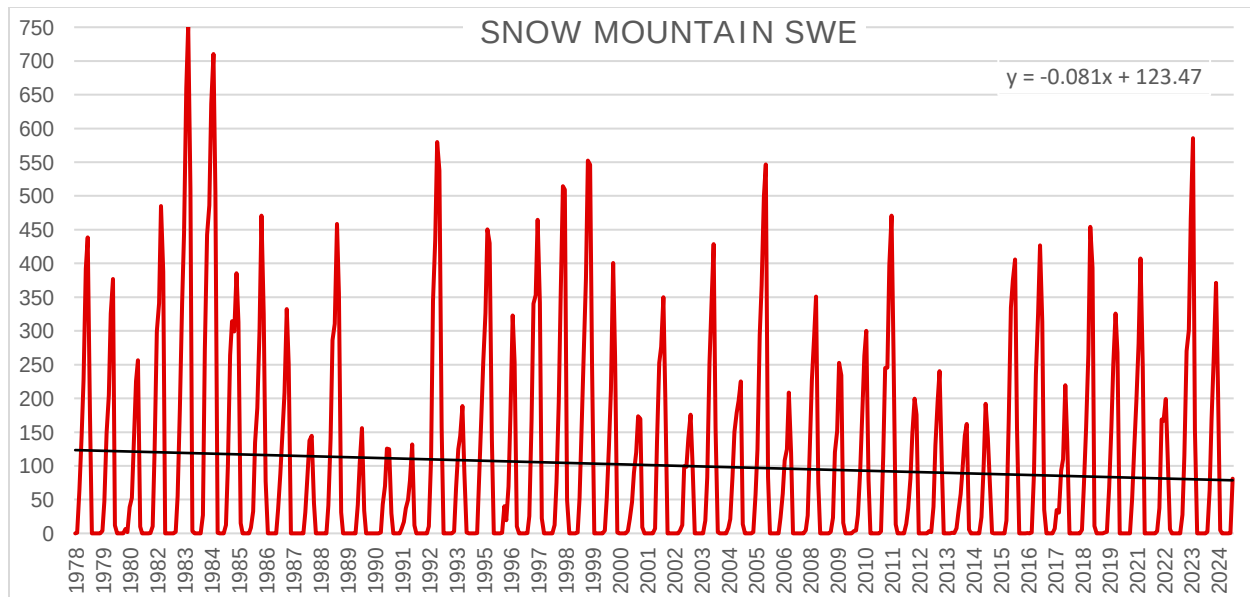
Snow pack measurements are by height. Snow/Water Equivalents [SWE] measurements are by volume and weight. NRCS SNOTEL stations calculate early winter and spring thermal compressions and winter height weight compactions with “snow pads” or “pillows”, precipitation gauges and ambient temperature thermometers. Measurements are adjusted to accommodate liquid water amounts of the solid ice and snow. Measuring devices are calibrated near every year as assumed temperatures change.

In general, “Snow water equivalent is a measure of the liquid water contained in snowpack. It is more useful than snow depth for estimating the volume of meltwater flow. This is because 3 feet of fresh, dry, fluffy snow may represent only 4-5 inches of SWE, but 3 feet of compacted, wet, spring snow may contain 12 inches or more of SWE. Using SWE helps scientists measure snowpack in a standardized way. Units are inches (in).¹ Most European countries measure using horizontal pressure “snow poles” instead of vertical pressure pads and use the “Newtonian” Δ snow model to estimate more accurate SWEs.



Composite graph showing all three SNOTEL station 45 and 47 year annual snow/water equivalent precipitations. Base data is for a snow/water year from OCT 1 to SEP 30 presented in a calendar year time line. SNOW MOUNTAIN 1983 absolute maximum (752.4 inches) is not shown in full. Linear trend lines indicate all three stations have decreasing SWEs during their Period of Record. Note not all have their maximum and minimum years in the same year.

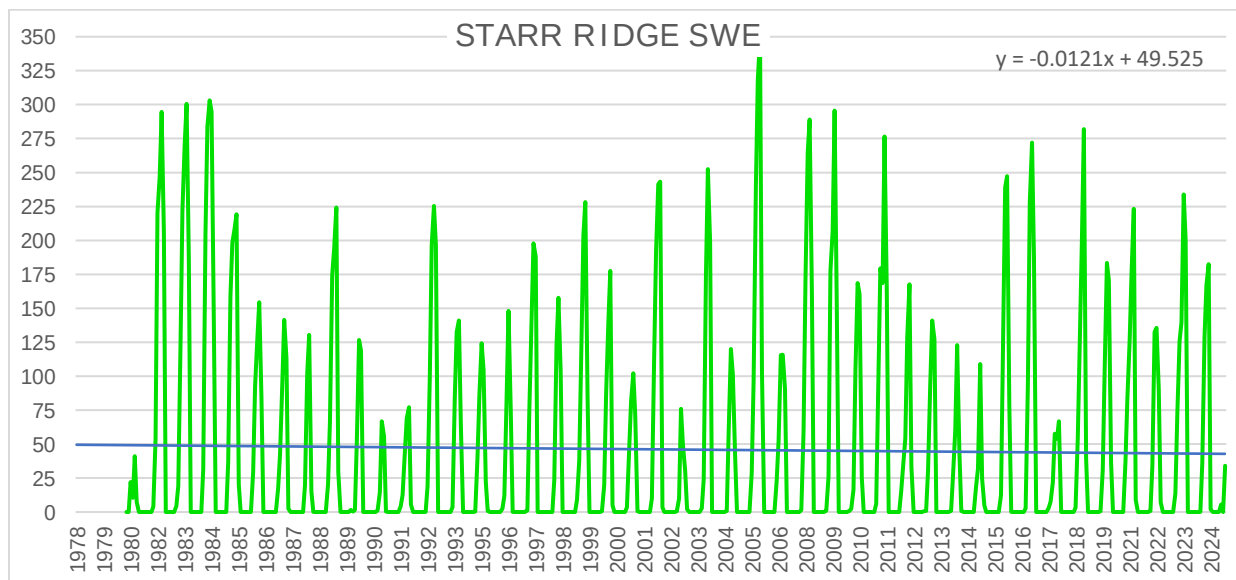
1. <https://labs.waterdata.usgs.gov/visualizations/snow-to-flow/index.html> #/.



SNOW MOUNTAIN [SNW03] (USDA 6,220 or NOAA 6,230 ft) OCT 1978 – NOV 2024 Period of Record. 1983 752.4 inches is not shown in full. Record is missing JUN-SEP 2013.

SNOW MOUNTAIN mean monthly SWE is 101.19 inches. Maximum peak annual snows are on APR 1983 (752.4 inches) followed by APR 1984 (710.1 inches) then by MAR 2023 (585.7 inches) which ends a 2 1/2 year drought. Minimum peak annual snows are in MAR 1991 (124.9 inches) followed by MAR 1990 (156.2 inches) then by MAR 1988 (144.7 inches).

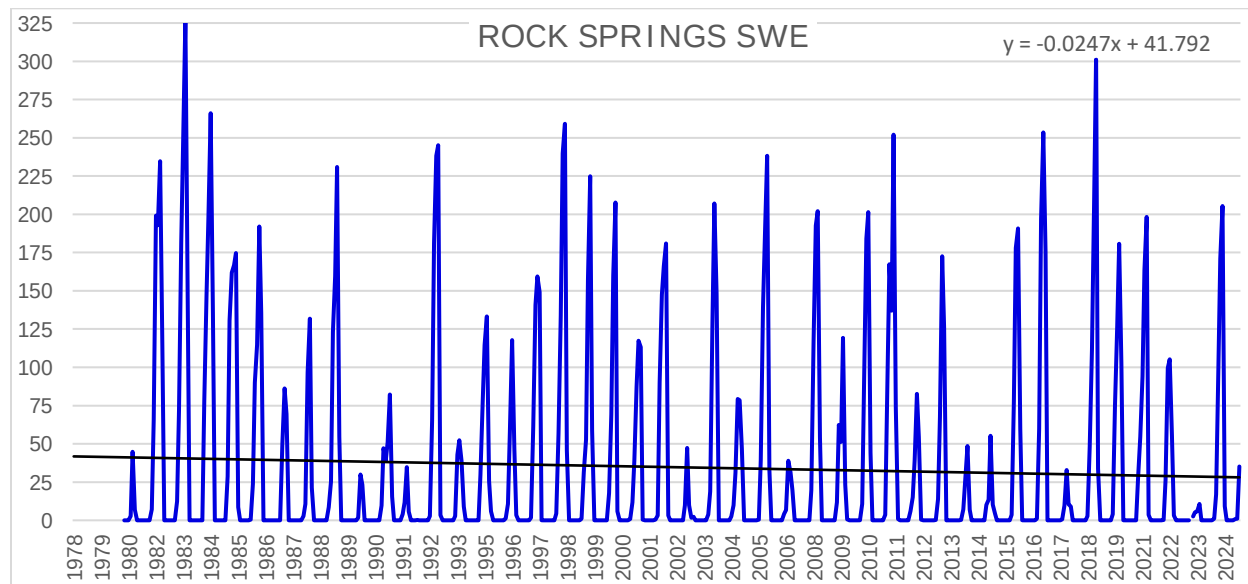
Linear trend line begins at 123.47" and ends at 77.96", a -36.86% decrease over 47 years. Period begins with 1983 and 1984 having the highest snow equivalencies. Ratios between highest and lowest annual peak snows, 752.4 and 124.9 inches, is a high 6.02 to 1 or 0.166 to 1. SNOW MOUNTAIN north flank permanent snow field disappears after 2002 then reforms in 2023.



STARR RIDGE [STR03] (USDA 5,250, NOAA 5,240 or 5,300 ft) OCT 1980 – NOV 2024 Period of Record. Annual monthly SWE average is 46.11 inches, 45.57% of SNOW MOUNTAIN average. Maximum peak monthly snows are in MAR 2006 (349.1 inches) followed by FEB 1984 (303.1 inches) then by MAR 2009 (295.6 inches). Minimum monthly snows are in MAR 1991 and MAR 2018 (66.9 inches) followed by FEB 2003 (76.0 inches) then by FEB 1992 (77.1 inches). First year FEB 1981 (44.1 inches) is not considered.

Ratios between highest and lowest monthly snows, 349.1 and 66.9 inches, is a high 5.22 to 1 or 0.192 to 1.

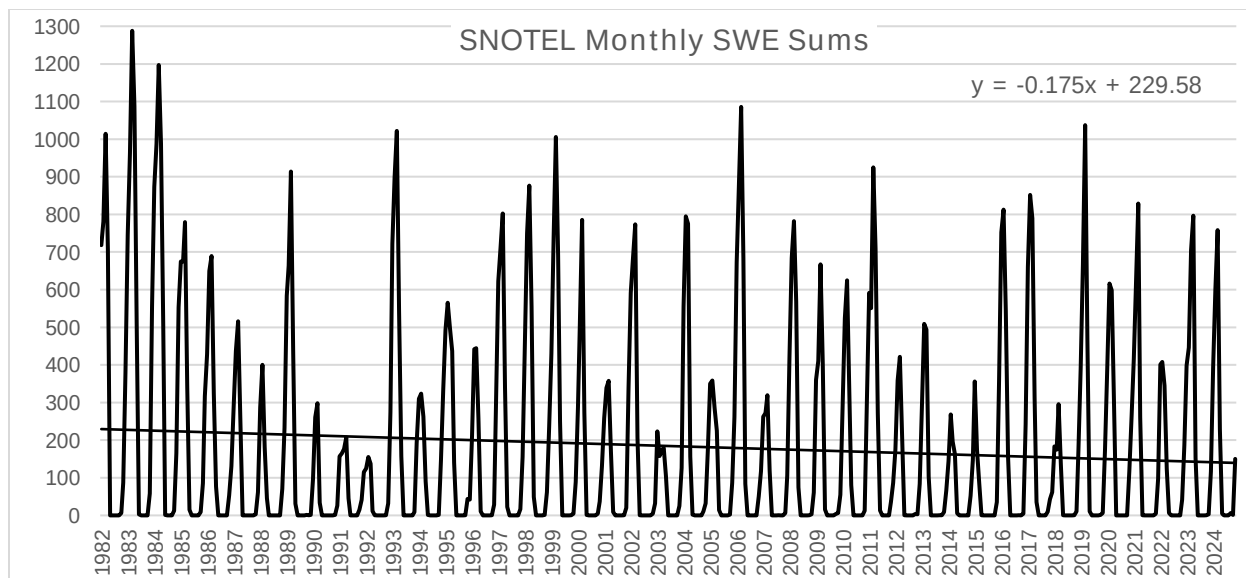
Linear trend line begins at 49.53" and ends at 43.12", a -12.94% decrease over 45 years. Period begins with 1982- 1984 having the second, third and fifth highest snow equivalencies. STARR RIDGE, 13.8 miles west southwest from the Strawberry Mountain peak, is the most reliable and least variable of the three SNOTEL stations.



ROCK SPRINGS [RCS03] (USDA 5,290 or NOAA 5,550 ft) OCT 1980 – NOV 2024 Period of Record. 1983 328.4 inches is not shown in full.

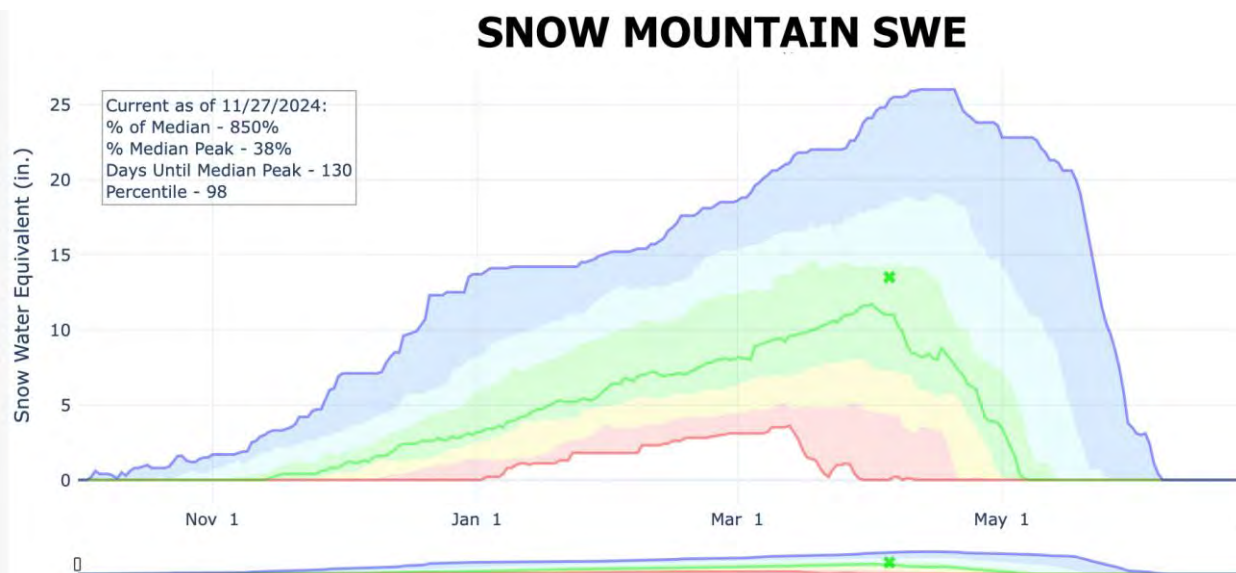
Average monthly SWE is 34.78 inches, 34.37% or near 1/3 of Snow Mountain mean. Maximum monthly snows are in MAR 1983 (328.4 inches) followed by MAR 2019 (301.0 inches) then by FEB 1984 (266.0 inches). Minimum monthly snows are in APR 2023 (10.6 inches) followed by FEB 1990 (30.0 inches) then by JAN 2018 (32.9 inches). Ratios between highest and lowest monthly snows, 328.4 and 10.6 inches, is a very high 30.98 to 1 or 0.032 to 1.

Linear trend line begins at 41.79" and ends at 28.73", a -31.25% decrease over 45 years. Period begins with 1983 and 1984 having the highest and third highest snow equivalencies. There are years with little snow accumulations. ROCK SPRINGS IS the most variable and least reliable of the three SNOTEL stations. It is the farthest from the Pacific Ocean. High volatility may also be true for same or higher elevations nearby east and south of the Silvies Valley.



Combined mean monthly sum for all three SNOTEL stations is 181.34 inches. Months with highest snow/water equivalencies are DEC 1983 (1,287.9 inches) followed by DEC 1984 (1,197.1 inches) then by DEC 2006 (1,085.9 inches). Months with lowest maximums are MAR 1992 (125.5 inches) followed by MAR 1991 (131.6 inches) then by MAR 2003 (141.2 inches). Ratios between highest and lowest peak snows, 1,287.9 and 125.5 inches, is a very high 10.26 to 1 or 0.097 to 1.

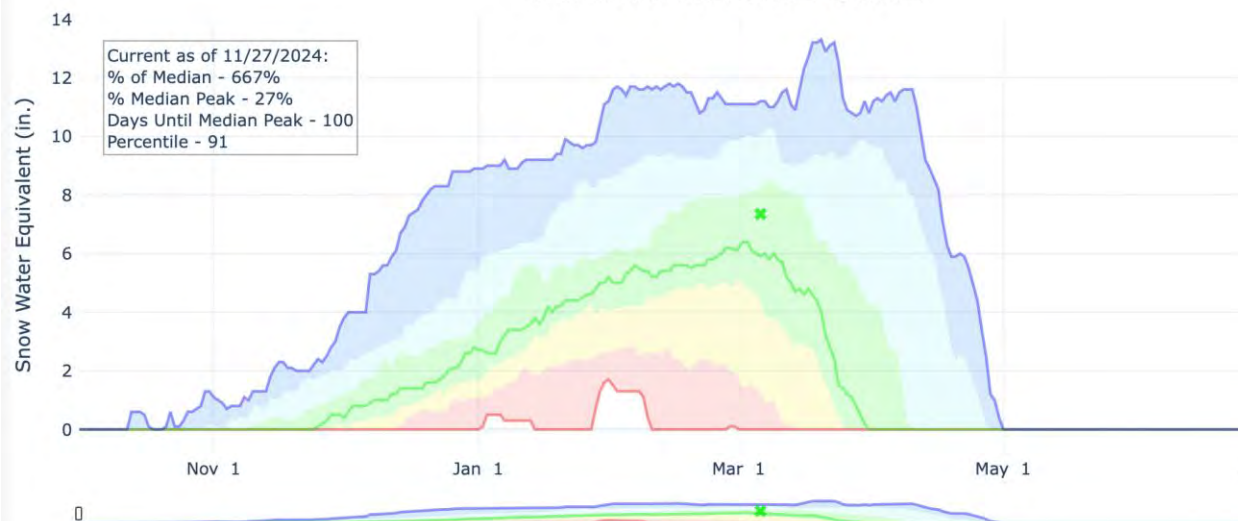
Linear trend line begins at 229.6 inches and ends at 148.3 inches, a -35.41% decrease during the past 47 years. However, depends on where the time ruler is placed. 10 year OCT 1982 to SEP 1991 trend line has an -80.96% decrease while 33 year OCT 1992 to SEP 2024 has a -19.35% decrease. On average, the annual snow accumulation sum at the three SNOTEL stations is decreasing from the 181.34 inches by a mean 1.51 inches or 38.35 mm a year for an annual -0.83% decrease.



CAUTION: All WRCC SNOTEL daily SWE measurements are recorded by as much as 1/1,000,000ths of an inch. There are no SWE weight pads available with this accuracy. Published data appears to have been aligned or adjusted.

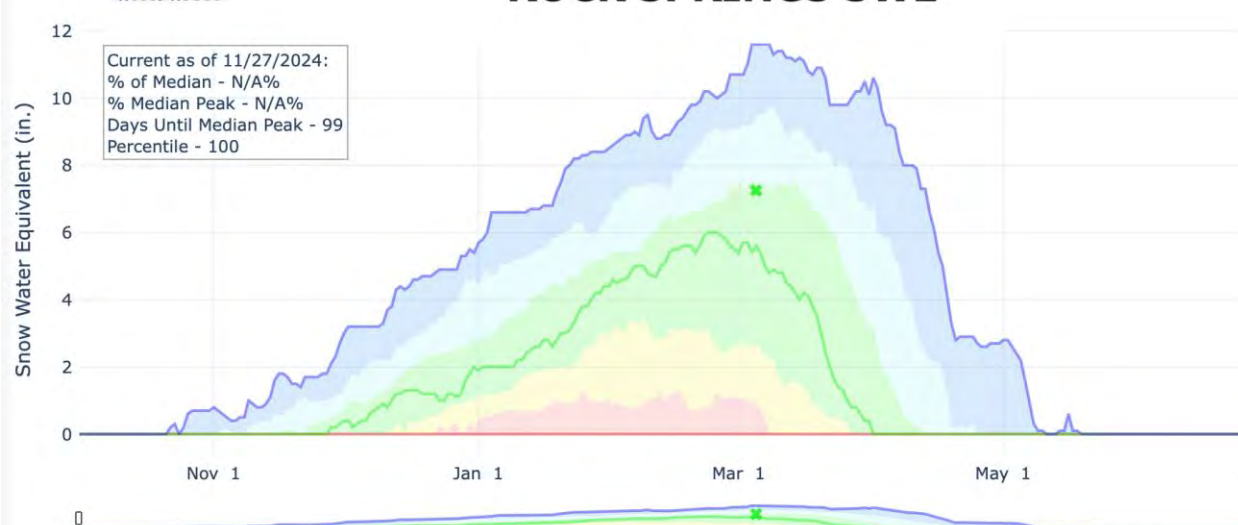
SNOW MOUNTAIN maximum peak snow water equivalent of 26.0" occurs on 12-20 APR 1983. Lowest maximum of 3.5" occurs 13 MAR 2015. During the Period of Record, mean maximum is 13.5" and mean peak day is 5 APR. The mean melt ends on 6 MAY with the last melt on 6 JUN 2011.

STARR RIDGE SWE



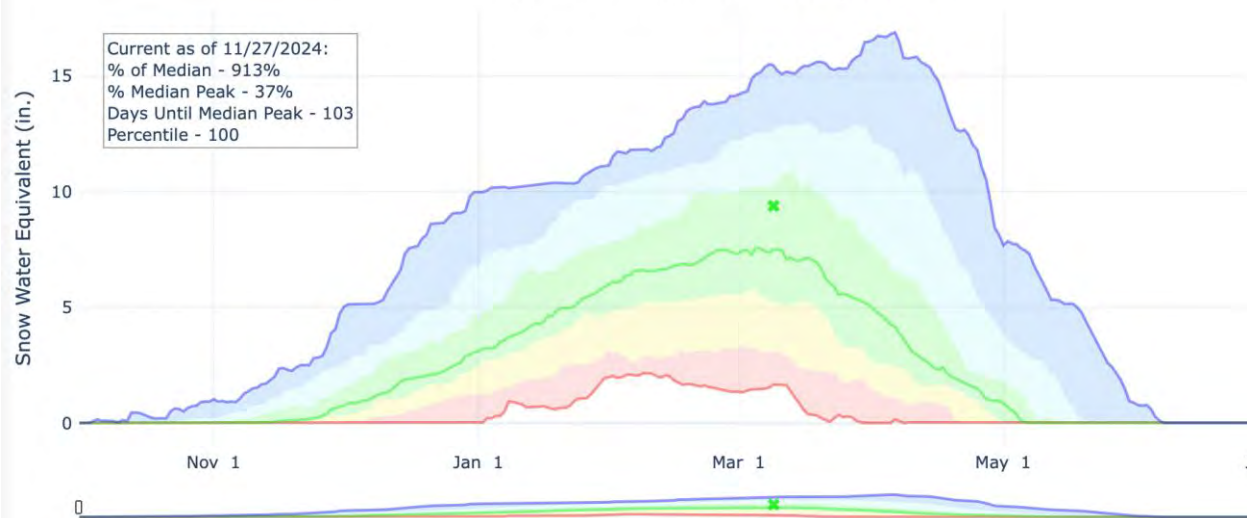
STARR RIDGE maximum peak snow water equivalent of 13.3 inches occurs on 20 MAR 2006. Lowest maximum of 2.7" occurs on 28-30 JAN 1992. During the Period of Record, mean maximum is 7.3 inches and mean peak day is 6 MAR. The mean melt ends 30 MAR with the last melt on 30 APR 2011. While STARR RIDGE station is at the second highest elevation, it is, in part, masked by the "snow shadow" of the Aldrich Ridge divide to the north.

ROCK SPRINGS SWE



ROCK SPRINGS maximum peak snow water equivalent of 11.6 inches occurs on 8 MAR 1983. Lowest maximum of 1.6 inches occurs 22 FEB 1990 and 21 DEC 1992. During the Period of Record, mean maximum is 7.3 inches and mean peak days are MAR 8-9. The mean melt ends on 31 MAR with the last snows and melts on 5-8 MAY 1991.

SILVIES BASIN SWE



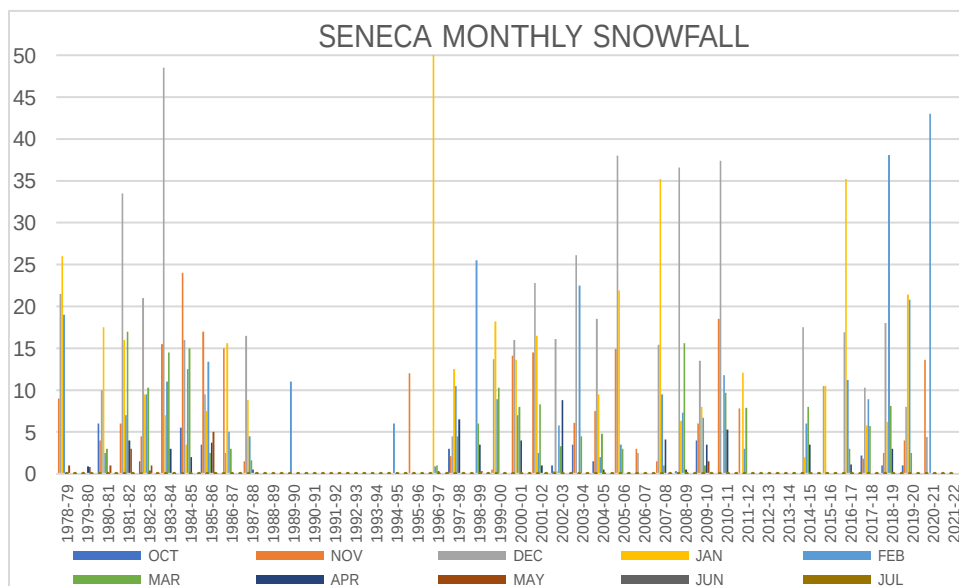
USDA Western Regional Climate Center, Reno – Nevada, and its Desert Research Institute provide composite estimates for all seven sub-basins within Harney County. They are more accurate than the Oregon PRISM precipitation estimates as they rely more on the Sierra Nevada – Great Basin experiences and records than the Oregon coastal and Cascade ranges. WRCC SILVIES BASIN uses data from four unspecified sites. Perhaps the three SNOTEL stations and the NWS station at the Burns Municipal Airport. SILVIES BASIN includes Bear, Silvies, Emigrant sub-Basins.

SILVIES BASIN maximum peak snow water equivalent of 16.88 inches occurs on 6 APR 1983. Lowest maximum of 2.1 inches occurs on 4-5 FEB 1992. During the Period of Record, mean maximum is 9.4 inches and mean peak day is 9 MAR. The mean melt occurs on 5 MAY with the last melt on 6 JUN 2011.

ROCK SPRINGS mean SWE peak occurs 4-8 MAR. SNOW MOUNTAIN mean peaks occur 6 and 12-20 MAR. STARR RIDGE mean peak occurs 20 MAR. Western and northern stations have peaks sooner than the eastern station. STARR RIDGE peak SWE accumulation is 51.15% of SNOW MOUNTAIN, ROCK SPRINGS is 44.62% AND SILVIES BASIN is 72.60% of SNOW MOUNTAIN.

Excepting SNOW MOUNTAIN, annual mean SWEs peak 5-9 MAR. SNOW MOUNTAIN average is 5 APR, one month later. Both STARR RIDGE and ROCK SPRINGS mean accumulations are 54.07% of SNOW MOUNTAIN and SILVIES BASIN is 69.63%.

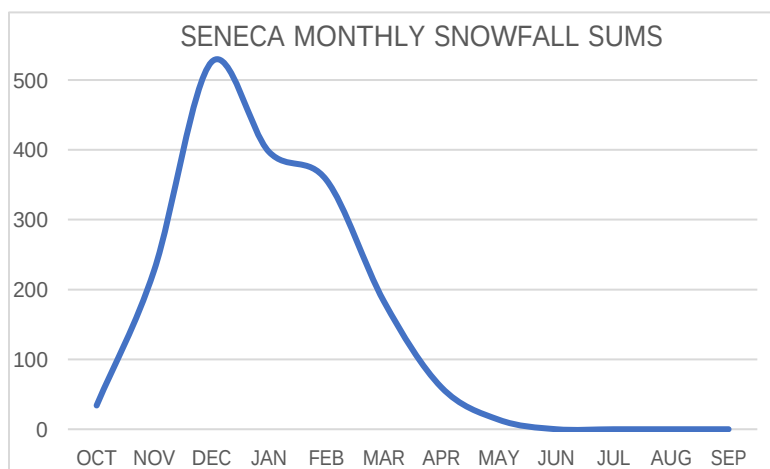
SENECA CO-OP station (NWS/WRCC 357675) has incomplete snow records for monthly and annual means, thresholds, and sums. Months with 5 or more missing days and years with 1 or more missing month are not considered. Station changes location at least four times since 1908. Last location is at the Seneca school house. Daily precipitation and temperature measurements using a snow stick, a standard rain gauge and thermometer are observed in the morning around 0800 hours then sent via internet to the NOAA National Centers for Environmental Information [NCEI]. Records are last revised 15 OCT 2022.



JAN 1997 50.5" is not shown in full. During the Period of Record, SENECA monthly record is missing 7 of the 12 calendar months from the 44 year monthly record. Most are for JAN (12), MAY and AUG (11), DEC and JUL (10). Record is not complete. From the available record, SENECA mean monthly snowfall is 46.04 inches, 47.60% of SNOW MOUNTAIN. From the available

record, SENECA peak snow months are 50.5 inches in JAN 1997 followed by 48.5 inches in DEC 1983 then by 43.0 inches on FEB 2021. Minimum snow months are 0.1 and 0.3 inches on DEC 1996 and APR 1997, respectively. Extreme minimum water years bracket the extreme maximum year. 0.3 inches is also recorded in MAY 1999, NOV 2002, JAN 2003 and OCT 2008.

From the available record, OCT linear trend line begins at 1.22 inches and ends at 0.32 inches, a -73.77% decrease. JAN is missing 12 months, MAY 11 months and FEB is missing eight months. Annual and monthly linear trend lines range from +269.0% to -73.03%. SENECA record trends are not accurate.



From the available record, between OCT 1978 and MAR 2020, during the eight month OCT to MAY snow period and omitting missing years, mean annual snowfall trends begin at 41.68 inches and end at 40.47 inches, a relative flat trend bias of -2.90%.

Recorded OCT-MAY water year monthly mean is 224.71 inches. Maximum snowfall month is the recorded DEC 525.5 inches. Minimum snowfall month is the recorded MAY 13.6 inches.

SNOTEL and SENECA measure snow in different ways. Both are cumulative

but SNOTEL measures calculated snow/water equivalencies with daily snow level changes and SENECA measures daily snowfall. STARR RIDGE is 9.1 straight miles north of SENECA and ROCK SPRINGS is 20.3 straight miles to the southeast. However, SENECA monthly SWE waveform mimics SNOTEL SILVIES BASIN estimates and ROCK SPRINGS measurements more than the closer STARR RIDGE. It gets cold there. Recall OCT-MAY records are missing as much as 16.28% (MAR) to 27.91% (JAN) of period totals. SENECA snow records cannot be considered.

From their Period of Record numbers:

	Start of Record	Elevation	Mean Annual SWE	Max Peak	Mo-Yr	Min Peak	Mo-Yr	Trend	Max/Mean Ratio
SNOTEL									
Snow Mountain	Oct-78	6,230	101.19	752.4	Apr-83	124.9	Mar-91	-36.86%	6.02
Starr Ridge	Oct-80	5,250	46.11	349.1	Mar-06	66.9	MAR-91 & 18	-12.94%	5.22
Rock Springs	Oct-80	5,290	34.78	328.4	Mar-83	10.6	Mar-24	-32.15%	30.98
Mean		5,590	50.03	476.63	-	195.33	-	-35.44%	7.06

	Period of Record	Elevation	Max SWE	Mo-Yr	Min SWE	Mo-Yr	Max/Min Ratio	Mean Max	Mean Peak Day
WRCC									
Snow Mountain	78-24	6,230	26.0	Apr-83	5.4	May-90	4.82	13.5	5-APR
Starr Ridge	80-24	5,250	13.3	Mar-06	2.7	Jan-92	4.93	7.3	6 Mar
Rock Springs	80-24	5,290	11.6	Mar-83	1.6	Feb-90	7.25	7.3	5 Mar
Silvies Basin	80-24	-	16.9	Apr-88	2.1	Feb-92	8.04	9.4	9 Mar

WRCC	Mean First Snow	First Snow	Mean Last Melt Day	Last Melt	Mean First- Last Days
Snow Mountain	15-Nov	4-Oct-10	6-May	6-Jun-11	172
Starr Ridge	25-Nov	14-Oct-18	30-Mar	30-Apr-11	125
Rock Springs	28-Nov	23-Oct-05	31-Mar	8-May-91	123
Silvies Basin	15-Nov	14-Oct-18	5-May	6-Jun-11	171

All stations have lowest maximums in different years. Snow Mountain and Starr Ridge low peaks occur 13 and 30 MAR, 2015 and 2011 respective. Rock Springs and Silvies Basin occur four and five weeks earlier on 22-28 and 4-5 FEB, 1994 and 1992 respective. Starr Ridge maximum minimum accumulation is 77.14% of Snow Mountain, Rock Springs is 48.57% and Silvies Basin is 60.00%.

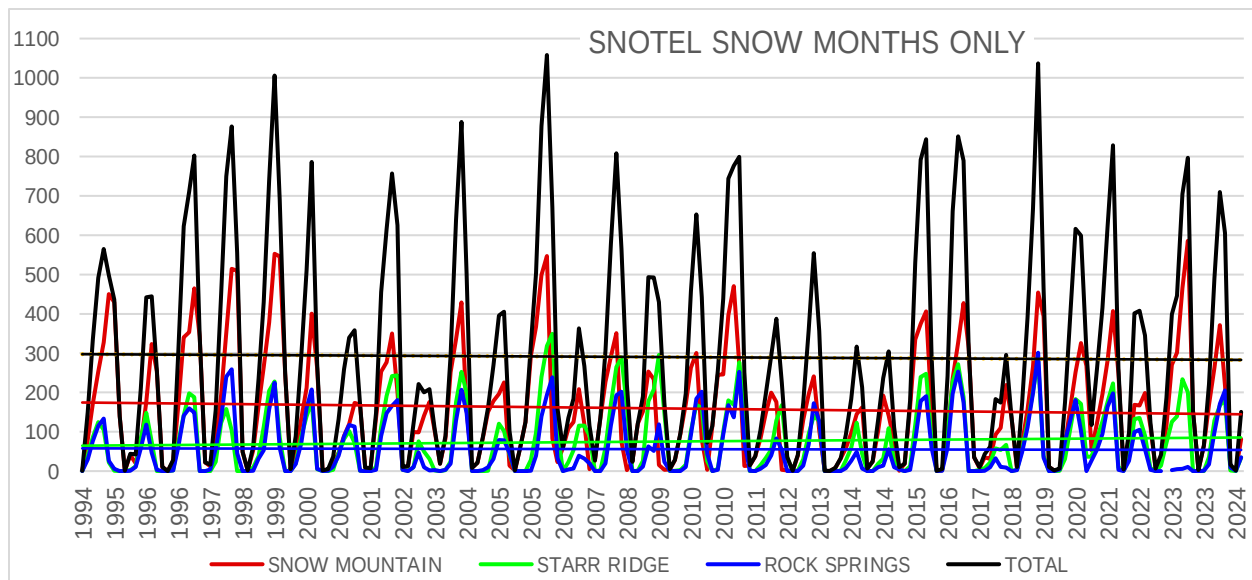
Melts are variable and volatile with many rain on snow events impacting lower elevations most but not always first. STARR RIDGE and ROCK SPRINGS on average tend to melt off first on 30 and 31 MAR, SNOW MOUNTAIN and SILVIES BASIN tend to five weeks later on 5 and 6 MAY. BURNS WSO AP records annual mean peak precipitations on MAR 25-26 when most rain on snow events occur.

Last melts are also variable and tend not have major rain on snow events. SNOW MOUNTAIN and SILVIES BASIN last melts occur on 6 JUN 2011, STARR RIDGE occurs five weeks earlier on 30 APR 2011 and ROCK SPRINGS occurs 8 MAY 1991 nine days later. STARR RIDGE is closest to the Columbia River and ROCK SPRINGS is the farthest from the Pacific Ocean.

By the numbers, there is evidence SWEs are decreasing due to climate change. Lower elevation melts are completed on average three days earlier than at the start of their Periods of Record. SNOW MOUNTAIN melt periods have little change despite vanishing permanent north slope snow field in 2002 when the second most intense drought in a century ends which does not recover until 2023. Winters are not as cold and appear to be rather shorter and last rather longer into Spring.

By the numbers, a -35.4% decrease of snow over 45 years is concerning. However, Periods of Record include the 1982-1984 very high and 1989-1991 very low snow years. These skew linear trends more negative and they make for great news headlines.

Statistical analysis of 30 years snow only months with SWE amounts of 0.2 inches and more reveal a different story.

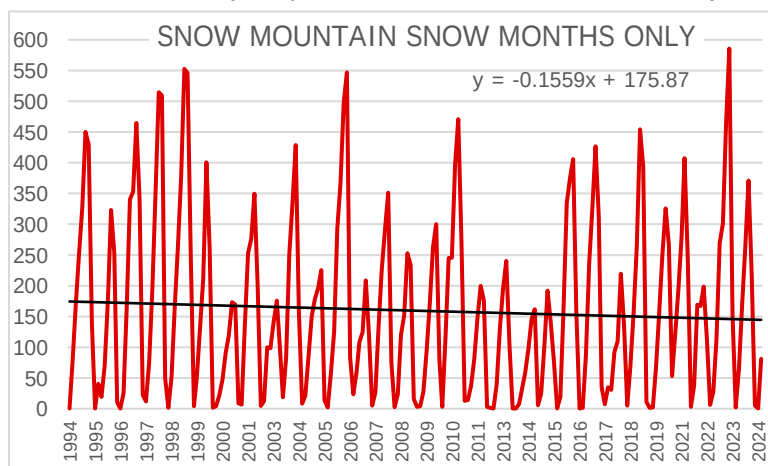


Statistical analysis of SNOTEL snow months only from OCT 1994 to SEP 2024, a nominal 30 water year period of 360 months with months of 0.2 inches or less SWEs removed. Remainder is 217 snow months with a 234.5 day (leap years) annual mean for 60.23% of all calendar months and a 26 JAN 2009 median, 118 days after the calendar SEP 30 2008 median. There are more snow months the past 15 years than the previous 15. Linear trends and ratios are more realistic and stable.

SNOTEL three station total monthly mean is 288 73 inches. SNOW mean snow months only SWE is 158.72 inches, STARR is 74.73 inches and ROCK has 55.54 inches. SNOW is 54.97 to 55.57% of total mean, STARR is 25.32 to 25.88% and ROCK has 19.10 to 19.24% of total. A 55/25/20 SWE ratio.

SNOTEL maximum SWE month amounts are 2006 (1,058.1 inches) followed by 2019 (1,037.1 inches) then by 1999 (1,005.5 inches). Minimum peak SWE month amounts are 2002 (223.0 inches) followed by 2013 (268.2 inches) then by 2018 (295.2 inches). Ratio between highest and lowest peak snow months, 1,085.9 and 223.0 inches, is a more real 4.87 to 1 or 0.21 to 1.

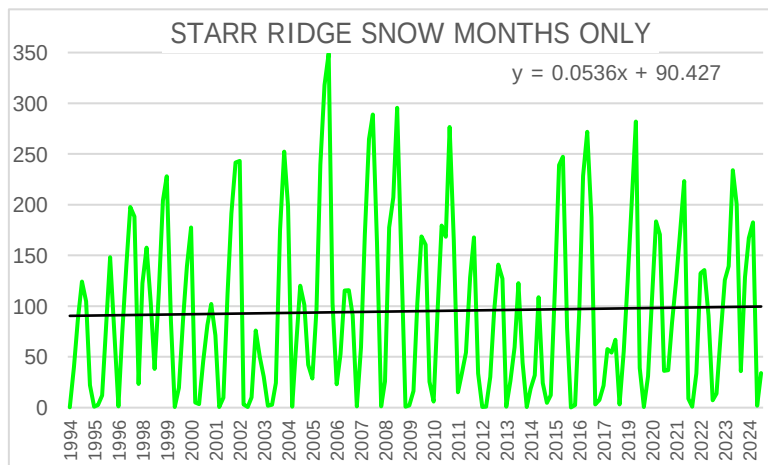
SNOTEL linear trend line begins at 294.14 inches and ends at 277.81 inches, a -5.55% decrease. During this condensed 30 year period, SNOWTEL SWEs decrease by -0.54 inch a year.



SNOW MOUNTAIN condensed mean annual SWE is 158.72 inches. Maximum annual snows are 2023 (585.7 inches) followed by 1999 (552.5 inches) then by 2006 (548.7 inches). Minimum annual snows are 2014 (161.9 inches) followed by 2001 (173.4 inches) then by 2003 (176.0 inches). Ratios between highest and lowest peak snow months, 585.7 and 161.9 inches, is a more real 3.62 to 1 or 0.28 to 1.

Condensed SNOW MOUNTAIN linear trend line begins at 175.87 inches and ends at 141.70 inches, a -19.47%

decrease. SNOW MOUNTAIN snow months only amounts decrease by -1.14 inches a year. Recall the mountain is in the Emigrant sub-Basin and has more snow to lose.



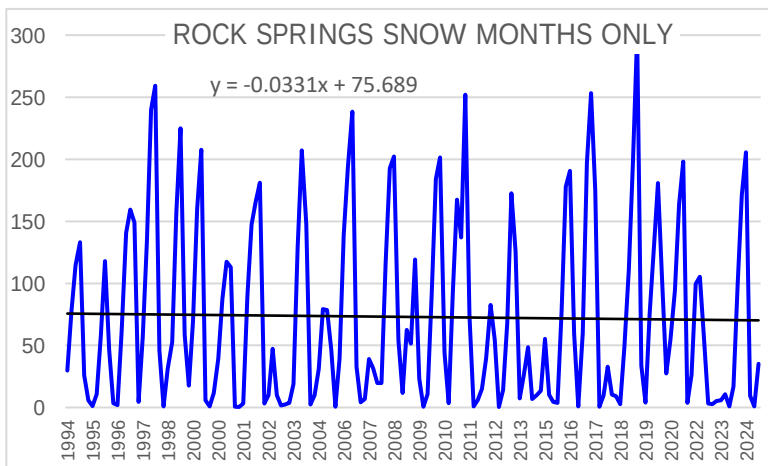
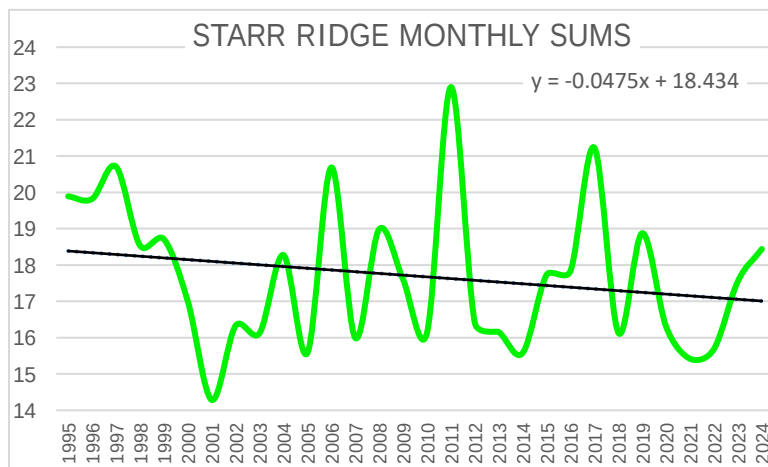
STARR RIDGE mean snow months only SWE is 95.06 inches. Maximum annual snows are 2006 (349.1 inches) followed by 2009 (295.5 inches) then by 2008 (288.9 inches). Minimum annual snows are 2018 (66.9 inches) followed by 2003 (76.0 inches) then by 2001 (102.1 inches). Ratios between highest and lowest peak snow only months, 349.1 and 66.9 inches, is a high 5.22 to 1 or 0.19 to 1.

Condensed linear trend line begins at 90.43 inches and ends at 99.62 inches, a +10.16% increase.

However, when the mean monthly SWEs are summed, the linear trend line begins at 18.43 inches and ends at 17.05 inches, a -7.49% decrease.

Ratios between maximum and minimum, 22.90 inches and 14.29 inches are a more real 1.60 to 1 or 0.62 to 1.

STARR RIDGE is the only SNOTEL station with this large a divergence between annual and monthly SWE deltas or rates of change. Month to month amounts tend to be more unequal over the snow year, more equal year to year and are decreasing during the period.



ROCK SPRINGS mean snow months only SWE is 74.73 inches. Maximum annual snows are 2019 (301.0 inches) followed by 1998 (259.2 inches) then by 2017 (253.4 inches). Minimum annual snows are 2023 (10.6 inches) followed by 2018 (32.9 inches) then by 2007 (38.9 inches). Ratios between highest and lowest peak snow only months, 301.0 and 10.6 inches, is a very high 28.40 to 1 or 0.035 to 1. Of the three SNOTEL stations, ROCK is the most variable.

Condensed ROCK SPRINGS linear trend line begins at 75.68 inches and ends at 70.19 inches, a -7.25% decrease. Snow amounts decrease by -0.14 inch a year. Recall ROCK SPRINGS station is located east of the Silvies Valley and is farthest from the Pacific Ocean.

ends at 70.19 inches, a -7.25% decrease. Snow amounts decrease by -0.14 inch a year. Recall ROCK SPRINGS station is located east of the Silvies Valley and is farthest from the Pacific Ocean.

STARR RIDGE has 175 of SNOW MOUNTAIN 218 month base. Base OCT 1994–SEP 2024 median day is 30 SEP 2008. STARR RIDGE 175 month median day is 27 FEB 2009, 151 days after median. There are 85 months before and 90 months after median for 53.14% of total. SWE months are less than SNOW by -19.72%. STARR SWE increases tend to start later than SNOW and decreases tend to start first and melt faster than ROCK.

STARR RIDGE has more SWE months after its SEP 2008 median than before and with larger SWEs with 7,541.1 inches from OCT 1994 to SEP 2008 and 8,809.4 inches from OCT 2008 to SEP 2024 for 54.03% of the 16,305.5 inch total. Recall STARR SWEs are less variable than ROCK.

Condensed ROCK SPRINGS has 170 of SNOW MOUNTAIN 218 month base. Base 218 month median day is 30 SEP 2008. ROCK SPRINGS 170 month median day is 1 SEP 2008, 31 days before median. There are 84 months before and 86 months after median for 50.59% of total. SWE months are less than SNOW by 22.02%. Both STARR and ROCK SWE decreases start first and melt faster than SNOW. Between the two, STARR starts first and melts faster.

ROCK SPRINGS has less SWE amounts with 5,977.6 inches from OCT 1994 to SEP 2009 and 6,127.8 inches from OCT 2008 to SEP 2024 for 50.62% of the last half of the 12,105.4 inches total. Both STARR and ROCK have more snow months after the 2007-08 snow year but ROCK now has smaller SWEs than before. This matches the decreasing snows in the lower Harney Basin as it is the closest station to there.

SNOW MOUNTAIN median day is 2 SEP 2008, 29 days before base median. There are 112 months before SEP 2008 and 106 months after for 48.62% of total. After the 2008-09 snow year, it is less active than STARR but more active than ROCK with 17,810.0 inches from OCT 1994 to SEP 2008 and 16,946.9 inches from OCT 2008 to SEP 2024 for 47.52% of the 34,756.9 inch total.

SNOW SWEs decline more the past 15 years than the previous 15, STARR has more SWEs the past 15 and ROCK 50/50 decline percentage is half of SNOW.

From the numbers:

	Period of		Mean					Max/Min	
SNOTEL	Record	Elevation	Annual SWE	Max Peak	Mo-Yr	Min Peak	Mo-Yr	Ratio	Trend
Snow Mountain	95-24	6,230	156.70	585.7	JAN-23	161.9	MAR-14	6.02	-36.86%
Starr Ridge	95-24	5,250	76.10	349.1	MAR-06	66.9	MAR-18	5.22	-12.94%
Rock Springs	95-24	5,290	56.08	301.0	MAR-19	10.6	APR-23	30.98	-31.25%
Total	95-24		288.73	1,058.1	FEB-06	221.7	JAN-03	10.26	-35.41%

	Period of	Total		Months Before	Months After				
CONDENSED	Record	Months	Median Day	Median Day	Median Day	After Median	Total Inches	After Median	
Snow Mountain	95-24	218	2-Sep-08	112	106	48.62%	34,756.9	47.52%	
Starr Ridge	95-24	175	27-Feb-09	85	90	53.14%	16,305.5	54.03%	
Rock Springs	95-24	170	1-Sep-08	84	86	50.59%	12,105.4	50.62%	

CONDENSED	Mean Annual SWE	% of Total	Max/Min Ratio	Trend
Snow Mountain	158.72	48.32%	3.62	-19.47%
Starr Ridge	95.06	28.94%	5.22 ^A	-7.49% ^A
Rock Springs	74.73	22.75%	28.40	-7.25%
Total	328.51	99.99%	11.35	-13.99%

A. STARR RIDGE -7.49% trend is the annual snow months only sums. The condensed ratio between maximum and minimum years is 1.60 to 1. However, the condensed monthly trend increases by +10.16%. Then, the SNOTEL condensed annual SWE mean decrease would be -5.55%.

This is rather indicative of differences between annual and monthly means between the three SNOTEL stations and the difficulties in predicting future trends.

WRCC	Period of Record	Max SWE	Day	Min SWE	Day	Max/Min Ratio	Mean Max	Mean Peak Day	Max/Mean Ratio
Snow Mountain	95-24	20.7	9 APR 23	6.6	18 JAN 15	3.14	11.15	3 APR	1.87
Starr Ridge	95-24	13.3	20 MAR 06	2.8	9 JAN 03	4.75	6.35	4 MAR	1.78
Rock Springs	95-24	11.4	11 MAR 98	1.7	28 JAN 18	6.71	5.36	1 Mar	2.13
Silvies Basin	95-24	15.4	8 APR 23	3.2	8 JAN 03	4.81	8.12	10 Mar	1.90

WRCC	Mean First Snow Day	First Snow	Mean Last Melt Day	Last Melt	Mean First-Last Days
Snow Mountain	15 NOV	4-OCT 10	13 MAY	6 JUN 11	179
Starr Ridge	24 NOV	14-OCT 18	7 APR	30 APR 11	134
Rock Springs	25 NOV	26 OCT 05	8 APR	26 APR 96	134
Silvies Basin	15 NOV	13 OCT 18	12 MAY	6 JUN 11	179

Condensed total SWE during the past 30 year period is 63,167.90 inches for an annual 2,105.59 inch mean. SNOW is 55.02% of total, STARR is 25.82% and ROCK has 19.16%. Compressed and condensed SWE data conform.

The 55/25/20 ratio among all is becoming 50/30/20 as STARR RIDGE SWEs seem to accelerate. Recall SNOW MOUNTAIN SNOTEL station location is lower and southwest of the 7,165 foot summit by 935 feet. For Emigrant and Crowsfoot creek sources, which are on the east and south flanks, actual SWEs will be lower.

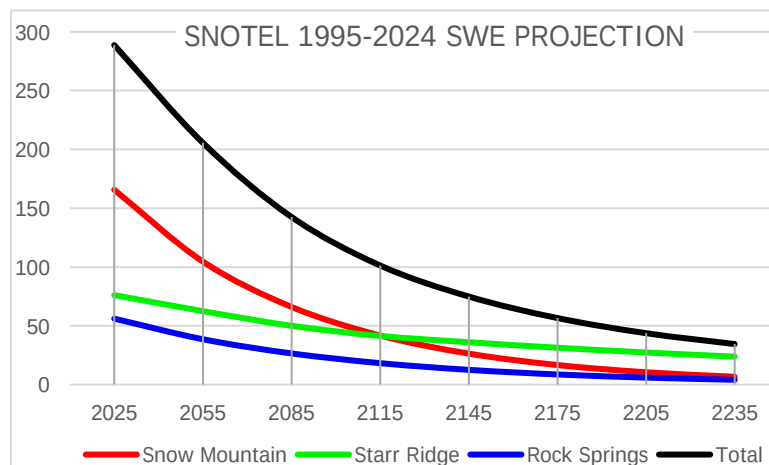
Although maximum month SWEs occur on different months and days, higher elevation SNOW MOUNTAIN annual changes tend to have less variation while lower elevation stations are more dynamic. STARR RIDGE annual SWE amounts are less variable than ROCK SPRINGS.

During the past 30 years, winter snows begin and end three days later resulting in more rain on snow events. SNOW MOUNTAIN retains snow +25.14% longer than the 980 and 940 foot lower elevation stations where many low SWE years have higher water content.

Melts are variable and volatile with many rain on snow events impacting the lower elevation stations most but not always first. STARR RIDGE and ROCK SPRINGS on average tend to complete melt off first on 30 and 31 MAR, SNOW MOUNTAIN and SILVIES BASIN tend to five weeks later on 5 and 6 MAY.

Last melts are also variable and tend not to have major rain on snow events. Those often occur earlier when there are substantial snows to melt. SNOW MOUNTAIN and SILVIES BASIN last melts occur on 6 JUN 2011, STARR RIDGE last melt occurs five weeks earlier on 30 APR 2011 and ROCK SPRINGS occurs nine days later on 8 MAY 1991. Recall STARR RIDGE station is located north of Bear Valley below the Aldrich Mountains ridge, is closest to the Columbia River and the warmer spring temperatures rising from the John Day Basin. Snows tend to start last and melts start first melting faster.

From the available and estimated numbers, three 210 years projections are produced; SNOTEL, WRCC and SNOTEL condensed.

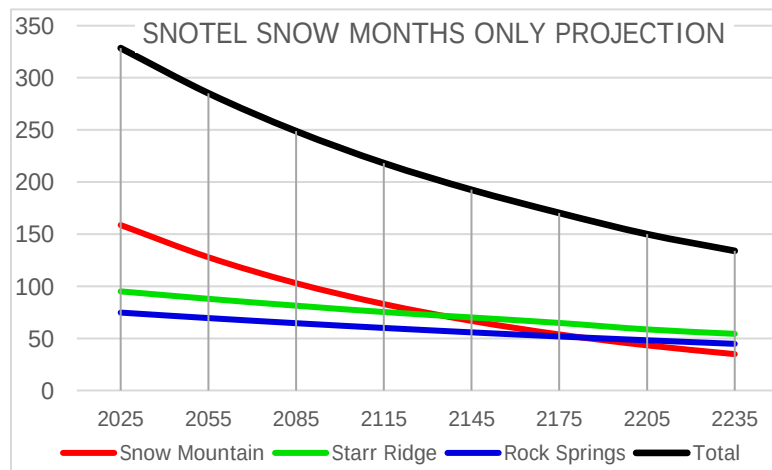


This projection uses the NRCS 1995-2024 SNOTEL 30 year annual mean of SWE inches. In 210 years, SNOW MOUNTAIN mean annual SWEs may decline by -96.00%, STARR RIDGE by -68.78% and ROCK SPRINGS by -92.75%. Total SNOTEL SWEs may decline -50.00% by 2080, $\pm$ five years, -88.43% by 2235 $\pm$ 10 years.

Appears SNOW and ROCK have large decadal decreases for different reasons. SNOW due to its higher elevation and the effects of long term climate factors. ROCK due to its closer

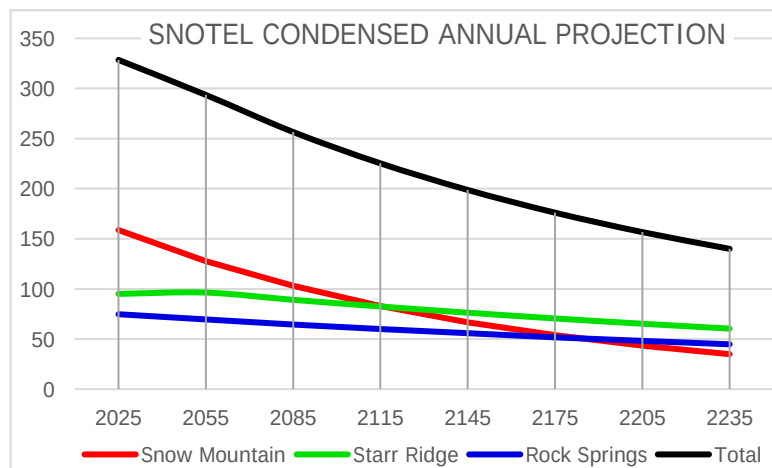
proximity to the lower Harney Basin. STARR station may begin to measure more annual SWEs than SNOW by 2100-2120.

Of course, this won't happen. Nominal 30 year period includes the second and third most intense droughts in 100 years and Silvies Basin SWEs are very volatile year to year and decade to decade.



This projection uses WRCC SNOTEL 30 year annual mean of condensed snow months only SWE inches. In 210 years, SNOW MOUNTAIN mean annual SWEs may decline by -59.22%, STARR RIDGE by -42.84% and ROCK SPRINGS by -40.12%. Total SNOTEL SWEs may decline -50.00% by 2185 and -59.22% by 2235.

Recall STARR condensed monthly snow months only increase +10.11 to +10.16% during the past 30 year period.



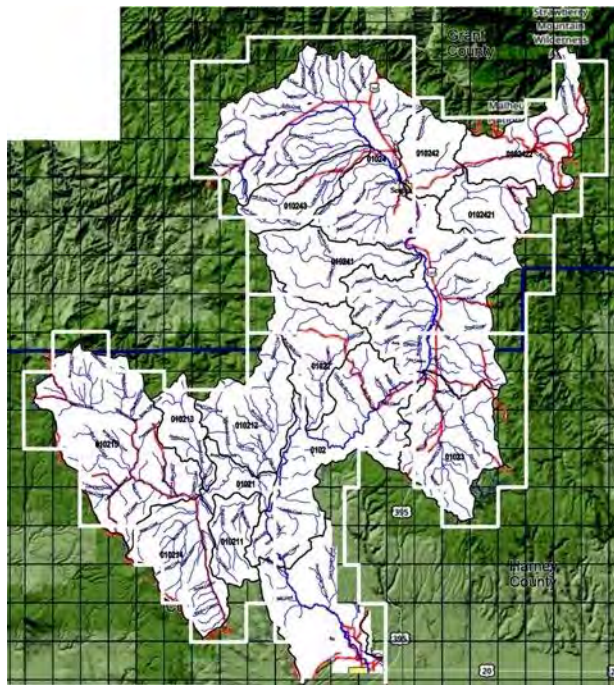
When the STARR future trend line is modified using the mean between the annual sum +10.16% and the monthly sum -7.49% or by +1.34% for the first 30 year period then declines by the monthly -7.49% rate, then the SNOTEL 1995-2024 total condensed SWEs decline by a mean -8.20%. STARR now decreases by -36.47% by 2235. SNOTEL mean annual SWEs may be half the 1995-2024 annual means by 2195, ± five years, and -57.38% by 2235 ± ten.

SNOTEL SWEs may be half of the past 30 years in 65 to 170 years. Of

course, this won't happen. But it could and this is the best Occam's Razor statistical guesstimate.

With the warming winters, precipitation comes as less snow and more rain. By how much, if any? Future precipitation projections are presented in the next chapter.

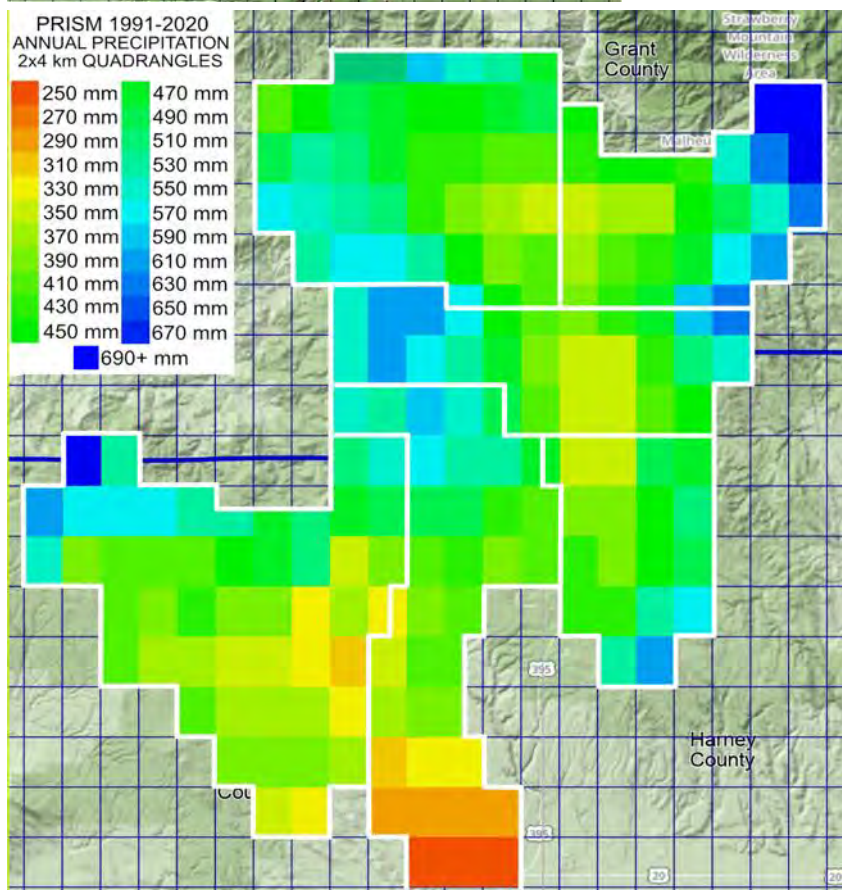
RAIN



The USDA Risk Management Agency supports PRISM, the Parameter-elevation Regressions on Independent Slopes Model program. The Northwest Alliance for Computational Science and Engineering at Oregon State University manages. Although there are only four government precipitation gauges in the Silvies Basin area during the past 30 years, the developing science is the most accurate data set available. Quadrangles with more than half of any of the 16 USGS Hydrologic Unit [HUC] watershed boundaries within the four sub-Basins are included in this survey. The often published upper Harney Basin map is not accurate. This report relies on 3DEP LiDAR relief maps with elevations. There is a very slight increase in precipitation totals for the 1991-2020 period estimates.

Metric numbers allow for more accuracy. 25.4 millimeters [mm] is one inch. 508 mm is 20 inches. One square kilometer is 0.386 sq. miles. Source data is from <https://prism.oregonstate.edu/explorer>

PRISM estimates the dark blue west quadrangle



on Snow Mountain where the SNOTEL station is receives an average or mean 713.7 mm (28.1 inches) of precipitation annually over the 30 year period. Southeast flank where Emigrant Creek headwaters are receive 640.19 mm or 2.89 inches less. Bear Creek headwaters quadrangle on Strawberry Mountain southern flank receives a mean 812.4 mm (31.98 inches).² Silvies River and Myrtle Creek headwaters which join below the Upper Silvies Canyon receive 617.06 to 629.45 mm (24.29 - .78 inches). Calamity Butte quadrangle east of both valleys receives 642.40 mm (25.29 inches). Trout Creek headwaters west of King Mountain receives 579.20 mm (22.80 inches). The dark red Five Mile Dam quadrangle which includes Burns city receives 251.83 mm (9.91 inches). From the numbers,

². Bear Creek watershed on

Strawberry Mountain is adjacent to the Canyon Creek watershed, a John Day River tributary. Its quadrant is included in the map.

ratios between the quadrangles at the Bear Creek headwaters and the Five Mile Dam quadrangle, 812.40 and 251.83 mm, are a high 3.23 to 1 or 0.31 to 1.

Peak precipitation months for most quadrangles are December, January then March. Silvies Valley, middle Silvies River and lower Emigrant Creek areas peak in December, May then January or January then May and are more prone to Spring rain on snow events. Most quadrangles in the Bear sub-Basin Aldrich Mountain watersheds and King Mountain peak in December, January then November.

PRISM estimates the Burns Municipal Airport quadrangle receives an annual mean 236.25 mm (9.30 inches). However, the National Weather Service station at the airport [BURNS WSO AP] measures an annual mean of 10.20 inches from JUL 1999 to JUN 2023 and the 1993–2023 decadal mean is 10.49 inches. This is a -12.8% discrepancy. PRISM precipitation amounts are conservative.

The four upper Harney Basin sub-basins, Bear, Silvies, Silvies Canyon and Emigrant, are divided into six sections:

The West Bear Valley has 11,114.50 mm (437.54 inches) mean annual precipitation total within 37 2km by 4km quadrangles or 296 square kilometers (114.29 sq. miles). Per quadrangle mean annual rain and snow precipitations, 11,114.50 mm / 37 quadrangles, is 300.39 mm (11.87 inches).

The East Bear Valley has 11,961.34 mm (470.92 inches) total within 24 quadrangles or 192 sq. kilometers (74.13 sq. miles). Total mean annuals, 11,961.34 mm / 24 quadrangles, is 498.39 mm (19.62 inches) per quadrant.

Bear Valley totals are 23,075.84 mm, 61 quadrangles, 488 sq. kilometers (188.42 sq. miles) and 391.12 mm (15.40 inches) per quadrant.

North Silvies Valley has 12,717.47 mm (500.69 inches) within 23.5 quadrangles or 188 sq. kilometers (72.59 sq. miles). Total mean annuals, 10,891.09 mm / 23.5 quadrangles, is 463.45 mm (18.25 inches).

South Silvies Valley has 8,576.67 mm (337.66 inches) within 18.5 4km quadrangles or 148 sq. kilometers (57.14 sq. miles). Total mean annuals, 8,576.67 mm / 18.5 quadrangles, is 463.60 mm (18.25 inches).

Silvies Valley totals are 21,294.14 mm, 42 quadrangles, 676 sq. kilometers (261.00 sq. miles) and 507.00 mm (19.96 inches) per quadrant.

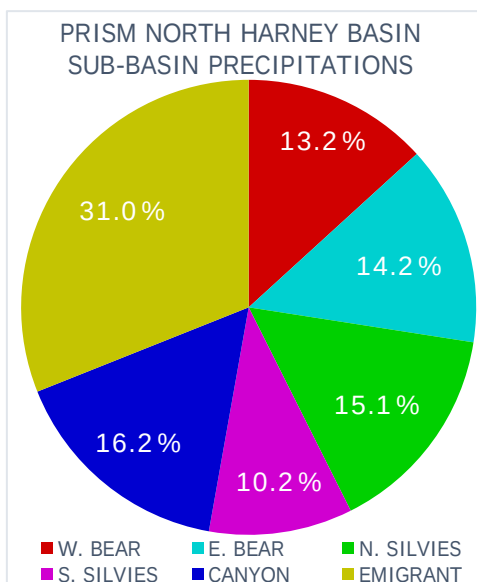
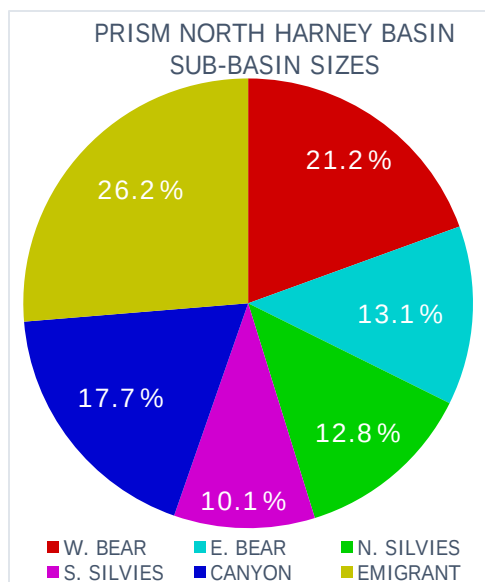
Silvies Canyon (middle Silvies River upper and lower canyons) has 13,576.67 mm within 33.5 quadrangles or 260 sq. kilometers (100.39 sq. miles). Total mean annuals, 13,576.67 mm / 33.5 quadrangles, is 405.28 mm (15.96 inches) per quadrant.

Emigrant Creek sector has 26,081.49 mm within 48 quadrangles or 384 sq. kilometers (148.26 sq. miles). Total mean annuals, 26,081.49 mm / 48 quadrangles is 543.36 mm (21.39 inches) per quadrant.

PRISM estimates upper Harney Basin precipitation totals above Burns are 84,028.14 mm within 183.5 2km by 4km quadrangles or 1,468 sq. kilometers (566.80 sq. miles) for a 30 year mean annual 457.92 mm (18.03 inches) per quadrant.

From the numbers:

	Sq. Kilometers	Sq. Miles	Area Percentage	Total Millimeters	Precipitation Percentage	MM per KM	Mean Inches
PRISM							
West Bear	296	114.29	21.16%	11,114.50	13.23%	37.55	11.87
East Bear	192	74.13	13.08%	11,961.34	14.23%	62.30	19.62
North Silvies	188	72.59	12.81%	12,717.47	15.13%	67.65	18.25
South Silvies	148	57.14	10.08%	8,576.67	10.21%	57.95	18.25
Silvies Canyon	260	100.39	17.71%	13,576.67	16.18%	52.22	15.96
Emigrant	384	148.26	26.16%	26,081.49	31.04%	67.92	21.39
Sums & Averages	1,468	566.80	100.10%	84,028.14	99.97%	57.59	17.56



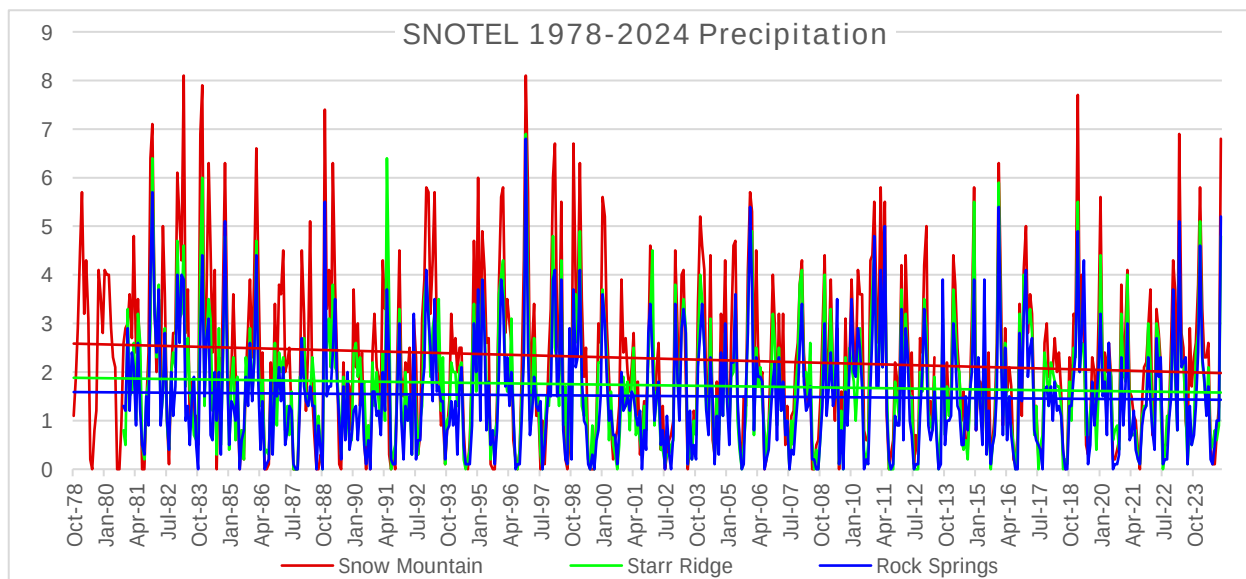
Myrtle Creek- Silvies Canyon and Emigrant Creek watersheds are 43.87% of the size and 48.22% of total precipitation.

Emigrant sector has the highest millimeters per kilometer followed by East Bear then by both North and South Silvies sectors.

East Bear and the Emigrant sectors, where the Strawberry Range and Snow Mountain are,

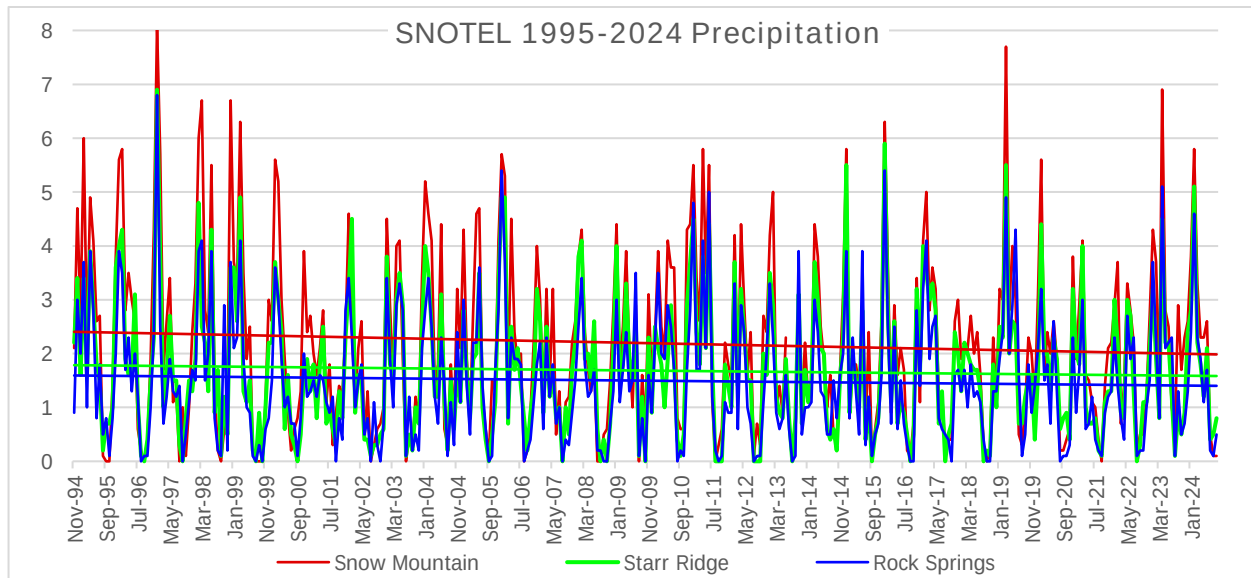
are the “magnets”, providing a mean annual 44.27% of upper Basin precipitation as rain and snow.

Recall there is a -12.8% precipitation discrepancy between the PRISM Burns Municipal Airport estimate and the NWS station measurement at the Airport. PRISM actual numbers may be higher with higher elevations but having more errors. Among the three SNOTEL stations with comparable periods of record, the highest elevation and closest to the Pacific Ocean, SNOW MOUNTAIN station, has a +9.67% more precipitation than the PRISM quadrangle precipitation mean. The other two SNOTEL stations at lower elevations have near identical mean precipitation amounts to PRISM estimates. Lower elevations have more relative barren butte and canyon geologies due to rib faulting. This unique topology may be outside the PRISM model slope calculus to be more accurate. PRISM 1991-2020 estimates are conservative.³

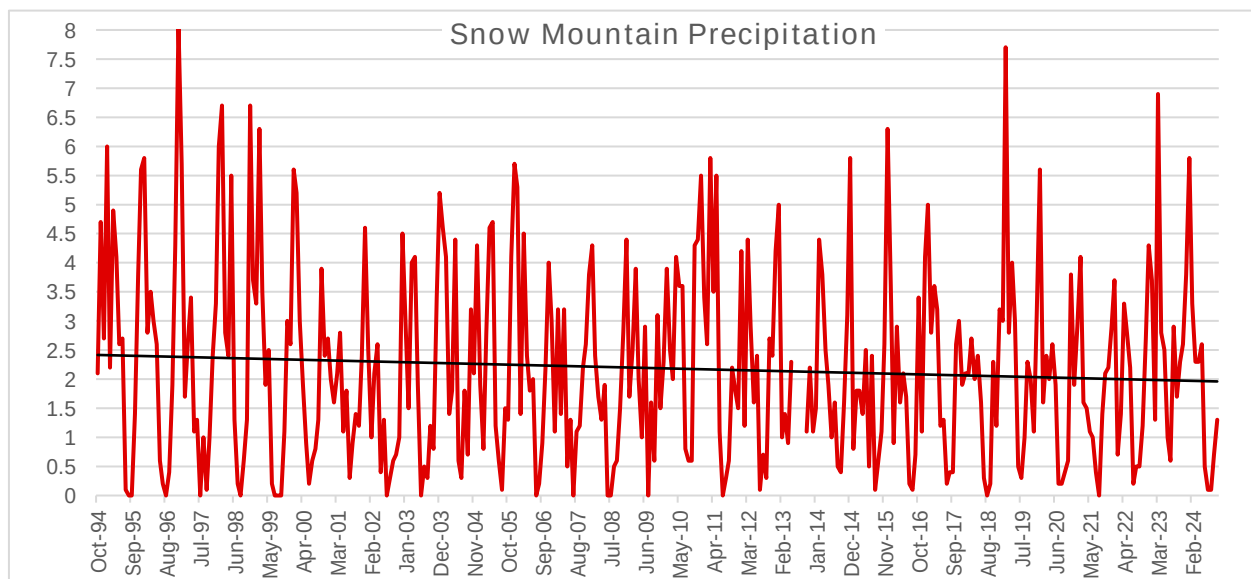


Composite graph showing all three SNOTEL station total Periods of Record monthly precipitations, rain and snow, from OCT 1978 (SNOW MOUNTAIN) and OCT 1980 (STARR RIDGE – ROCK SPRINGS) to NOV 2024. SNOW MOUNTAIN record is missing JUN-SEP 2013 which are estimated by inserting the mean of adjacent months and years. Linear trend lines for each during their Periods of Record are shown. Note the similarities to the SNOTEL SWE graph in Chapter One.

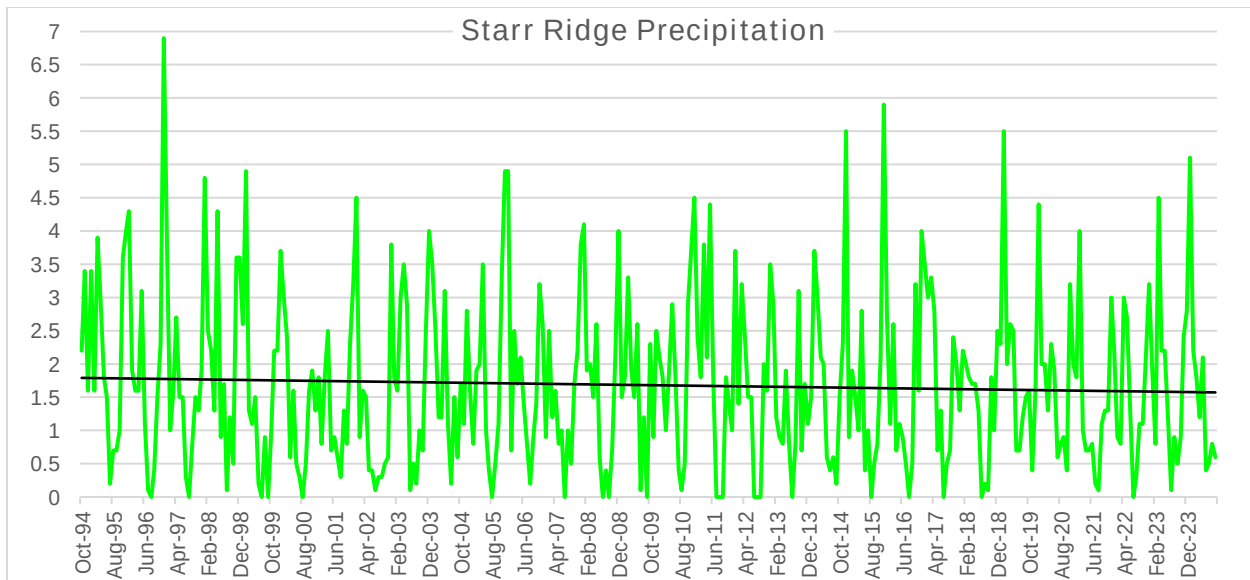
3. Snow Mountain rain gauge has a minor error measuring annual precipitation accumulation above 711 inches. Actual amounts are near 25 inches higher which makes the SNOTEL / PRISM discrepancy larger.



Composite graph showing all three SNOTEL station total monthly precipitations during the latest nominal 30 year period in water years (OCT-SEP). SNOW MOUNTAIN DEC 1996 8.1 inches is not shown in full. From OCT 1995 to SEP 2024, SNOTEL three station mean monthly precipitation is 1.79 inches or 21.45 inches a year. Linear trends range from -12.23% (STARR RIDGE) to -18.98% (SNOW MOUNTAIN) or from -0.19 to -0.42 inch a year.



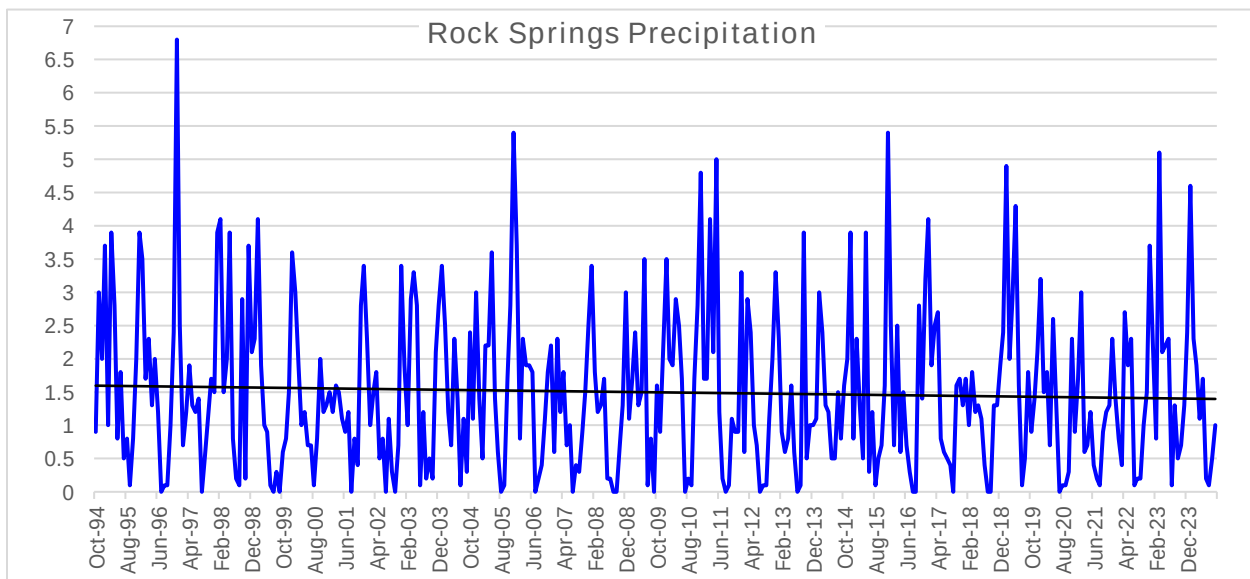
SNOW MOUNTAIN (6,230 feet) 1995-2024 mean monthly precipitation is 2.19 inches or 26.28 inches a year. PRISM Snow Mountain quadrangle estimates 23.74 inches. Maximum monthly means are DEC 1996 (8.1 inches) followed by FEB 2019 (7.7 inches) then by MAR 2023 (6.9 inches). There are many months with 0.1 inch or less precipitation. Longest duration is JUN-SEP 1999. Linear trend line begins at 2.418 inches and ends at 1.959 inches, a -18.98% decrease or -0.42 inch a year. SNOW MOUNTAIN compressed SWEs decrease -19.47% during the same period. Snow and snow/rain percentages are decreasing near the same rate.



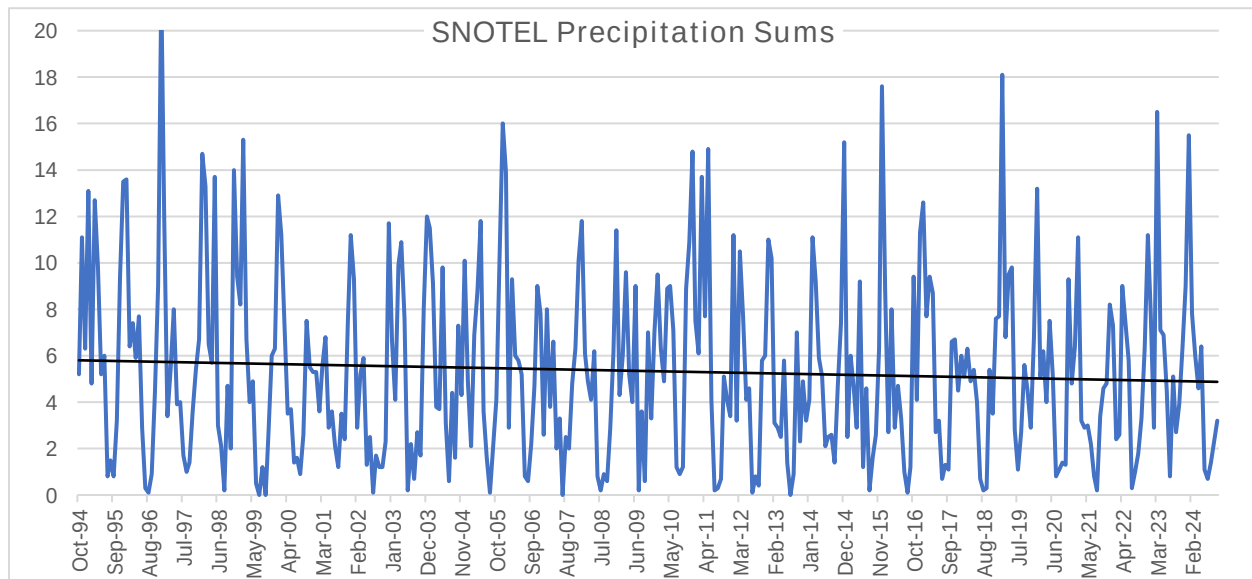
STARR RIDGE (5,250 feet) 1995-2024 mean monthly precipitation is 1.69 inches or 20.28 inches a year. PRISM Starr Ridge quadrangle estimates 19.85 inches. Maximum monthly means are DEC 1996 (6.9 inches) followed by DEC 2015 (5.9 inches) then by DEC 2014 and FEB 2019 (5.5 inches). There are many months with 0.1 inch or less precipitation. Longest duration is JUL-SEP 2011 and JUL-SEP 2012.

Linear trend line begins at 1.791 inches and ends at 1.572 inches, a -12.23% decrease or -0.21 inch a year. Recall STARR RIDGE SWEs decrease -12.94% during the period. STARR RIDGE condensed SWEs increase +13.03%. It has the least snow only months of the three stations.

Peak monthly SWEs occur in DEC 2006, yet 2005-2006 water year precipitation totals are the fifth highest. Snow and snow/rain percentages are decreasing near the same rate.



ROCK SPRINGS (5,290 ft) 1995-2024 mean monthly precipitation is 1.50 inches or 18.04 inches a year. PRISM Rock Springs quadrangle estimates 18.56 inches. Maximum monthly means are DEC 1996 (6.8 inches) followed by DEC 2005 and 2015 (5.4 Inches) then by MAR 2023 (5.1 inches). There are fewer months with 0.1 inch or less precipitation than Starr Ridge. Longest duration is JUL-SEP 2012 and JUL-SEP 2020. Linear trend line begins at 1.598 inches and ends at 1.397 inches, a -12.58% decrease or -0.19 inch a year. Recall ROCK SPRINGS condensed SWEs decrease -11.49% during the period. Snow and snow/rain percentages are decreasing near the same within discrepancy margins.



SNOTEL three station mean monthly precipitation is 5.35 inches or 64.2 inches a year. Maximum means are DEC 1996 (21.8 inches, not shown in full) followed by FEB 2019 (18.1 inches) then by DEC 2015 (17.6 inches). 2010-2011 above average precipitation has the longest duration (eight months) followed by 1994-1995 (nine months with lower amounts). There are eight from 360 months with 0.1 inch or less precipitation. 1999 has two, JUL and SEP. Note cumulative maximum and minimum years and months differ from every distinct record. Exempting DEC 1996, SNOTEL station maximums and minimums are not uniform. Northern Harney Basin precipitations are not universal.

During this period, NWS BURNS WSO AP at the Burns Municipal Airport records a mean annual 10.6 inches, -49.53% less than or half the three SNOTEL station sum of 21.4 inches.

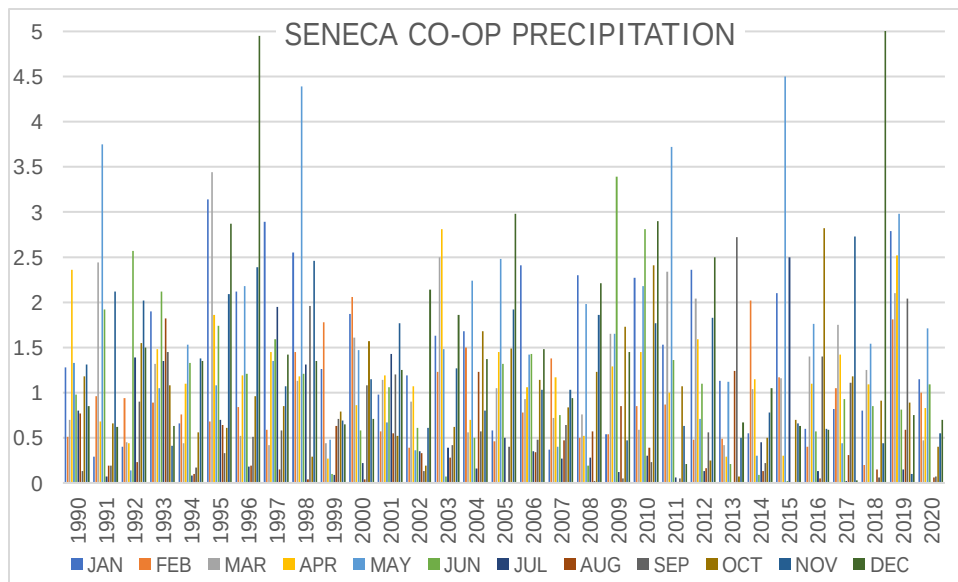
Linear trend line begins at 5.802 inches and ends at 4.885 inches, a -15.84% decrease or -0.31 inch a year. SNOTEL SWE condensed snow months only sums decrease -13.99% during the same period. This may indicate total rain precipitation amounts are decreasing more than snow SWEs.

From the numbers

		Mean	Mean Annual	Max. Monthly	Max. Month	30 Year
SNOTEL	Elevation	Annual	Sum Percentage	Amount	Year	Trend
Snow Mountain	6,230	26.28	40.68%	8.1	DEC 1996	-18.98%
Starr Ridge	5,250	20.28	31.39%	6.9	DEC 1996	-12.23%
Rock Springs	5,290	18.04	27.93%	6.3	DEC 1996	-12.58%
Sums	5,590	64.60	100.00%	21.8	DEC 1996	-15.84%

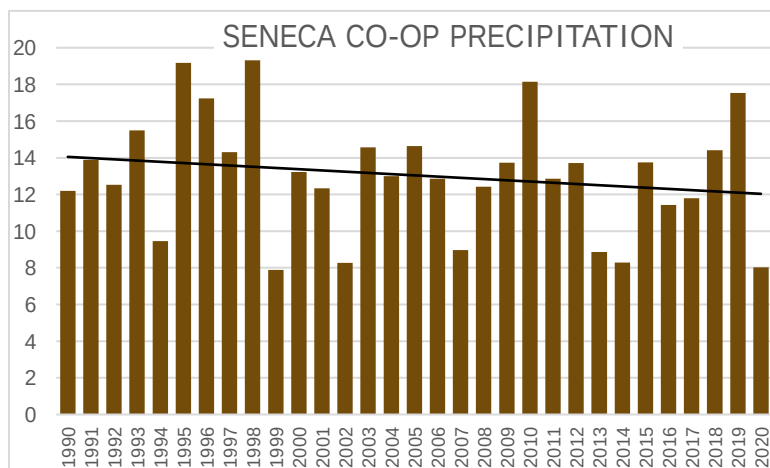
SENECA CO-OP station at 1,425 meters or 4,675 feet elevation (USGS) has weather records since 1908 but they are sporadic and incomplete. 1978-2022 precipitation records are more complete than its snow records. However, record has major errors in measurement and is missing many days which corrupts the monthly record. 1990-2020 is the most coherent. 10 missing months are estimated by inserting adjacent month means. DEC 2018 to APR 2019 is missing during the SNOTEL second most active water year and cannot be repaired.³

3. In 1998, NOAA and NWS form the Cooperative Observer Network. Harney Basin had the OSU Squaw Butte Experimental, OO Ranch, Malheur Refuge HDQ, Burns BUR03 and Seneca stations. Excepting Burns WSO AP, all are no longer active and are soon replaced by the USGS. USFS and BLM (WRCC) Remote Automatic Weather Station (RAWS) network with stations at Bald and Riddle Mountains, Basque, Moon and P Hills, Crow and Foster Flats, Little McCoy Creek, Fish Fin, Sage Hen and Wagontire, Owens Hay joins the network 25 JUN 2019. OSU Experimental Station near the airport begin on the same day but is not in the network. Within the NWS, BURNS WSO AP is identified as KBNO.



SENECA CO-OP mean monthly precipitation is 1.06 inches or 12.5 inches a year. Maximum means are DEC 1996 (4.95 inches) followed by MAY 2015 (4.5 inches) then by MAY 1998 (4.39 inches). There are 14 from 372 months with 0.1 inch or less precipitation. 2011 has three (JUL-SEP), 2015 has two (AUG and SEP). DEC has the most snow and MAY has

the most rain.



A 31 year linear trend line without the 2018-19 snow months has little value. However, when those months are estimated using the percentage differences between the SENECA and SNOTEL monthly sums during SNOTEL three peak snow seasons (DEC-APR in magnitude order of 1996-97, 2018-19 and 2014-15), mean monthly precipitation changes to 1.09 inches or 13.04 inches a year.

Maximum annual precipitations are 1998 (19.32 inches) followed by 1995 (19.18 inches) then by 2010 (18.15 inches). Minimum annual precipita-

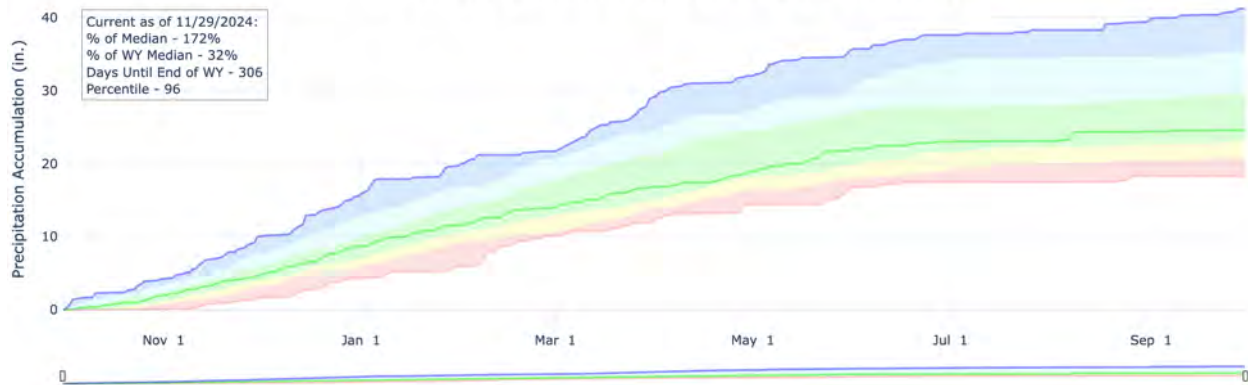
tions are 2000 (7.89 inches) followed by a suspect 2020 (8.03 inches) then by 2002 and 2014 (8.27 inches). Ratios between maximum and minimum precipitation amounts, 19.32 inches and 7.89 inches, are 2.45 to 1 or 0.41 to 1.

Estimated linear trend line begins at 14.05 inches and ends at 12.05 inches, a -14.23% decrease.

SENECA CO-OP annual precipitation records are included in the analyses.

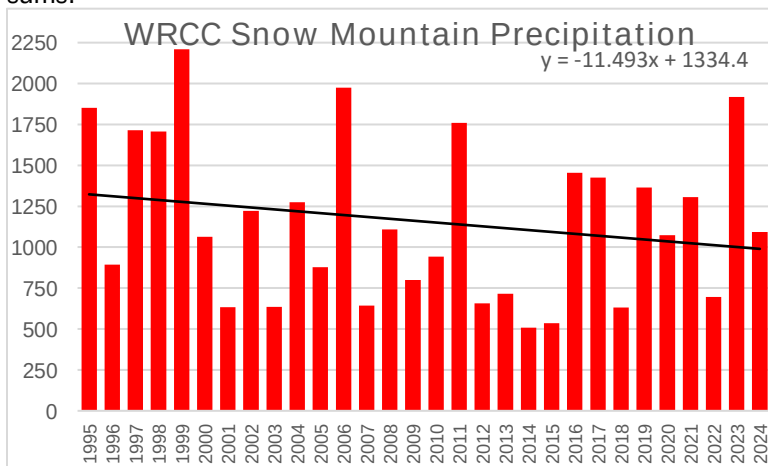
NOAA Western Regional Climate Center [WRCC] Desert Research Institute in Reno – Nevada publishes SNOTEL numbers with different data sets and format for more results. 1980 to 2024 Period of Record data is only available in this graphic format.

SNOW MOUNTAIN PRECIPITATION



WRCC estimates SNOW MOUNTAIN maximum annual precipitation accumulation of 41.2 inches ends the 1982-3 water year. Minimum precipitation of 18.3 inches ends 1991-2 water year. Median during the Period of Record is 24.7 inches. Mean SWE peak day is 5 APR (13.5 inches) with near all as snow and ice. Also, 5 APR maximum precipitation is 30.3", minimum is 12.9" and mean is 16.9". Additional annual precipitation as non-SWE rain above mean maximum is 10.9", minimum is 5.4" and mean is 7.8". Total maximum precipitation accumulation as non-SWE rain is 31.58%, minimum is 26.46% and mean is 29.51%. Less than 30% of total SNOW MOUNTAIN measured precipitation is rain.

Note SNOW MOUNTAIN annual and monthly mean precipitations are nearer to the absolute minimum means than the absolute maximums indicating how much the 1981-1983 "flood years" impact means and sums.

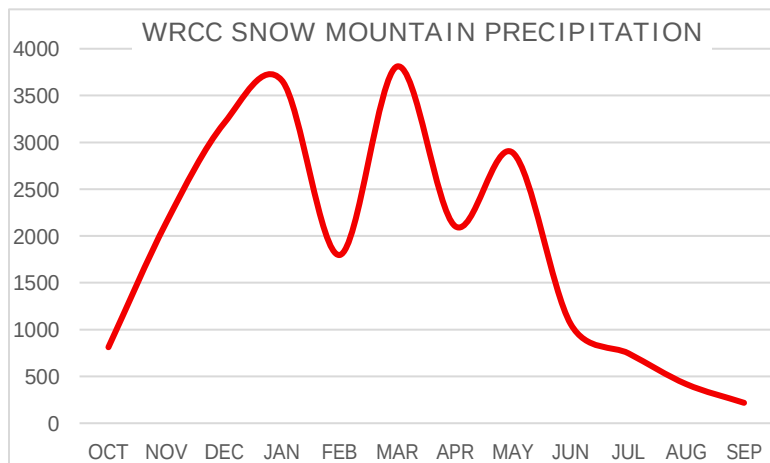


WRCC SNOW MOUNTAIN 1995-2024 total annual precipitation from the daily record. 3-7 MAY 2019 is missing and is estimated by inserting 5-9 May 2017 with similar numbers.

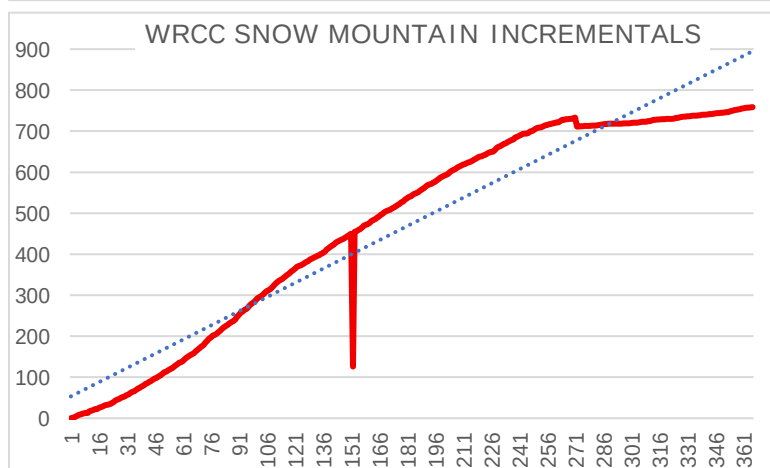
Mean annual precipitation is 1,156.25 inches. Mean annual daily is 1,157.52 inches. Maximum annuals are 1999 (2,209.9 inches) followed by 2006 (1,974.1 inches) then by 2023 (1,917.7 inches). Minimum annuals are 2014 (507.2 inches) followed by 2015 (535.9 inches) then by 2001 (633.6 inches). Ratios between maximum and minimum annuals,

2,209.9 and 507.2 inches, are 4.36 to 1 or 0.23 to 1.

Linear trend line begins at 1,334.6 inches and ends at 998.8 inches, a -25.16% decrease. SNOTEL SNOW MOUNTAIN SWE decrease is -18.98%. This may indicate rain precipitation is decreasing more and faster than snow there.



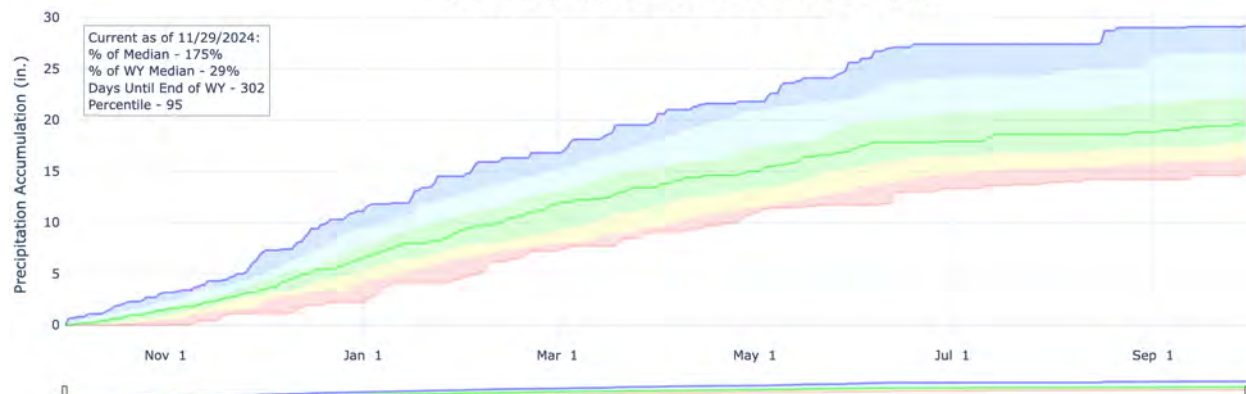
WRCC SNOW MOUNTAIN monthly totals during the period in millimeters. There are seven leap days in the 30 years adding another partial day to February totals. Maximum daily precipitation occurs on 14 FEB 2017 with 9.5 inches.



WRCC SNOW MOUNTAIN mean daily incremental accumulations during the 30 year period of record. Day 152 is 29 FEB on leap years. Day 170 is 28 JUN when accumulations reset from 731.1 inches to 711.0 inches, a 2.25% decrease, then increases to 758.5 inches by the water year end on 31 SEP, a +47.5 inch (+6.08%) increase from 28 JUN to SEP 31. Error appears to be the station rain gauge. It has been serviced but not replaced.

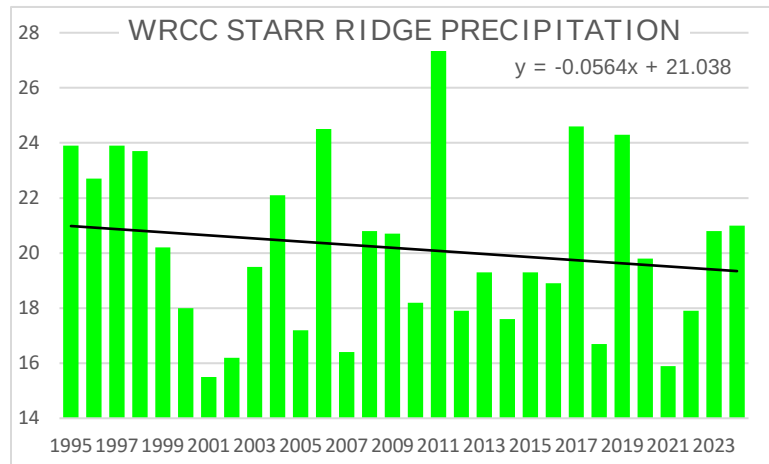
This minor error is unique among the three SNOTEL stations. From JUN 28 to SEP 31, Starr Ridge increases by +45.8 inches (+8.92%) and Rock Springs by +39.6 inches (+7.96%). SNOW MOUNTAIN annual precipitation accumulations above 711 inches are suppressed by at a minimum 25 inches (2.0% - 2.5%).

STARR RIDGE PRECIPITATION



WRCC STARR RIDGE maximum precipitation accumulation of 29.3" ends 1981-2 water year. Minimum precipitation of 14.7" ends 1993-4 water year. Median during Period of Record is 19.6". Mean SWE peak day is 6 MAR (7.3"). 6 MAR maximum precipitation accumulation is 18.1", minimum is 7.7" and mean is 12.1". Additional precipitation as non-SWE rain above mean maximum is 11.2", minimum is 7.0" and

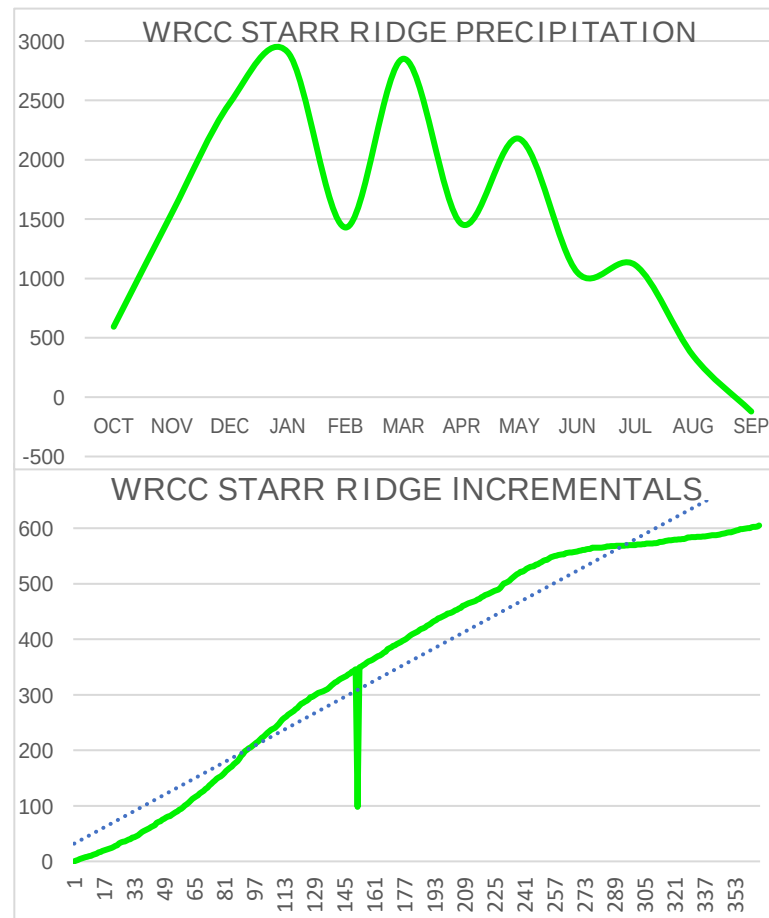
mean is 7.5" as rain. Total maximum precipitation accumulation as non-SWE rain is 61.73%, minimum is 52.38% and mean is 61.73%. More than 60% of total Starr Ridge precipitation is rain.



WRCC STARR RIDGE 1995-2024 mean annual precipitation is 20.16 inches. Maximum annual means are 2011 (27.4 inches) followed by 2017 (24.6 inches) then by 2006 (24.5 inches). Minimum annual means are 2001 (15.5 inches) followed by 2021 (15.9) then by 2002 (16.2 inches). Ratios between minimum and maximum annual means, 27.4 and 15.5 inches, are 1.77 to 1 or 0.57 to 1.

Linear trend line begins at 21.04 inches and ends at 19.34 inches, a -8.08% decrease. SNOTEL precipitation decrease is -12.27% to -12.38%.

This may indicate snow precipitation is decreasing more than rain.

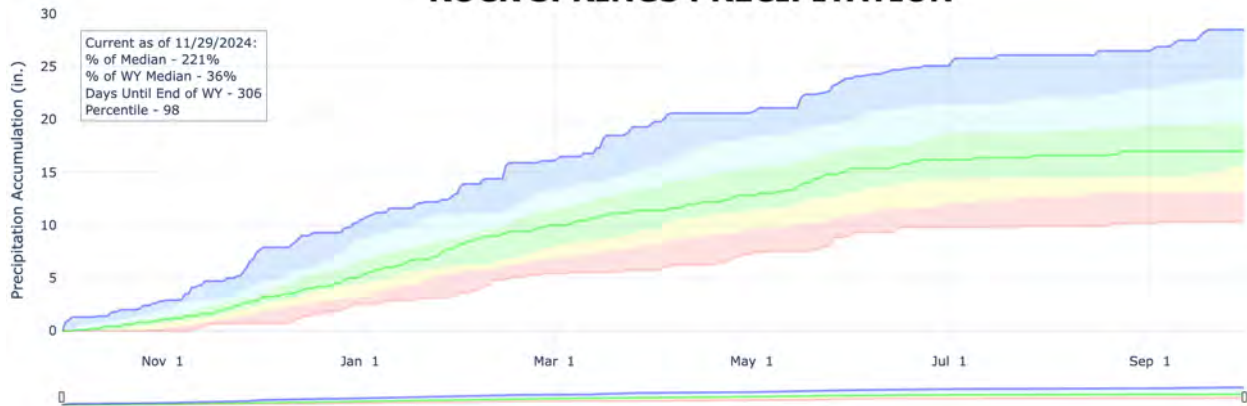


WRCC STARR RIDGE monthly totals during the period in millimeters. There are seven leap years of 30 adding another partial day to February totals.

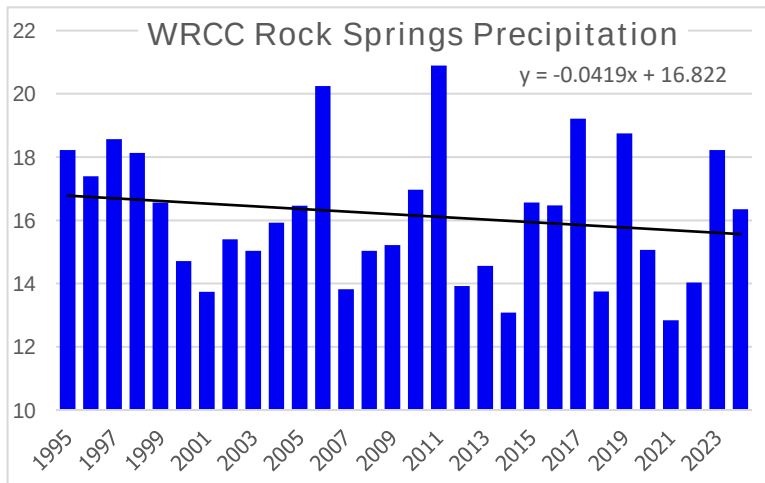
Maximum daily precipitation occurs on 16 MAY 2011 with 1.2 inches. 30 year AUG to SEP totals decline -121.3 inches. How cannot be found in the daily record unless through evaporation.

In comparison to the SNOW MOUNTAIN accumulation error, STARR RIDGE 28 JUN has 559.1 inches and ends the water year at 604.9 inches, a +45.8 inch increase (+8.19%).

ROCK SPRINGS PRECIPITATION



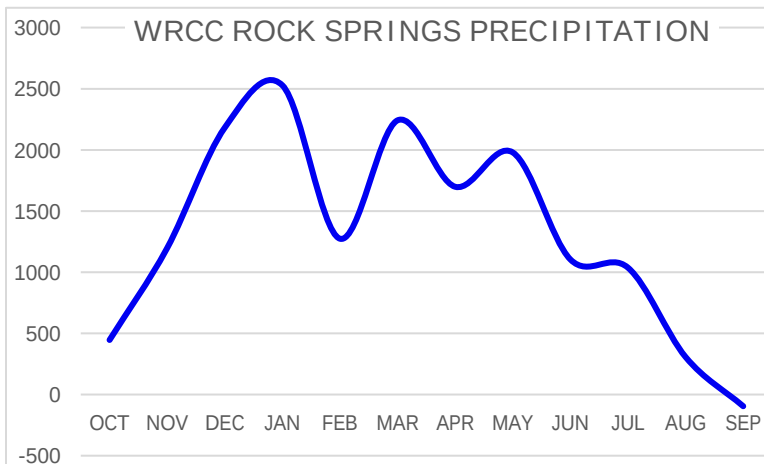
WRCC ROCK SPRINGS maximum precipitation accumulation of 28.5" ends 1981-2 water year. Minimum precipitation of 10.3" ends 1993-4 water year. Median during Period of Record is 17.2". Mean SWE peak day is on 5 MAR (7.3"). 5 MAR maximum precipitation is 16.5", minimum is 5.4" and mean is 10.0". Additional precipitation as non-SWE rain above mean maximum is 12.0", minimum is 4.9" and mean is 7.2" as rain. Total maximum precipitation accumulation as non-SWE rain is 57.89%, minimum is 52.43% and mean is 58.14%. Less than 60% of total Rock Springs precipitation is rain.



WRCC ROCK SPRINGS 1995-2024 mean annual precipitation is 16.17 inches. Maximum annual means are 2011 (20.9 inches) followed by 2006 (20.2 inches) then by 2017 (19.2 inches). Minimum annual means are 2021 (12.8 inches) followed by 2013 (13.1 inches) then by 2001 (13.7 inches). Ratios between minimum and maximum annual means, 20.9 and 12.8 inches, are 1.63 to 1 or 0.61 to 1.

Linear trend line begins at 16.82 inches and ends at 15.56 inches, a -7.49% decrease. SNOTEL precipitation decrease is -12.58%. This may indicate snow precipitation is

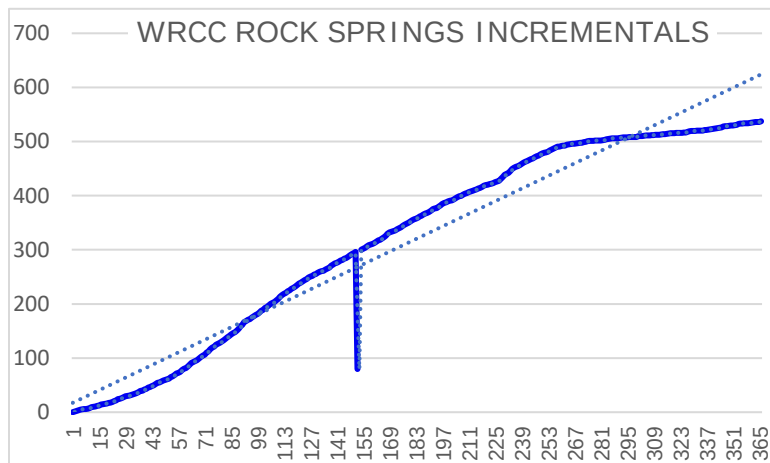
decreasing more than rain there.



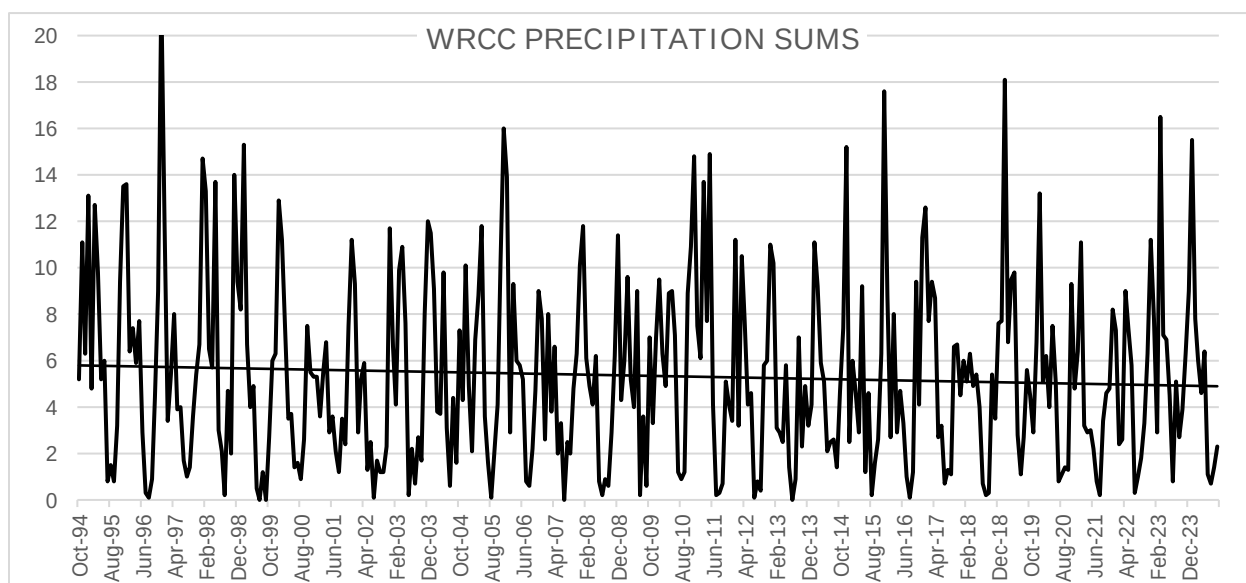
WRCC ROCK SPRINGS monthly totals during the period. There are seven leap years of 30 adding another partial day to February totals.

Maximum daily precipitation occurs on 16 MAY 2011 with 1.5 inches. On the same day, STARR RIDGE records 1.2 inches

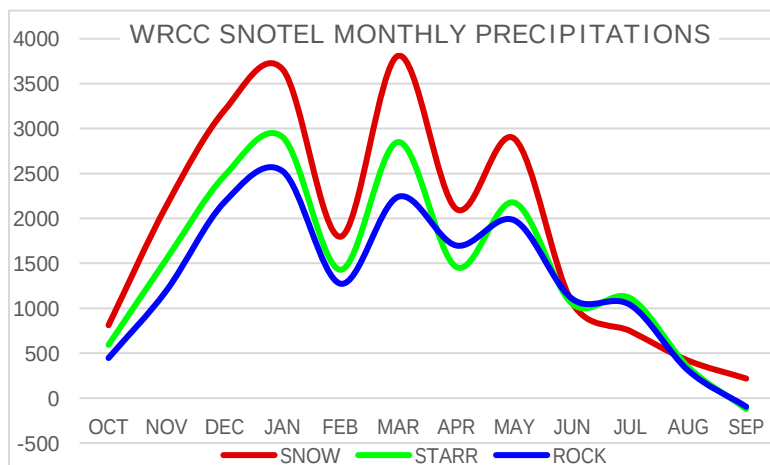
30 year AUG to SEP totals decline -95.6 inches. How cannot be found in the daily record unless through evaporation. STARR RIDGE decreases by -121.3 inches. SNOW MOUNTAIN does not.



In comparison to SNOW MOUNTAIN accumulation error, ROCK SPRINGS 28 JUN has 497.8 inches and ends the water year at 537.4 inches, a +39.6 inch increase (+7.96%). Graph line is more similar to higher elevation Snow Mountain with a 47.5 inch increase (+6.08%).

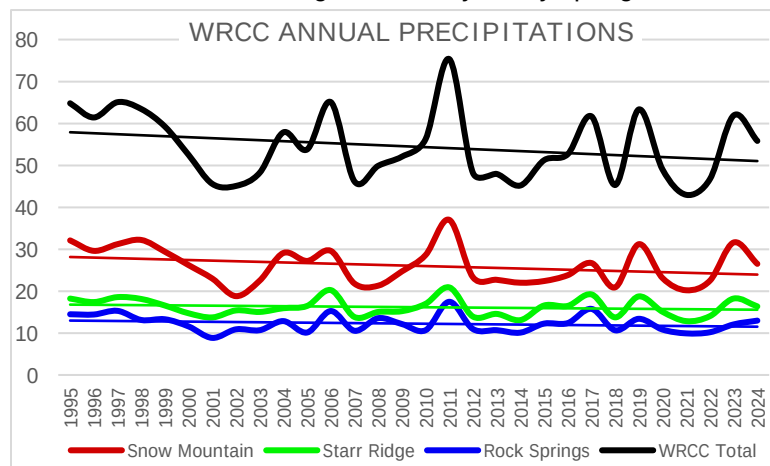


DEC 1996 21.6 inches is not shown in full. WRCC SNOTEL three station precipitation sum monthly mean is 5.345 inches or 64.14 inches a year. Maximum monthly precipitations are DEC 1996 (21.8 inches) followed by FEB 2019 (18.1 inches) then by DEC 2015 (17.6 inches). Eight of 360 months have 0.1 inch or less.



Linear trend line begins at 5.79 inches and ends at 4.90 inches, a -15.37% decrease or -0.30 inch a year over the past 30 years. SNOTEL three station sum has a linear -15.84% decrease or -0.31 inch a year. Both records conform and indicate snow precipitation is decreasing more than rain. WRCC upper Harney Basin monthly precipitations, in millimeters, do not have the nominal "bell curve" characteristics of coastal ranges. They tend to oscillate.

MAR-MAY rain on snow events impact Snow Mountain more. Its more rapid snow run-offs determine the extent but not the length of Harney Valley spring freshets.

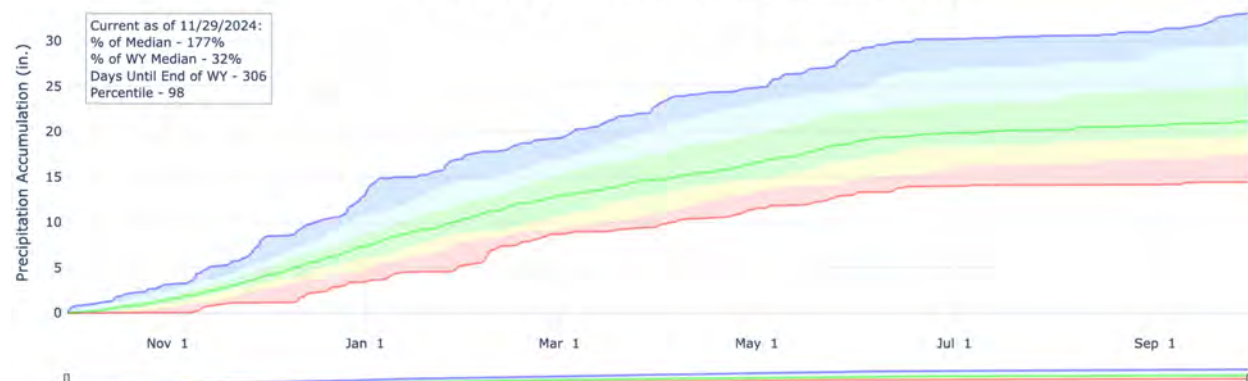


WRCC SNOW MOUNTAIN 1995-2024 total annual mean precipitation is 54.46 inches. Maximum mean annuals occur in 2011 (75.34 inches), with the second highest measured River flows since 1924, followed by 2006 (65.09 inches), the fourth highest flows, then by 1997 (65.07 inches). Minimum mean annuals occur in 2000-2002 (45.33 inches) and 2021-2022 (44.84 inches), the two most intense droughts since 1924. Ratios between maximum and minimum mean annual precipitations, 75.34 and 42.97 inches, is 1.75 to 1 or 0.57 to 1.

WRCC SNOTEL annual linear trend line begins at 57.59 inches and ends at 51.02 inches, a -11.41% decrease.

During the Period, the median difference between extreme precipitation and extreme drought is a 57.01% in annual precipitation above or below the 30 year annual mean measured among the three SNOTEL stations.

SILVIES BASIN PRECIPITATION

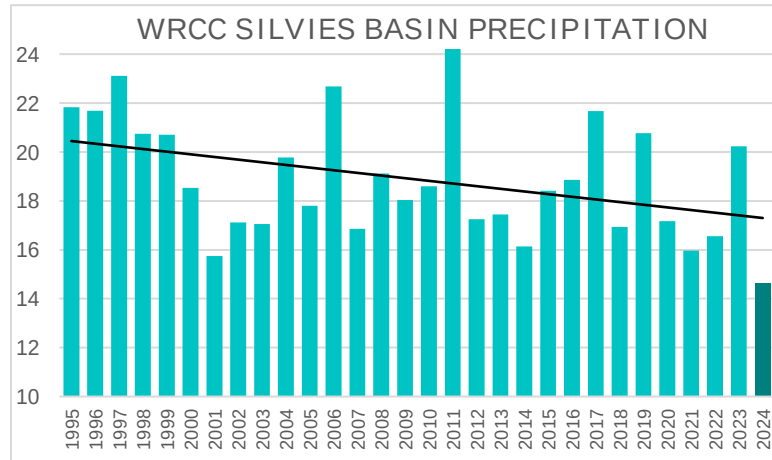


USDA National Resource Conservation Service [NRCS] Western Regional Center, Reno – Nevada, also provides composite estimates for all seven sub-basins within the Harney Basin area. They are more accurate than the Oregon Water Resources Department [OWRD] estimates as they rely more on the Sierra Nevada – Great Basin experiences and records than on the Oregon coastal and Cascade ranges. WRCC SILVIES BASIN record is the most complete as it is cumulative of the three identified SNOTEL stations and the unidentified NWS BURNS WSO AP station. SILVIES BASIN is also unspecified but may include the Bear and Silvies sub-Basins.

WRCC SILVIES BASIN maximum annual precipitation accumulation of 33.1" ends the 1982-3 water year. Minimum precipitation of 14.4" ends 1993 water year. Median during the Period of Record is 21.1 inches. Maximum month is DEC 1996 (Mean SWE peak day is 9 MAR (9.4")). Maximum annual precipitation during the latest 30 year period is 30.6" (2011), minimum is 16.6 inches (2021). Ratios between maximum and minimum are 1.84 to 1 or 0.54 to 1.

Additional precipitation as non-SWE rain above mean maximum is 12.8", minimum is 5.5" and mean is 7.8" as rain. Total maximum precipitation accumulation as non-SWE rain is 61.33%, minimum is 61.81% and mean is 63.03%. More than 60% of total Northern Harney Basin precipitation is rain.

WRCC measures the median difference between extreme precipitation and drought as $\pm 54.25\%$ of its 30 year annual mean.

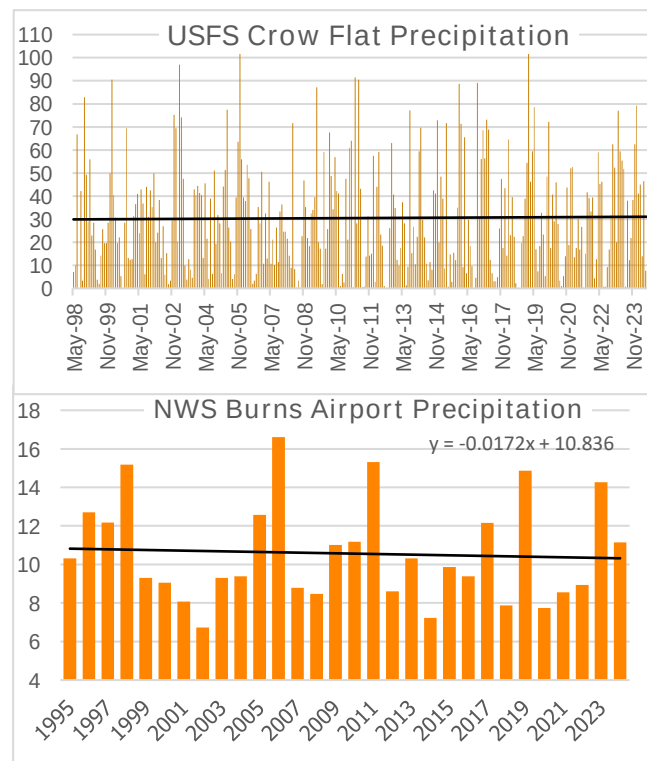


WRCC 1995-2024 estimate of the SILVIES BASIN annual precipitations. Mean annual precipitation is 18.87 inches. Maximum annual means are 2011 (24.72 inches) followed by 1997 (23.11 inches) then by 2006 (22.68 inches). Minimum annual means are 2001 (15.74 inches) followed by 2014 (16.14 inches) then by 2021 (15.97 inches). Ratios between maximum and minimum, 24.72 and 15.74 inches, are a relative lower 1.57 to 1 or 0.64 to 1.

Linear trend line begins at 20.45 inches and ends at 16.72 inches, a

relative high -18.23% decrease.⁴

CAUTION: WRCC 2023-24 water year estimate of 14.66 inches is low by near -4.12 inches. 18.78 inches is more accurate. Previous 2022-23 and suspect 2023-24 accumulated sums would differ by a more accurate -7.17%. Also. WRCC three SNOTEL station sum is 54.57 inches while the 2022-23 sum is 61.89 inches, an -11.34% year to year difference. During this year, SNOTEL SNOW MOUNTAIN decreases -16.14%, STARR RIDGE increases +0.98%, ROCK SPRINGS decreases -10.50% and BURNS WSO AP records a -10.45% decrease. The corrected WRCC SILVIES BASIN linear trend is -14.89%



For comparison, USDA USFS Remote Automatic Weather Station [RAWS] at CROW FLAT, located in the South Silvies sector extreme upper western half quadrangle east of US 395 at the T-section for USFS Road 3935 - King Mountain Road (see PRISM map at the beginning of this chapter first page) is at 1,115.1 meters (USDA 5,102 or NRCS 5,130 feet) elevation. 30 water year monthly linear trend line begins at 29.93 mm (1.18 inch or 14.16 annual inches) and ends at 31.08 mm (1.22 inch or 14.64 annual inches), a +3.84% increase.

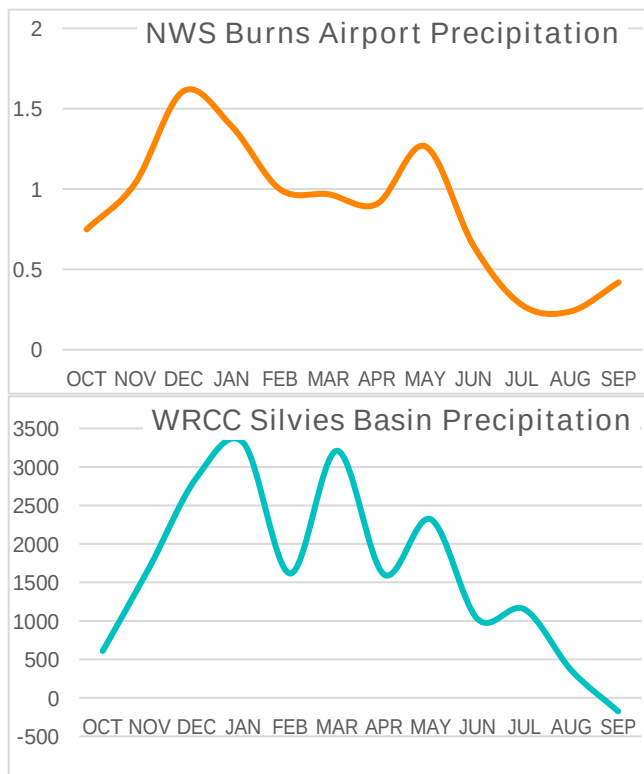
SNOTEL ROCK SPRINGS station is 10.4 miles northeast of RAWS CROW FLAT and is 160-188 feet higher in elevation. SNOTEL estimates ROCK SPRINGS precipitation from 2022-23 and 2023-24 decreases -12.23%.

BURNS WSO AP (KBNO) at 1,261.8 meters (4,140 feet) elevation. Monthly record is missing JAN, MAY-AUG 1995 and APR 1996 which are estimated by inserting adjacent month or year means.

4. "WARNING - The data you have obtained from this automatic Natural Resources Conservation Service database are subject to revision regardless of indicated Quality Assurance level. Data is released on condition that neither the NRCS nor the United States Government may be held liable for any damages resulting from its use.

30 year mean annual precipitation is 10.57 inches, mean annual monthly is 10.45 inches and mean annual daily precipitation is 10.63 inches. Maximum annual means are 2005-06 (16.61 inches) followed by 2011-12 (15.32 inches) then by 1997-98 (15.18 inches). Minimum annual means are 2001-02 (6.72 inches) followed by 2013-14 (7.22 inches) then by 2020-21 (7.74 inches). Ratios between highest and lowest annual precipitations, 16.61 and 6.72 inches, are a very high 2.47 to 1 or 0.40 to 1.

Linear trend line begins at 10.84 inches and ends at 10.33 inches, a -4.70% decrease. NWS BURNS KBNO precipitation trends differ from SNOTEL and WRCC trends by a significant amount. The lower Harney Basin is a different micro-climate.



NWS BURNS KBNO 1998-2024 monthly precipitations do not have the middle MAR peak as SNOTEL stations do. Lower Harney Basin IS a different micro-climate.⁵

WRCC SILVIES BASIN 1995-2024 monthly precipitations in millimeters from NRCS SNOTEL data. SNOW MOUNTAIN peaks in MAR, STARR RIDGE and ROCK SPRINGS peak earlier in DEC-JAN. Maximum daily precipitations occur on 9 APR 2010 with an 0.85 inch mean. 30 year AUG to SEP totals decline -174.51 inches. How cannot be found in the daily record unless through evaporation. STARR RIDGE decreases by -121.3 inches and ROCK SPRINGS by -95.6. SNOW MOUNTAIN does not.

This estimate is close to an accurate summation of upper Harney Basin monthly precipitations.

For the three SNOTEL stations during the 30 year period, WRCC records 173,510.6 inches total as rain/snow precipitation, an annual mean of 5,783.69 foot/inches or a 481.97 acre/feet mean for the three station locations. SNOTEL records 81,937.35 SWE inches, an annual mean of 2,731.25 foot/inches or a 227.60 acre/feet mean as SWE or 47.22% of total period precipitations as rain. 42.22% of total precipitation at elevations above 5,200 feet is SWE snow. Recall SNOTEL reports more than 60% of total precipitation as rain. The 55/25/20 SWE ratio among the three stations is becoming a 40/30/30 total precipitation ratio.

5. Harney County has 13 WRCC RAWs stations. Eight are in and around the Harney Basin (BURNS WSO AP is a co-operative member). All but Owens Hay are in service since 2000. Excluding Owens Hay, 11 RAWs stations record flat or slight increasing trends in precipitation. CROW FLAT south of the Silvies Valley has the highest increase. Basque Hills and Fish Fin Rim have the lowest slight decreases. Both are outside the Basin west and south of Catlow Valley. Both record absolute annual minimums in 2021 and 2020 respective. Five others have theirs in 2001-2002, four in 2008. Nine record absolute annual maximums in both 2005 and 2023.

From the numbers:

NOAA SNOTEL and USDA WRCC newest nominal 30 water year (OCT to SEP) period of record:

SNOTEL	Elevation	Period of Record	Mean Annual Total Precipitation	Percent of 64.6" Total	Percent of 21.53" Mean	Max Month	Max Month Amounts	Percent of Max Months
Snow Mountain	6,230	1995-24	26.28	40.68%	122.06%	Dec-96	8.1	37.16%
Starr Ridge	5,250	1995-24	20.28	31.39%	94.19%	Dec-96	6.9	31.65%
Rock Springs	5,290	1995-24	18.04	27.93%	83.79%	Dec-96	6.8	31.19%
Sums and Means	5,590	1995-24	64.60	100.00%	300.04%	Dec-96	21.8	100.00%
Seneca Co-op	4,692	1995-24	13.04	20.19%	60.57%	Dec-96	4.5	20.64%
Silvies Basin	-		21.1	32.66%	98.02%	Dec-96	8.88	40.73%

Minimum months cannot be calculated or estimated with accuracy due to the many months with 0.1 inch or less precipitation.

SNOTEL	Max Year	Max Year Amount	Percent of Max Total	Min. Year	Min Year Amount	Percent of Min Total	Max/Min Ratio	SNOTEL TREND
Snow Mountain	2010-11	37.0	43.38%	2001-02	18.8	39.92%	1.97	-18.98%
Starr Ridge	2010-11	27.4	32.12%	2000-01	15.5	32.91%	1.77	-12.23%
Rock Springs	2010-11	20.9	24.50%	2020-21	12.8	27.18%	1.63	-12.58%
Sums and Means	2010-11	85.3	100.00%	2000-01	47.1	100.01%	1.75	-15.84%
Seneca Co-op	1995	19.18	22.49%	2000*	7.89	16.75%	2.45*	-14.23%
Silvies Basin	2010-11	30.6	35.87%	2000-01	16.6	35.24%	1.57	-18.23%

USDA WRCC newest nominal 30 water year (OCT to SEP) period of record:

WRCC	Elevation	Period of Record	Annual Mean	Percent of Annual Mean	Percent of 16.17" Mean	Max Month	Max Month Amount	Percent of 7.27" Mean
Snow Mountain ^C	6,230	1995-24	25.94 ¹	41.67%	124.95%	Dec-96	8.1	111.42%
Starr Ridge	5,250	1995-24	20.16	32.38%	97.11%	Dec-96	6.9	94.91%
Rock Springs	5,290	1995-24	16.17	25.97%	77.89%	Dec-96	6.8	93.54%
Sums and Means	5,590	1995-24	62.27	100.02%	299.95%	Dec-96	21.8	299.87%
Silvies Basin	-	1995-24	18.87	30.30%	90.90%	Dec-96	7.2	99.03%

C. SNOW MOUNTAIN record is missing JUN 27 to DEC 31 2013. Amounts are estimated by inserting the means of adjacent years thereby making the 2013-2014 water year available for analysis. However, calendar year 2013 is not considered in the annual precipitation mean.

SNOW MOUNTAIN 2023-2024 precipitation record is suspect. Between 2022-23 and 2023-24, SNOW MOUNTAIN annual precipitation decreases -16.14% while STARR RIDGE increases +0.98%. ROCK SPRINGS decreases -10.50% and BURNS WSO AP records a -10.45% decrease. Omitting suspect water year 2024, annual mean is 24.69 inches and the linear trend line begins at 25.99 inches and ends at 23.48 inches, an -11.02% decrease.

WRCC	Max Year	Max Year Amount	Percent of 28.4" Mean	Min Year Amount	Percent of 15.7" Mean	Max/Min Sum Ratio	Max Year/Day	Max Year/Day Amount
Snow Mountain	2010-11	37.0	130.28%	18.8	119.75%	1.97	14-Feb-17	9.5 SWE
Starr Ridge	2010-11	27.4	96.48%	15.5	98.77%	1.77	16-May-11	1.2 Rain
Rock Springs	2010-11	20.9	73.59%	12.8	81.53%	1.63	16-May-11	1.5 Rain
Sums and Means	2010-11	75.34	300.35%	45.33	300.05%	1.75	-	-
Silvies Basin	2010-11	24.72	87.04%	15.74	100.25%	1.57	9-Mar-17	3.4 SWE

WRCC	Elevation	Period of Record	Annual Mean	Percent of Annual Sum	Percent of 20.5" Mean	Max Year	Max Year Amount	Percent of Max Year
Snow Mountain	6,230	1979-24	24.7	40.16%	120.49%	1982-83	41.2	41.62%
Starr Ridge	5,250	1981-24	19.6	31.90%	95.61%	1981-82	29.3	29.60%
Rock Springs	5,290	1981-24	17.2	27.97%	83.90%	1981-82	28.5	28.79%
Sums and Means	5,590	1981-24	61.5	100.03%	300.00%	1981-82	99.0	100.01%
Silvies Basin	-	1981-24	21.1	34.31%	102.93%	1982-83	33.1	33.43%

WRCC	Min Year	Min Year Amount	Percent of Min Year	Min/Max Ratio	Max Month	Max Month Amount	Percent of Max Month	Mean Percent as Rain	WRCC TREND
Snow Mountain	1991-92	18.3	42.26%	2.25	Dec-96	8.1	37.16%	29.51%	-14.48%
Starr Ridge	1993-94	14.7	33.95%	1.99	Dec-96	6.9	31.65%	61.73%	-8.08%
Rock Springs	1993-94	10.3	23.79%	1.45	Dec-96	6.8	31.19%	58.14%	-7.49%
Sums and Means	1991-93	43.3	100.00%	1.88	Dec-96	21.8	100.00%	49.79%	-11.41%
Silvies Basin ^D	1992-93	14.4	33.26%	2.30	Dec-96	7.2	33.02%	63.03%	-18.23%

D. WRCC SILVIES BASIN trend, excluding its incomplete SNOW MOUNTAIN annual means, is -9.67%. With the corrected SNOW MOUNTAIN record, SILVIES BASIN trend is a more accurate -14.89%. Differential mean is also a more accurate -12.28%.

Ratios between SNOTEL snow precipitation as snow/water equivalent inches and rain as inches to determine percentages and trends cannot be considered. An example, SNOTEL FEB 2019 three station monthly SWE sum is 1,037.1 inches but precipitation sum is 18.1 inches. The very high 57.3 SWE inches to one-inch precipitation conversion rate makes SNOTEL SWEs appear to be accumulated snow fall, not snow pack. There are no perennial snow packs in the Northern Harney Basin. WRCC data does separate rain precipitation from snow as additional non-SWE precipitation above SWE mean. It must be calculated.

	Annual Rain (inches)			Rain Accumulation vs. SWE			TREND
Snow Mountain	10.9	7.8	5.4	31.58%	29.51%	26.49%	-25.16%
Starr Ridge	18.1	12.1	7.7	71.77%	61.73%	52.38%	-8.08%
Rock Springs	12.0	7.2	4.9	58.14%	57.89%	52.43%	-7.49%
Sums and Means	41.0	24.7	20.4	53.83%	49.71%	43.77%	-11.41%
Silvies Basin	12.8	7.8	5.5	63.03%	61.33%	61.81%	-18.43%

NRCS SNOTEL 1995-2024 trends are -18.98% for SNOW MOUNTAIN, -12.23% for STARR RIDGE and -12.58% for ROCK SPRINGS. SILVIES BASIN trend is -18.23%.

USDA WRCC 1995-2024 trends are -14.48% for SNOW MOUNTAIN, -8.08% for STARR RIDGE and -7.49% for ROCK SPRINGS. SILVIES BASIN trend is a corrected -14.89% while corrected daily mean is -12.82%. WRCC SILVIES BASIN record is the most complete as it is cumulative of the three identified SNOTEL stations and the unidentified NWS BURNS WSO AP station.

Recall SNOTEL SWE annual sums decrease -35.41% while condensed months with snow only SWEs decrease -13.99%. WRCC does not publish SWE alone data.

ROCK SPRINGS has the smallest negative delta or rate of change among all.

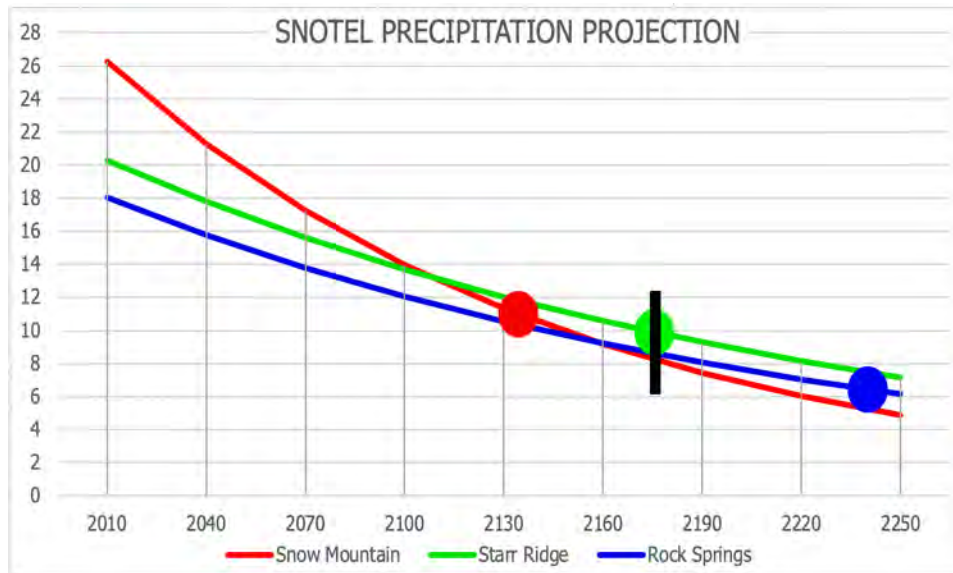
Precipitations across the north Harney Basin decade to decade or year to year are not universal. Weather direction and elevation can produce large variations on where and by how much there is in one sub-Basin and not another.

Past nominal 30 year period extreme high precipitations and flood events occurs in 1995-1996 and 2010-2011 water years. Extreme low precipitations and droughts occur during the 2000-2002 and 2021-2023 water years. SNOTEL measures the mean difference between extreme precipitation and extreme drought as 57.01% above and below the 30 year annual mean. WRCC measures the extreme high and low mean as 54.25%.

Silvies Basin precipitation projections can be estimated with the available data. Despite records having missing days, weeks and months, these NRCS SNOTEL and USDA WRCC estimates are acceptable.

Available SNOTEL and WRCC precipitation estimates have significant differences from the actual numbers. NRCS SNOTEL estimates large SWE decreases during the period. There are larger differences between NOAA / USDA estimates and NWS / WRCC RAWs numbers.

Three precipitation projections are produced. Recall the 1994-2024 period contains two severe droughts, 2000-2003 and 2020-2022. Most severe drought in the past century is 1928 to 1933 and by extension to 1935.

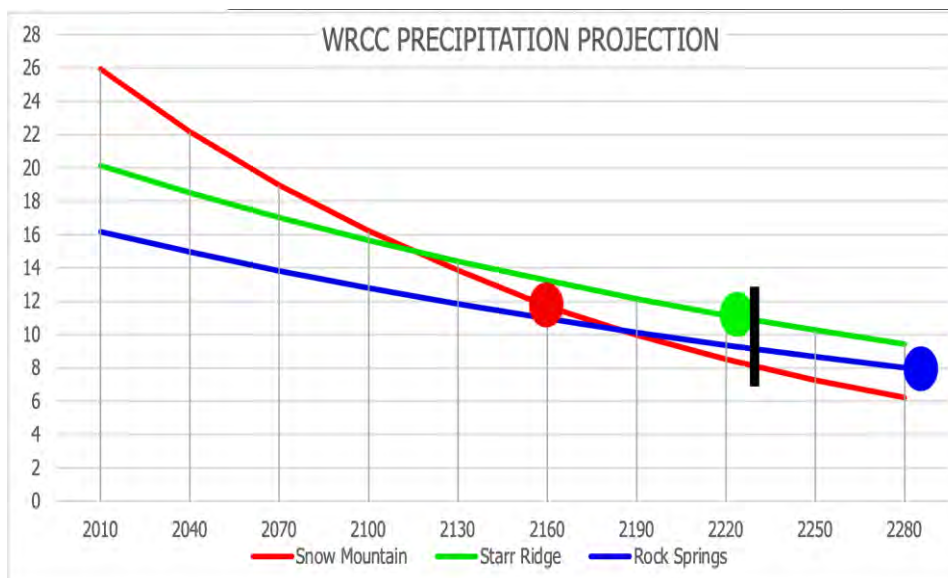


240 year projections of precipitation, rain and snow, from the three SNOTEL station latest 30 year linear trends. SNOW MOUNTAIN decreases -18.98%, STARR RIDGE by -12.23% and ROCK SPRINGS by -12.58%.

SNOW MOUNTAIN 30 year precipitation mean of 26.28 inches, STARR RIDGE 20.28 mean and ROCK SPRINGS 18.04 inches are the Y axis base. 2008-09 is the mean

water year and 2010 is selected as the X axis base for convenience.

SNOTEL past 30 year 57.01% mean between extreme flood and drought years is within the life experiences of most local residents. SNOW MOUNTAIN will have 57% less precipitation (11.30 inches) than it does now by 2135, STARR RIDGE (11.87 inches) by 2175 and ROCK SPRINGS (9.36 inches) by 2240. Sum of all three SNOTEL stations will reach 57% less precipitation (26.89 inches from 64.60 inches) by 2175.



270 year projections of precipitation, rain and snow, from WRCC estimates using the three SNOTEL and the NWS Burns Municipal Airport stations latest 30 year linear trends.

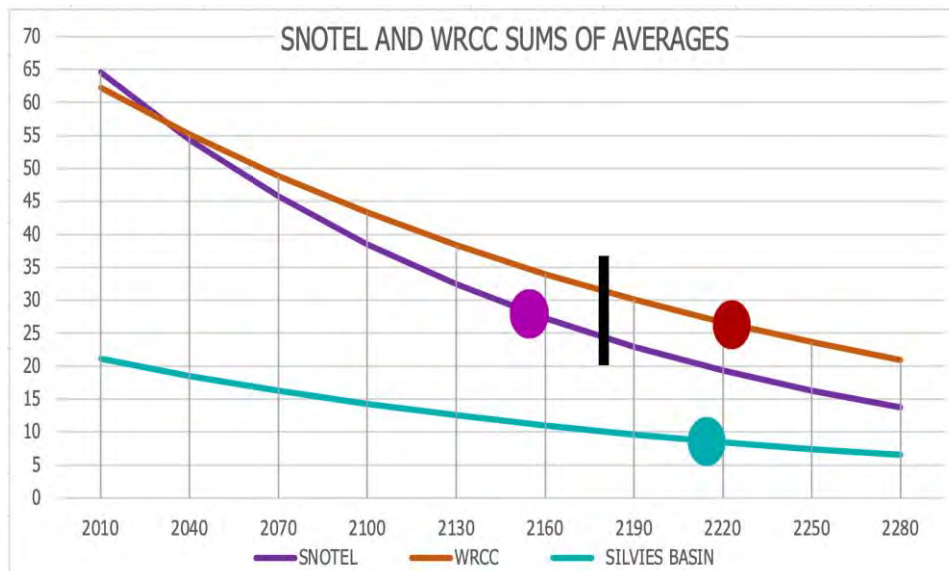
SNOW MOUNTAIN decreased -14.48%, STARR RIDGE by -8.08% and ROCK SPRINGS by -7.49%.

SNOW MOUNTAIN 30 year precipitation mean of 25.94 inches, STARR RIDGE 20.16

inch mean and ROCK SPRINGS 16.17 inches are the Y axis base. 2008-09 is the mean water year and 2010 is selected as the X axis base for convenience. WRCC measures the extreme high and low mean as 54.25%.

SNOW MOUNTAIN will have 54.3% less precipitation (11.87 inches) than it does now by 2160, STARR RIDGE (9.22 inches) by 2225 and ROCK SPRINGS (7.40 inches) by 2300. Sum of all three SNOTEL stations will reach 54.3% less precipitation than now by 2230.

270 year projections of precipitation, rain and snow, from SNOTEL and WRCC estimates using their total annual sums for the latest 30 year period. These are the averages of averages.



Mean linear trend for SNOTEL trend per tri-decade is -15.84%, WRCC is -11.41% and the WRCC SILVIES BASIN is -12.28% per tri-decade. SNOTEL annual mean is 64.60 inches WRCC is 62.27 inches and SILVIES BASIN with the most complete record starts at 21.10 inches. Period annual SNOTEL and WRCC sums (126.87 inches) will have 55.6% less precipitation (56.29 inches) than it does

now by 2180 and SILVIES BASIN (21.1 inches to 9.36 inches) by 2210.

Recall SNOTEL reaches past 30 year extreme drought of 2002 by 2175, five years earlier than with the WRCC estimate. Silvies and Bear valleys (SILVIES BASIN) may receive precipitation 30-35 years longer before reaching extreme drought. These more conservative guestimate may be the most accurate. They are the average of the averages.

Determining trends depends on where the ruler is placed. When the nominal 30 year period is moved five years earlier to include the minimal 1990-91 water year, trend lines will have smaller decreases.

PRISM precipitation estimates are lower than SNOTEL / WRCC estimates by near -12%. However, PRISM Silvies Basin sector or area amounts and percentages are the most accurate. Its 1991-2020 period estimates both Bear and Silvies sub-Basins receive 52.80% of total upper Basin precipitation.

If 55% of 1995-2024 mean annual precipitations is an extreme drought, then the Silvies Basin may have serious annual precipitation deficits unable to support life as now known in 155 years, plus or minus five years. Bear Valley in 180 years, plus or minus five. The lower Harney Basin much sooner.

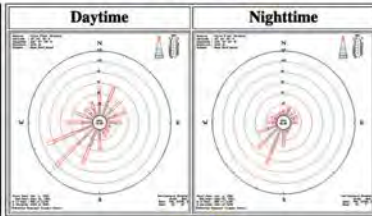
WIND

Crow Flat Oregon

January



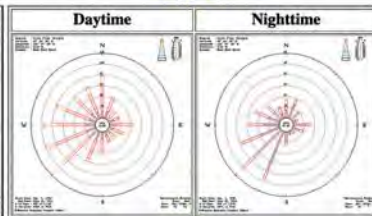
February



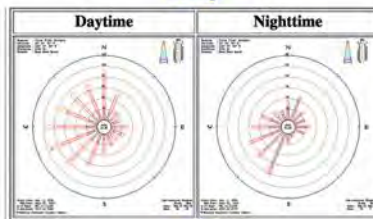
March



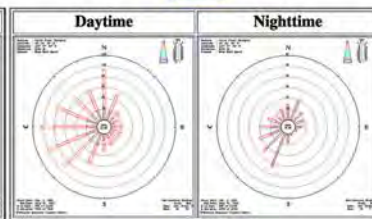
April



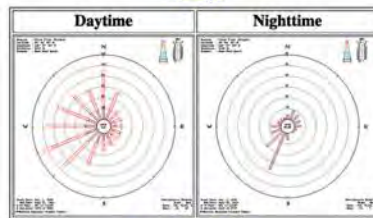
May



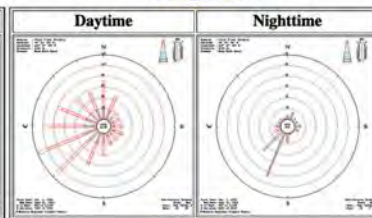
June



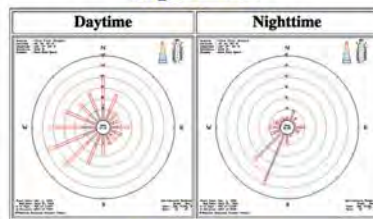
July



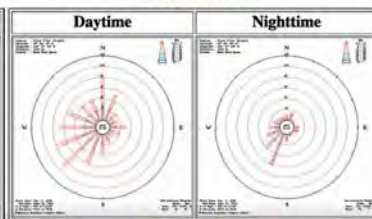
August



September



October



November



December



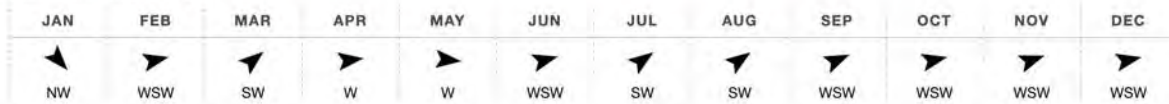
SNOTEL stations do not measure wind. WRCC RAWS / USFS CROW FLAT south of Silvies Valley and NWS BURNS WSO AP at the Burns Municipal Airport do. Although, available data is limited.

CROW FLAT Wind Rose Climatology web page presents sporadic monthly mean winds from 1 JAN 1985 to 31 JUL 2016. Rosettes show the predominate wind directions from their sources. Most come from the south-west and west southwest. MAR-APR has the highest day time wind speeds and DEC-JAN night time speeds are highest.

Monthly wind speed statistics and directions for Burns Municipal Airport



Dominant wind direction

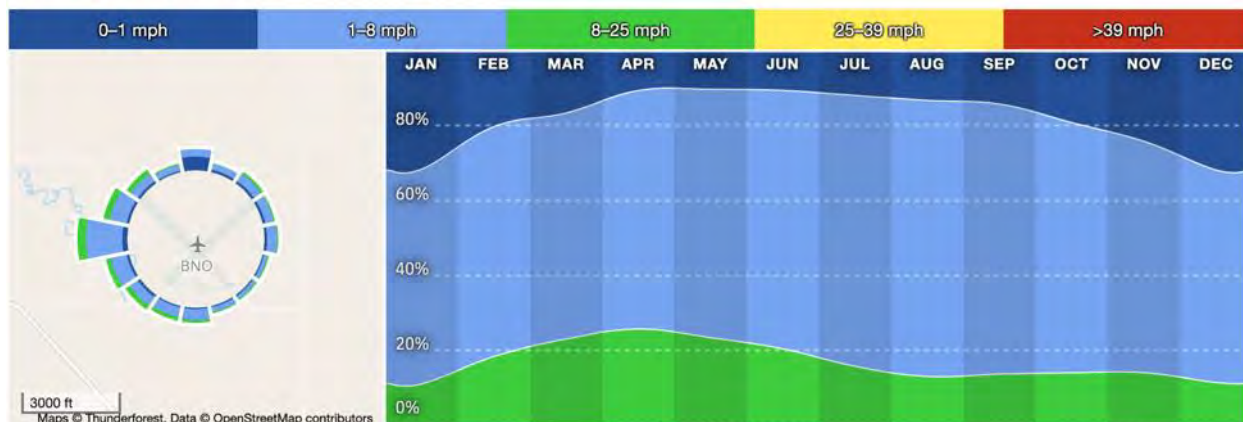


Average wind speeds and gusts (mph)



www.windfinder.com/windstatistics/burns_airport presents predominant monthly winds from "Statistics based on [NWS] observations taken between 08/2011 - 01/2025". Most come from the west or south-west. APR has the highest wind gusts, JAN-FEB the highest wind speeds.

Monthly wind direction and strength distribution



Windfinder.com graph shows APR-MAY with the most windy days.

WRCC reports the prevailing wind directions during the 1992-2022 period within the BURNS WSO AP two square mile quadrangle with the highest percent of frequency:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
E	E	WNW	NW	NW	WNW	WNW	WNW	WNW	WNW	E	E	WNW

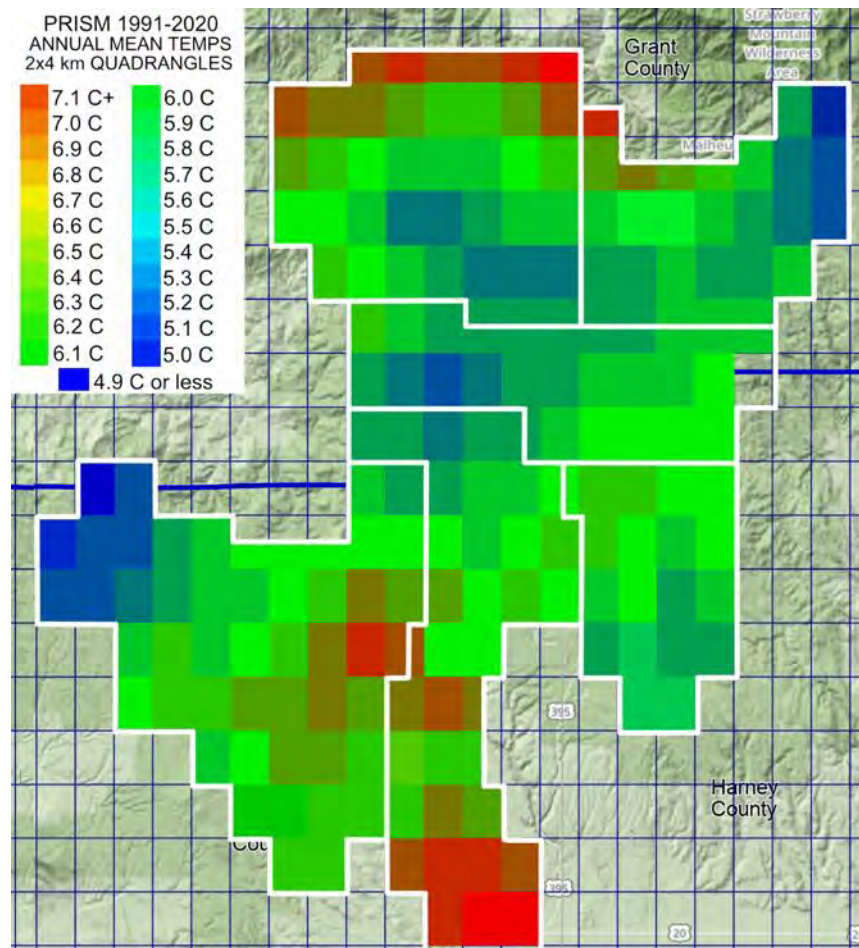
WRCC wind direction during NOV to FEB differs from the windfinder.com presentation of actual NWS numbers. WRCC has access to many more mini "meteo-stations" in and around the Harney Basin for numbers. This is the more accurate estimate for upper Harney Basin wind.

East and southeast winds have the best access into the upper Silvies Basin from the North Malheur River Basin with less elevation differentials into the east Bear Creek Valley. Northern winds from the South Fork John Day River and Canyon Creek blow into the north and west Bear Valley. Upper Silvies Canyon and the Dry Creek drainage area blows into the Silvies Valley from the south. Southern winds from the lower Harney Basin tend to stop or uplift at the Aldrich and Strawberry ridges above Bear Valley.

TEMP

The USDA Risk Management Agency supports PRISM, the Parameter-elevation Regressions on Independent Slopes Model program. The Northwest Alliance for Computational Science and Engineering at Oregon State University manages. Although there are only four government precipitation gauges in the Northern Harney Basin area during the past 30 years, the developing science is the most accurate data set available. Quadrangles with more than half of any of the 16 USGS Hydrologic Unit [HUC] watershed boundaries within the three sub-Basins are included in this survey.

Metric numbers allow for more accuracy. $0^{\circ}\text{C} = 32.00^{\circ}\text{F}$, $10^{\circ}\text{C} = 50.00^{\circ}\text{F}$ and $20^{\circ}\text{C} = 68.00^{\circ}\text{F}$. Data is from <https://prism.oregonstate.edu/explorer>

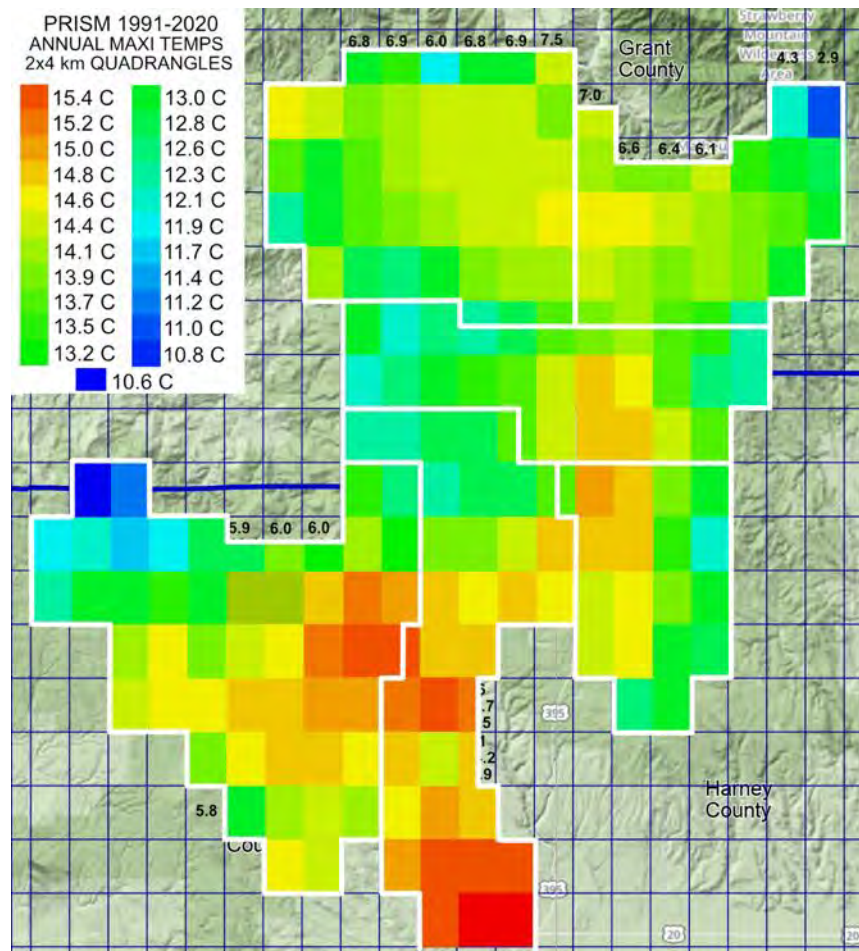


Mean monthly average temperatures in the north Basin range from 4.7°C to 7.2°C (40.5°F to 45.0°F). Lowest mean is the Bear Creek headwaters on Strawberry Mountain with 5.1°C (41.18°F). Highest mean is in the Five Mile Dam quadrangle with 7.2°C (44.96°F). Burns Airport WSO AP has 7.4°C or is $+0.54^{\circ}\text{F}$ higher. Ratios above water freeze between the Bear Creek quadrangle and the Five Mile Dam quadrangle, 5.1°C and 7.2°C , are 0.71 to 1 or 1.41 to 1. Mean temperatures have the lowest ratios than maximum and minimum.

Quadrangles with lowest temperatures are the North Bear Creek on the southwest flank of Strawberry Mountain, the upper Bear Creek, Camp and Myrtle Creek watersheds west of Silvies Valley and Emigrant Creek headwaters on the southeast flank of Snow Mountain.

Quadrangles with high temperatures above Five Mile Dam are from the Dry Creek drainage area west of the Myrtle Creek confluence with the Silvies River and further west to the Yellowjacket Creek drainage area.

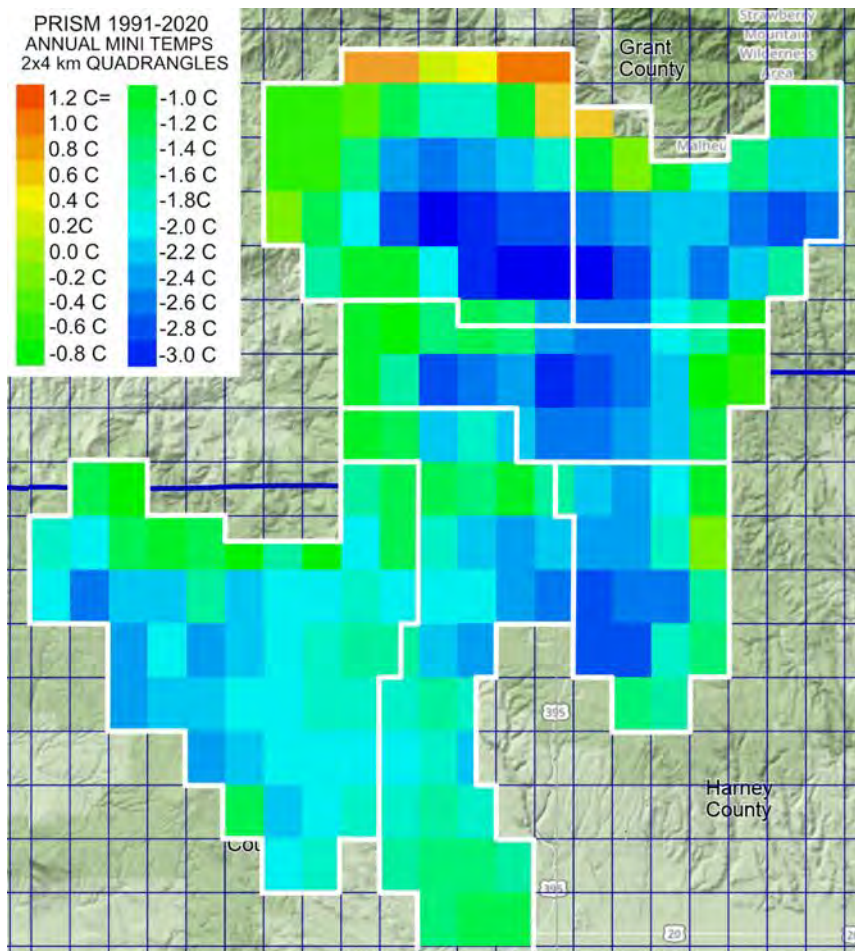
North Bear Valley higher means are from warmer air coming south from Canyon Creek and the lower elevation John Day River Basin.



headwaters near the Myrtle Creek confluence with the Silvie River west to past Yellowjacket Creek.

Silvie Basin maximum mean monthly temperatures range from 10.8°C (51.44°F) in the North Bear Creek watershed to 15.4°C (59.72°F) at Five Mile Dam. Burns Airport WSO AP mean is 15.6°C or 0.26°F higher. Ratios above water freeze between full 4 km quadrangle at the Snow Mountain headwaters and the Five Mile Dam quadrangle, 10.8°C and 15.4°C, are 0.71 to 1 or 1.4 to 1. Maximum monthly temperatures are less volatile than precipitations by half.

Maximum mean monthly temperatures in forested uplands can range on average -2.4°C (-4.7°F) lower than at Five Mile Dam. Quadrangles with low temperatures are Snow Mountain - North Bear Creek, Silvie River - Myrtle Creek headwaters and King Mountain. Quadrangles with high temperatures above Five Mile Dam are from the lower Harney Basin Poison Creek



Minimum mean monthly temperatures has errors such as the quadrangle south of the Upper Silvies Canyon and east of the middle River is +1.1°C higher than adjacent quadrangles.

Lowest temperatures occur in the west and south Bear Valley. Silvies Valley lowest quadrangles are in the Camp Creek drainage yet a co-adjacent quadrangle is an estimated +2.1°C higher. Trout Creek drainages north of King Mountain has low mean monthly temperatures but not the mountain. Five Mile Dam quadrangle is -0.7°C. Burns Airport WSO AP is -0.8°C.

There are no clear indications forested uplands are colder except in the Myrtle Creek drainage area and Emigrant Creek drainages below Snow Mountain which has an -1.7°C (28.94°F) estimate.

Ratios below water freeze between full 2 km by 4 km quadrangle at Seneca and the

Five Mile Dam quadrangle, -2.9°C and -0.7°C, are 4.14 to 1 or 0.24 to 1. Minimum monthly temperatures are more variable in the northern Basin than maximums by three.

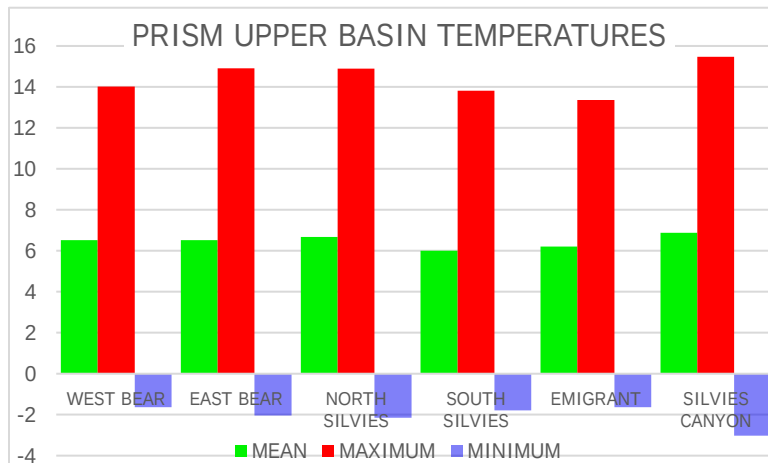
John Day River, South Fork John Day and the North Fork Malheur River basins adjacent to the north Bear sub-Basin have the highest minimum monthly temperatures but PRISM data does not specify for which months. All are at lower elevations.

PRISM uses 2 by 4 kilometer temperature quadrangles with 300 by 300 meter resolutions. Report identifies the upper Basin is enclosed within 183.5 quadrangles or 1,468 square kilometers (566.80 sq. miles). Basin is divided into six sectors. Quadrangle sums for each sector mean, maximum and minimum daily temperatures from 1991-2020 are divided by the quadrant number.

From the numbers which are in Centigrade per quadrant:

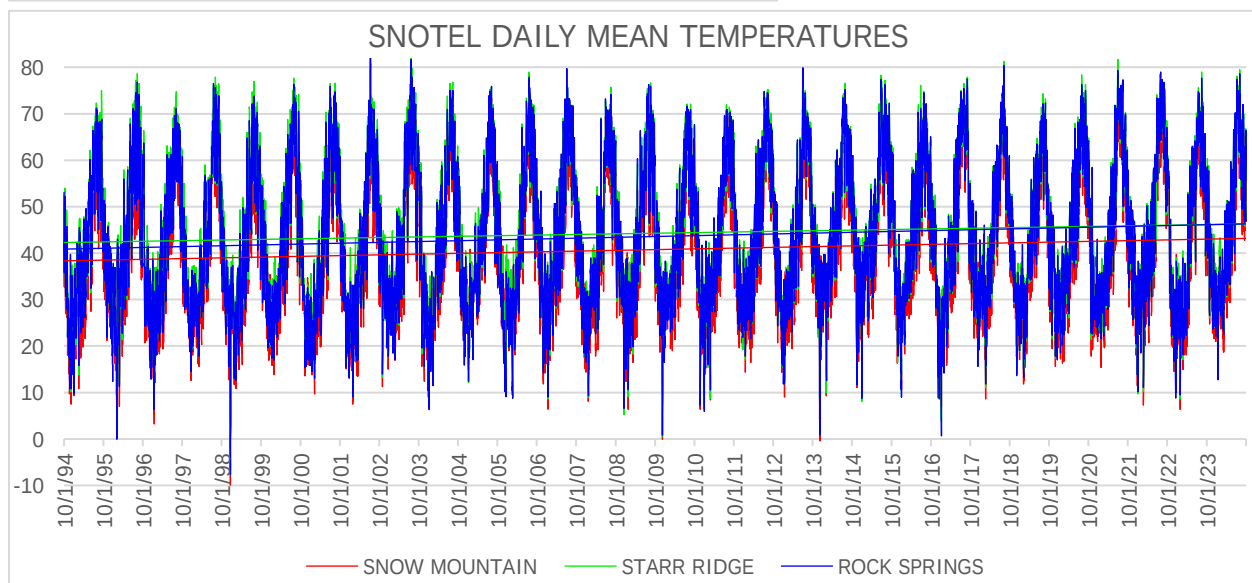
PRISM	WEST BEAR	EAST BEAR	NORTH SILVIES	SOUTH SILVIES	EMIGRANT	SILVIES CANYON
MEAN	6.527	6.527	6.670	6.000	6.202	6.886
MAXIMUM	14.016	14.917	14.898	13.822	13.365	15.474
MINIMUM	-1.641	-2.033	-2.153	-1.795	-1.627	-3.018

North Harney Basin mean daily temperature is 6.47°C (43.65°F), maximum mean is 14.42°C (57.96°F) and minimum mean is -2.04°C (27.68°F). BURNS WSO AP 1991-2020 monthly temperature mean is 45.98°F, maximum is 61.12°F and minimum mean is 30.82°F. On average, Burns Municipal Airport is 2.3°F to 3.2°F warmer than upper Basin temperature means.



Mean centigrade temperature ratios between maximum Silvies Canyon and minimum South Silvies sectors is 1.148 to 1. Maximum temperature ratios between Silvies Canyon and minimum Emigrant sectors is 1.158 to 1.

Note Silvies Canyon sector has the highest and lowest temperatures due to the lower Silvies Canyon and Myrtle Creek watershed climate extremes.



Mean daily air temperatures for all three SNOTEL stations during the latest nominal 30 year period. Record for SNOW MOUNTAIN is missing 4-17 FEB 2003, 25 MAY-2 JUN 2004 and 4-11 AUG 2021, STARR RIDGE for 14-22 JUN 2022 and 21-26 AUG 2024, ROCK SPRINGS for 2-18 FEB 2003. 28 missing days are estimated by inserting the adjacent days mean. The NRCS daily number sets are the most complete and accurate of the three federal agencies involved in climate and environmental sciences.

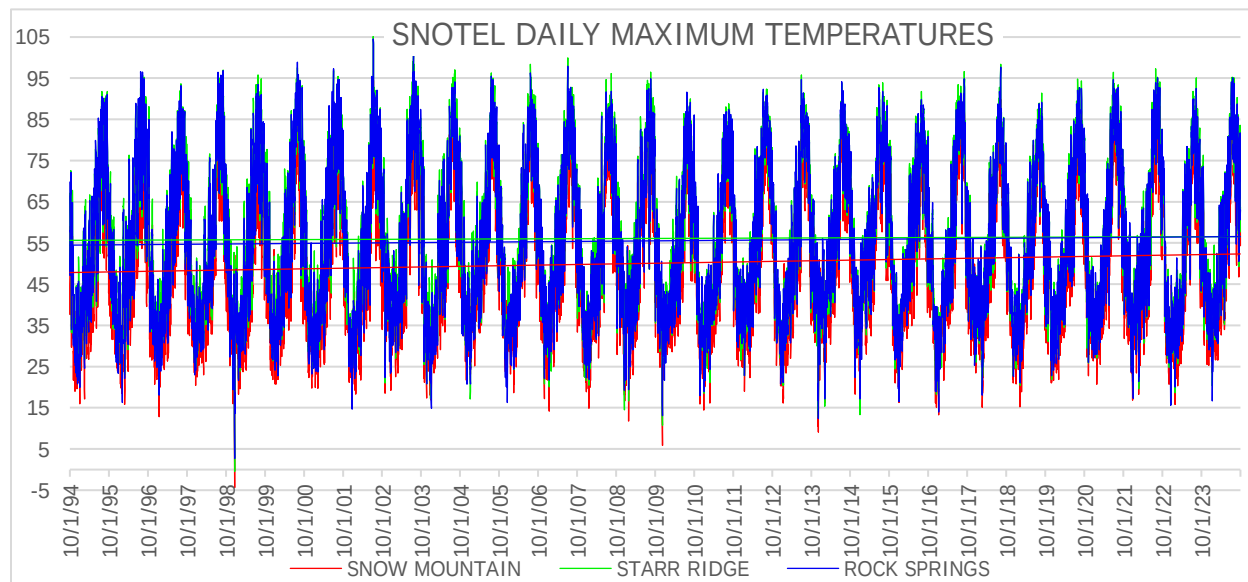
SNOW MOUNTAIN mean daily temperature during the 30 year period is 40.76°F, STARR RIDGE and ROCK SPRINGS are 44.29°F and 43.58°F respective. Recall BURNS WSO AP 1991-2020 monthly temperature mean is 45.98°F. Converting from 32° Fahrenheit to 0° Celsius, SNOW MOUNTAIN mean daily temperature (4.87°C) is -40.25% and -32.03% lower than both STARR and ROCK, 6.83°C and 6.43°C respective. 12 JUL 2002 is the highest mean temperature day for all three stations and 20 DEC 1998 is the lowest day.

SNOW MOUNTAIN differentials between maximum and minimum mean daily temperatures, 80.8°F and -9.9°F, is 90.7°F. STARR RIDGE differential, 83.7°F and -6.7°F, is 90.4°F. ROCK SPRINGS difference, 82.8°F and -4.9°F, is 87.8°F.

SNOW MOUNTAIN linear trend line begins at 38.36°F and ends at 43.16°F, a +4.80°F (+12.51%) increase above 32°F. STARR RIDGE linear trend line begins at 42.26°F and ends at + 46.28°F, a +4.59°F (+9.51%) increase. ROCK SPRINGS linear trend line begins at 40.90°F and ends at 46.24°F, a +5.34°F (+13.06%) increase.

Months with highest sum mean temperatures are JUL 2021 with 69.77°F followed by JUL 2003, AUG 2022 and JUL 2024, all within 68.20°F to 68.33°F, then by JUL 2013 with 67.90°F. 2001 to 2003 period is

the second most extreme drought since 1924, 2020-2022 is third. Months with lowest mean sum temperatures are JAN 1993 and 2017, both within 20.37°F to 20.47°F, followed by DEC 1998 with 21.37°F then by DEC 2009 with 23.37°F. Converting Fahrenheit to Celsius, ratio between mean warmest and coolest months, 69.77°F to 20.98°C and 20.42°F to -6.43°C, is 1.29 to 1 or 0.77 to 1.



Mean daily maximum air temperatures for all three SNOTEL stations. Record for SNOW MOUNTAIN is missing 4-11 AUG 2021, STARR RIDGE for 21-26 AUG 2024 and ROCK SPRINGS for 13-22 JUN 2022. 29 missing days are estimated by inserting the adjacent days mean.

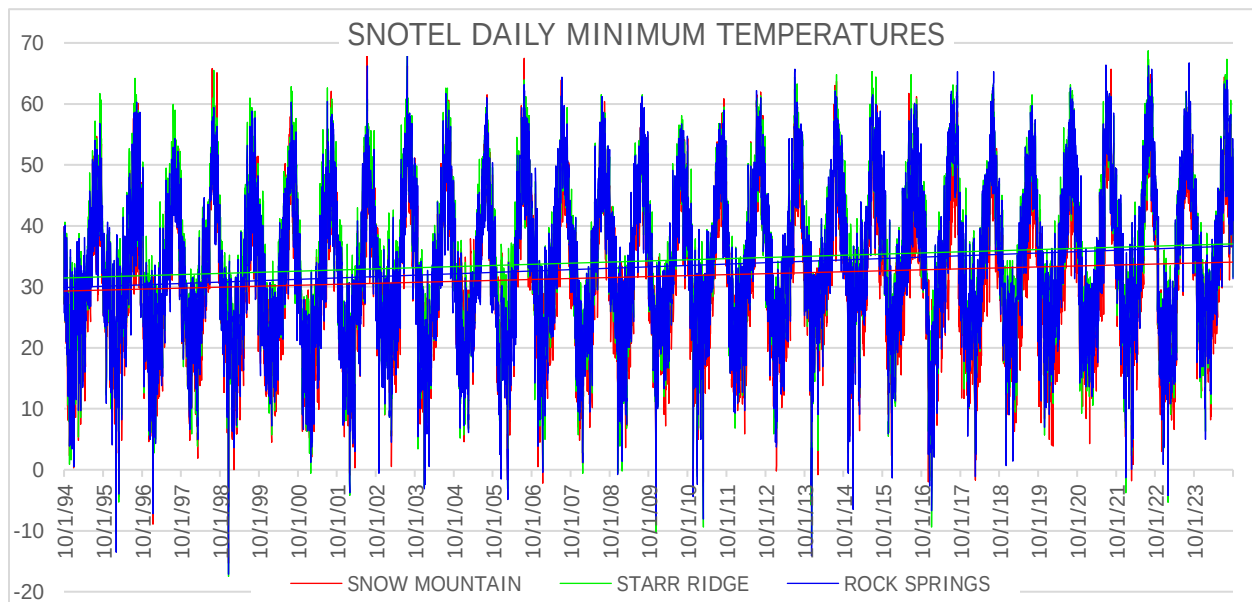
SNOW MOUNTAIN mean maximum daily temperature during the 30 year period is 50.08°F, STARR RIDGE and ROCK SPRINGS are 56.10°F and 55.51°F respective. BURNS WSO AP 1991-2020 maximum monthly temperature mean is 61.12°F SNOW mean maximum daily temperature is -9.98% and -11.94% lower than both STARR and ROCK. 11 JUL 2002 is the highest mean temperature day for all three stations and 20 DEC 1998 is the lowest day.

SNOW MOUNTAIN differential between maximum and minimum mean daily temperatures, 94.8°F and -4.4°F, is 99.2°F. STARR RIDGE differential, 105.1°F and -0.4°F, is 105.5°F. ROCK SPRINGS difference, 104.5°F and 2.7°F, is 101.8°F.⁶

SNOW MOUNTAIN linear trend line begins at 47.84°F and ends at 52.32°F, a +9.36% increase. STARR RIDGE linear trend line begins at 55.63°F and ends at 56.56°F, a +1.67% increase. ROCK SPRINGS linear trend line begins at 54.48°F and ends at 56.54°F, a +3.78% increase. Converting to Celsius, SNOW MOUNTAIN mean maximum monthly temperatures are +19.87% and +23.10% lower than both, respective.

Months with highest sum maximum temperatures are JUL 2002 with 101.47°F followed by JUL 2003 with 98.47°F then by JUL 1994 with 95.30°F. Months with lowest maximum sum temperatures are DEC 1992 with 36.97°F followed by JAN 2017 with 38.40°F then by FEB 1998, JAN 2000 and JAN 2016, all within 40.63°F - 40.84°F. Ratios between mean warmest and coolest months, 101.47°F and 36.97°F are a high 2.74 to 1 or 0.36 to 1. 11 JUL 2022 is the maximum mean temperature day for all three stations and 20 DEC 1998 is the minimum day.

6. SNOTEL air temperature data contains a known bias. This bias is rooted in the sensor conversion equation and varies through the output range. Solutions are in development [since 2002]. For more information go to [Air Temperature Bias Correction](https://wcc.sc.egov.usda.gov/reportGenerator/details/)



Mean daily minimum air temperatures for all three SNOTEL stations. SNOW MOUNTAIN record is missing 4-11 FEB 2003. STARR RIDGE for 21-26 AUG 2024 and ROCK SPRINGS for 13-22 JUN 2022. 35 missing days are estimated by inserting the adjacent days mean.

SNOW MOUNTAIN minimum mean temperature during the 30 year period is 31.68°F, STARR RIDGE and ROCK SPRINGS are 34.25°F and 33.27°F respective. BURNS WSO AP 1991-2020 minimum monthly temperature mean is 30.82°F. SNOW mean minimum daily temperature is -8.11% and -5.02% lower than both STARR and ROCK. 12 JUL 2002 is the highest minimum mean temperature day for SNOW, 23 JUL 2003 is for STARR and ROCK. 20-21 DEC 1998 are the lowest days for all.

SNOW MOUNTAIN differential between maximum and minimum mean daily temperatures, 69.1°F and -15.3°F, is 84.4°F. STARR RIDGE differential, 69.1°F and -17.5°F, is 86.6°F. ROCK SPRINGS difference, 68.4°F and -17.1°F, is 85.5°F.

SNOW MOUNTAIN linear trend line begins at 29.32°F and ends at 34.06°F, a +16.17% increase above 32°F. STARR RIDGE linear trend line begins at 31.46°F and ends at 37.04°F, a +17.74% increase. ROCK SPRINGS linear trend line begins at 28.89°F and ends at 36.68°F, a +26.96% increase.

Converting Fahrenheit to Celsius, SNOW MOUNTAIN mean minimum monthly temperatures are -16.68% and -10.46% lower than both. Yet, coldest mean minimum temperatures are in DEC 1990 with STARR RIDGE and ROCK SPRINGS reporting -25.6°F and -25.1°F respective.

During the latest 30 year period, months with highest sums of mean minimum temperatures are JUL 2021 with 48.83°F followed by JUL 2017 with 45.10°F then by JUL 2022 and 2023 with 44.50°F and 44.70°F respective. Months with lowest mean sum temperatures are DEC 1998 with -16.33°F followed by DEC 1990, FEB 1996 and DEC 2013, all within -10.40°F to -10.50°F. Converting Fahrenheit to Celsius, ratio between highest and lowest minimum months, 48.83°F to 9.35°C and -16.33°F to -27.13°C, is 1.60 to 1 or 0.63 to 1.

SNOW MOUNTAIN and STARR RIDGE station minimum temperatures are trending higher with near the same percentages. ROCK SPRINGS minimums trends are increasing 33.33% more. JUL 2021, 2022 and 2023 are the highest minimum mean monthly temperatures during this Period of Record.

Longer term, SNOTEL SNOW MOUNTAIN mean temperature linear trend increases +12.42% during 439 months, STARR RIDGE by +7.84% and ROCK SPRINGS by +9.22% during their 398 month Periods Of Record. SNOW MOUNTAIN mean daily temperature increases +0.143°F each of 47 years, STARR RIDGE by +0.091°F and ROCK SPRINGS by +0.104°F for each year of 45. SNOW MOUNTAIN annual mean is 40.63°F, STARR RIDGE is 44.48°F and ROCK SPRINGS mean is 43.38°F. Recall SNOW MOUNTAIN past 30

year period monthly mean temperature is 40.74-.76°F, STARR RIDGE is 44.22-44.29°F and ROCK SPRINGS mean is 43.51-.58°F. Temperature numbers conform.

Mean minimum temperature linear trends have near the same increases for the same periods. SNOW MOUNTAIN increases by +12.83%, STARR RIDGE BY +7.85% and ROCK SPRINGS by +9.02%. SNOTEL temperatures are becoming less cold together. Mean maximum temperature linear trends are different. SNOW MOUNTAIN increases by +4.08%, but STARR RIDGE decreases -6.18% and ROCK SPRINGS by -4.51%. SNOTEL high elevation station is becoming warmer and the lower elevation stations are not.

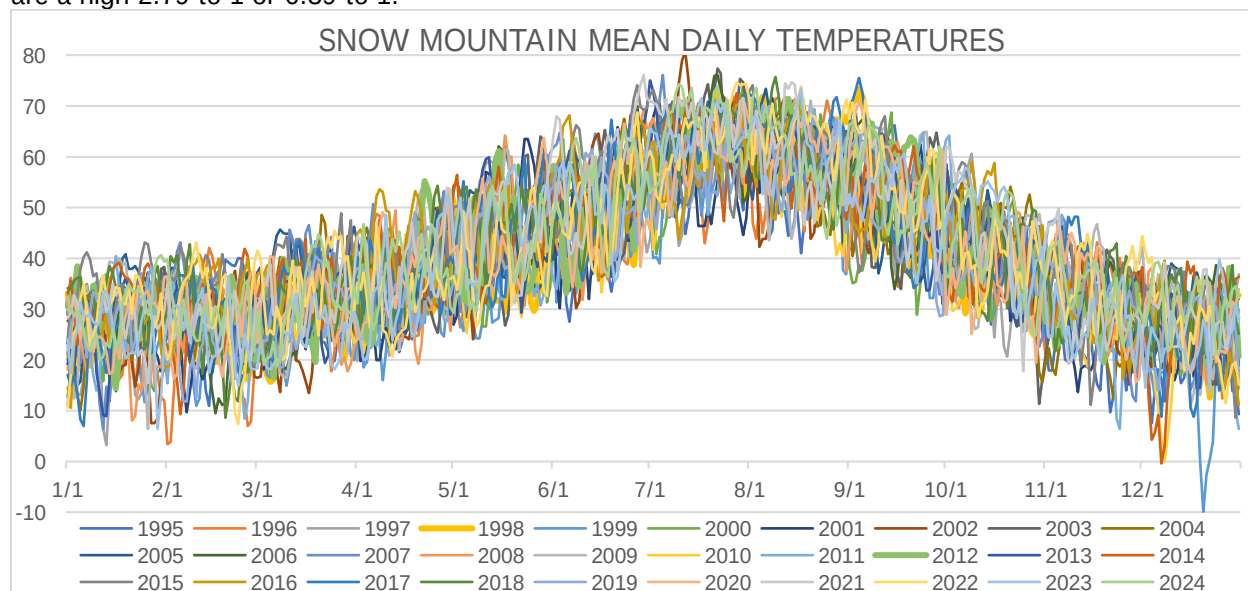
SNOW MOUNTAIN TEMPERATURE



WRCC presents data in a different format for a different perspective. Statistical shading percentiles are calculated from period of record (POR) data, excluding the current water year. Percentile categories range from: minimum to 10th percentile, 10th - 30th , 30th - 70th , 70th - 90th , and 90th – maximum.

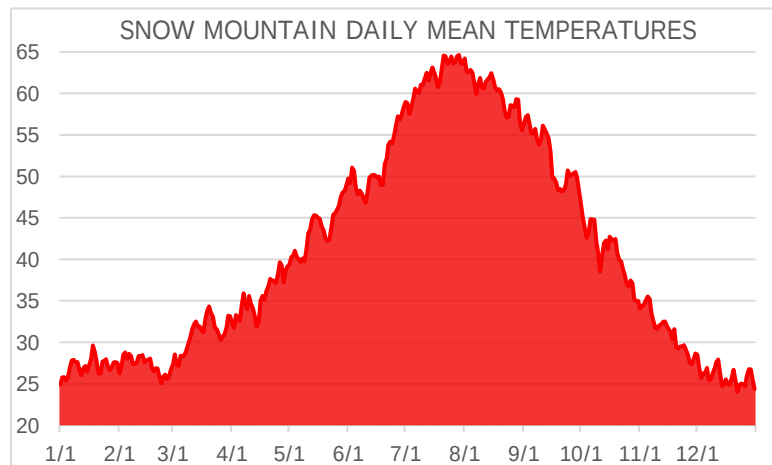
SNOW MOUNTAIN absolute maximum temperature day is 12 JUL 2002 (80.78°F). Absolute minimum day is 20 DEC 1999 (-9.94°F). Both are less than three years apart. Converting Fahrenheit to Celsius, ratios between maximum and minimum temperature days, 80.78°F to 27.10°C and -9.94°F to -23.30°C, are 1.66 to 1 or 0.60 to 1.

Mean highest temperature day during the Period of Record is 29 JUL (65.88°F) and mean lowest day is 25 December (23.63°F). Ratio between highest and lowest mean temperature days (65.88°F and 23.63°F) are a high 2.79 to 1 or 0.39 to 1.

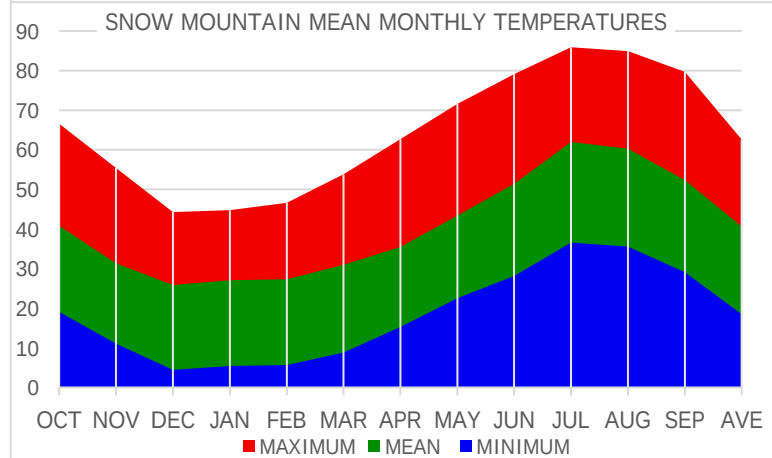
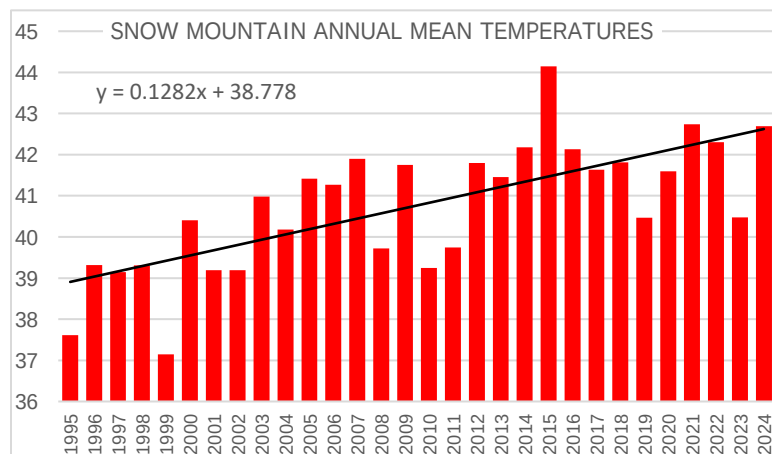


SNOW MOUNTAIN mean daily temperatures from OCT 1994 to SEP 2024 presented as a conventional Gregorian calendar graph. 24 days are missing from the record which are estimated by inserting the mean of adjacent days and months.

30 year mean is 40.74°F and 365.25 day mean is 40.77°F. Maximum daily means are on 12 JUL 2002 (80.78°F, not shown in full) followed by 22 JUL 2006 (76.10°F) then by 29 JUL 2003 (75.38°F). Minimum daily means are on 20 DEC 1999 (-9.94°F) followed by 7 DEC 2014 (-0.4°F) then by 13 JAN 1997 (3.20°F). Converting Fahrenheit to Celsius, ratios between maximum and minimum daily means, 80.78°F to 27.1°C and -9.94°F to -23.3°C (a 90.72°F or 50.4°C differential), are a high 2.00 to 1 or 0.50 to 1.



maximum and minimum, 64.62°F and 24.00°F (88.62°F). are a high 2.69 to 1 or 0.37 to 1.



with 85.89°F and DEC with 4.42°F, is 19.43 to 1 in Fahrenheit. Centigrade ratios between 29.94°C and -15.32°C is 1.53 to 1 or 0.51 to 1.

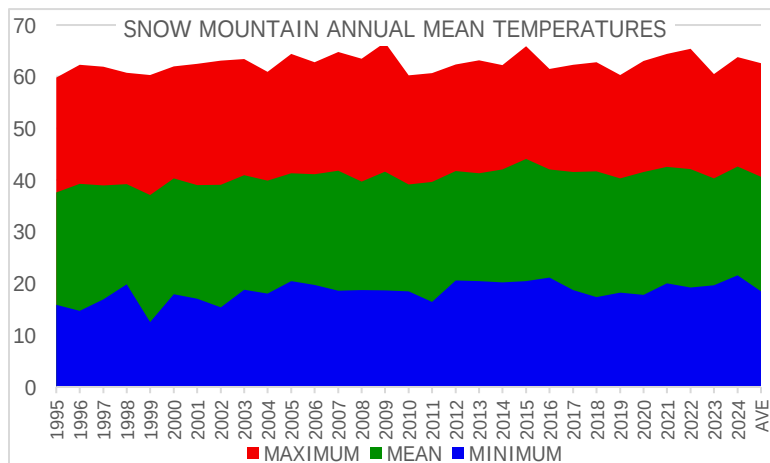
SNOW MOUNTAIN maximum mean day is 29 JUL (64.62°F). Minimum mean day is 22 DEC (24.00°F). Mean daily temperatures are below 32.0°F from 16 NOV to 17 MAR for 123.50 continuous days or 33.74% of the year. 18 JUN to 1 JUL has the highest positive delta change rate of +11.00°F. It gets warmer quickly then. 12 SEP to 4 OCT has the highest negative delta change of -13.13°F with a short period of stable mean day temperatures, an "Indian Summer", between 21 and 28 SEP. It cools quickly then. Ratio between

Maximum annual means are 2015 (44.15°F) followed by 2021 (42.74°F) then by 2024 (42.70°F). Minimum annual means are 1999 (37.15°F) followed by 1995 (37.61°F) then by 2001 and 2002 (39.19°F). Ratios between maximum and minimum, 44.15°F and 37.15°F, are 1.19 to 1 or 0.84 to 1.

Linear trend line begins at 38.78°F and ends at 42.64°F, a +3.86°F (+9.95%) increase above 32°F.

WRCC reports the same correct NOV mean monthly temperatures as the maximums. This skews SNOW MOUNTAIN mean maximum temperatures lower. Appears to be a record keeping error done with key strokes, copy and paste. True NOV maximum means are estimated by inserting the mean between the two adjacent months which is 55.43°F.

During the period, mean maximum monthly temperature is 62.61°F, mean monthly is 40.68°F and mean minimum is 18.47°F. Ratios between warmest and coolest months, JUL



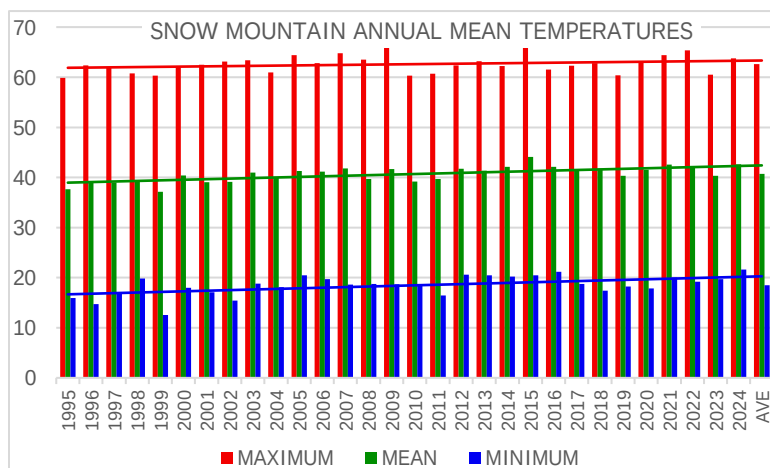
SNOW MOUNTAIN with the estimated NOV maximum means.

Years with maximum maximum means are 2009 (66.63°F) followed by 2015 (65.93°F) then by 2022 (65.38°F). Years with maximum minimum means are 1995 (59.86°F) followed by 2010 (60.29°F) then by 2023 (60.50°F). Ratios between maximum and minimum maximums, 66.63°F and 59.86°F, are 1.11 to 1 or 0.90 to 1.

Years with maximum means are 2024 (42.62°F) followed by 2021 (42.58°F) then by 2022 (42.13°F).

Years with minimum means are 1999 (37.11°F) followed by 1995 (37.62°F) then by 1997 (38.99°F). Ratios between maximums and minimums, 46.62°F and 37.11°F, are 1.15 to 1 or 0.87 to 1.

Years with minimum maximum means are 2024 (21.59°F) followed by 2016 (21.16°F) then by 2012 (20.59°F). Years with minimum minimum means are 1999 (12.53°F) followed by 1996 (14.71°F) then by 2002 (15.40°F). Ratios between maximum and minimum, 21.59°F and 12.53°F, are a high 1.72 to 1 or 0.58 to 1.⁷



Mean maximum temperature linear trend line begins at 61.88°F and ends at 63.33°F, a +1.45°F increase. Mean temperature linear trend line begins at 38.96°F and ends at 42.42°F, a +3.46°F increase. Minimum temperature mean linear trend line begins at 16.57°F and ends at 20.27°F, a +3.70°F increase.

Warming minimum and resultant mean temperatures during the period impact Snow Mountain most which is near 1,000 feet higher in elevation among the three SNOTEL stations.

Note SMOW MOUNTAIN records

years 2021-24 with absolute maximum temperatures ranked within the top three years during the past 30 and 2024 has the highest minimum maximum. However, record monthly maximum means differ from the daily measurements with 2002-03 and 2006 having the highest maximum mean day temperatures.

7. SNOTEL stations measure air temperatures every quarter hour. Sum of 96 measurements are divided by 96 for the average or mean daily temperature. Monthly and annual means are developed the same way.

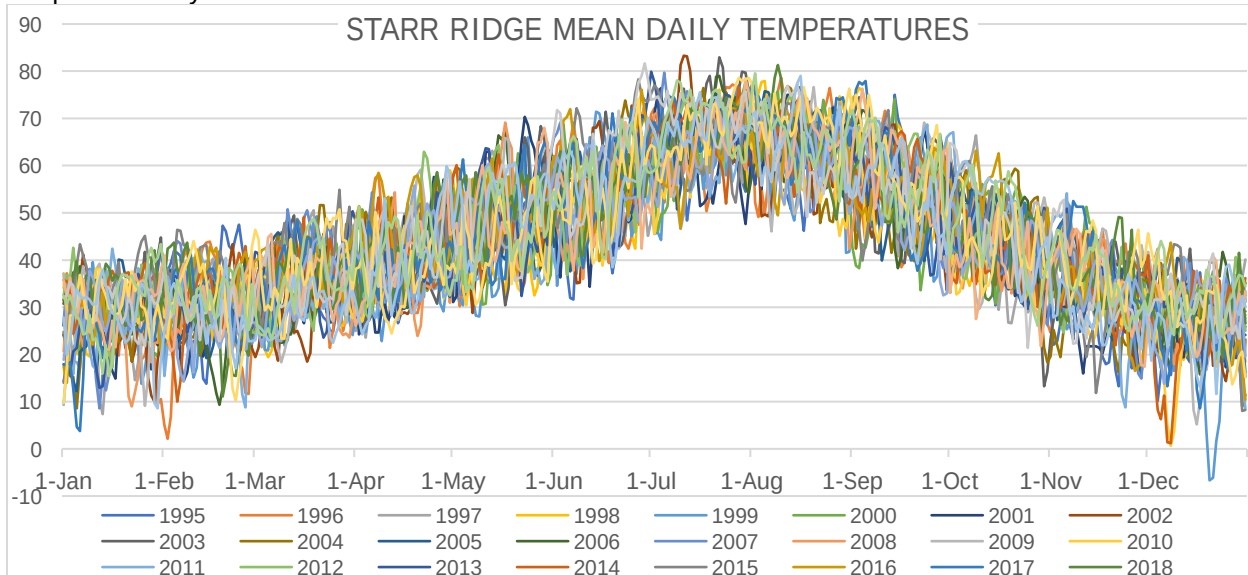
All ratios use 0.01°F as reference. Celsius numbers differ but ratios between Max, Mean, Min remain the same.

STARR RIDGE TEMPERATURE

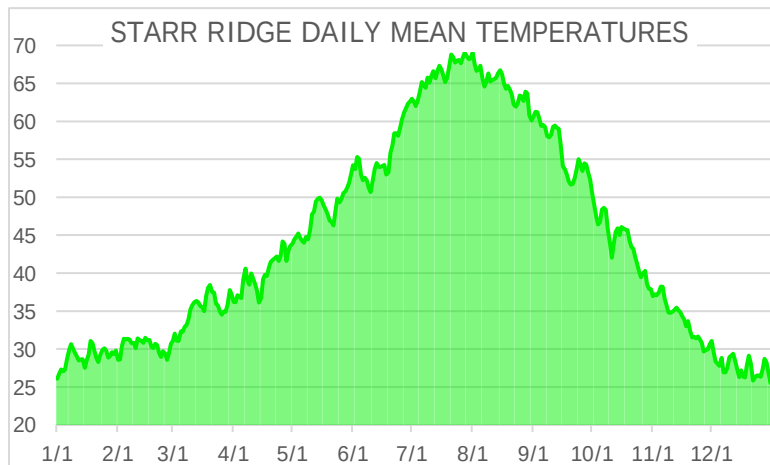


WRCC STARR RIDGE 17 AUG – SEP 20 errors occur in 1988. 21 DEC 1991 absolute minimum mean temperature day is an extreme -7.86°F. Author uses OCT 1994 to SEP 2024 only for analysis.

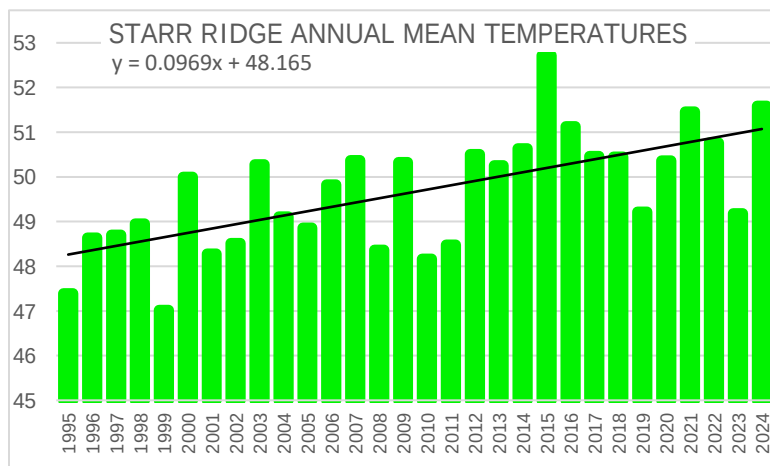
During the Period of Record, maximum mean daily temperature is 83.10°F on 12 JUL 2002. Minimum mean daily low is -16.96°F on 21 DEC 1991. Maximum temperature day is 28 JUL (70.16°F) and minimum days are December 14, 24 and January 1 (26.42°F). Ratios between mean maximum and minimum temperature days are 2.66 to 1 or 0.38 to 1.



Thirteen days are missing from the STARR RIDGE record which are estimated by inserting the mean of adjacent days or months. 30 year mean and 365.25 day mean are both 44.22°F. Maximum means are on 12 JUL 2002 (83.12°F) followed by 24 JUL 2003 (82.94°F) then by 9 AUG 2018 (81.32°F). Minimum means are on 20 DEC 1999 (-6.16°F) followed by 8 DEC 2014 (1.22°F) then by 2 FEB 1996 (2.12°F). Converting Fahrenheit to Celsius, ratios between maximum and minimum daily means, 83.12°F to 28.4°C and -6.16°F to -21.2°C (a 89.28°F or 31.82°C differential), are 1.61 to 1 or 0.62 to 1.

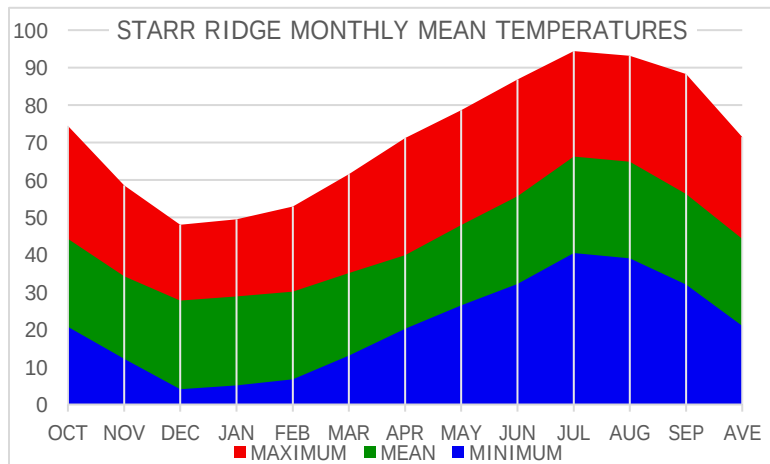


STARR RIDGE maximum mean day is 1 AUG (69.07°F). Minimum mean day is 31 DEC (25.54°F). Mean daily temperatures are below 32.0°F from 21 NOV to 4 MAR for 105.50 continuous days or 28.82% of the year. 19 JUN to 2 JUL has the highest positive delta change of +10.31°F. 13 SEP to 4 OCT has the highest negative delta change of -12.74°F with a short period of stable mean day temperatures between 21 and 28 SEP. Ratio between maximum and minimum, 69.07°F and 22.54°F, are 3.06 to 1 or 0.33 to 1.

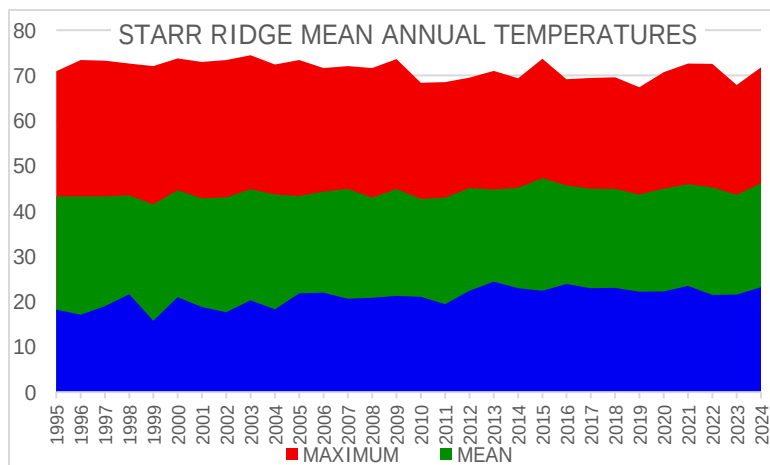


Maximum annual means are 2015 (52.72°F) followed by 2024 (51.58°F) then by 2021 (51.47°F). Minimum annual means are 1999 (41.67°F) followed by 1995 (42.06°F) then by 2010 (42.79°F). Ratios between maximum and minimum, 52.72°F and 41.67°F, are 1.27 to 1 or 0.79 to 1.

Linear trend line begins at 48.26°F and ends at 51.07°F, a +2.81°F (+5.82%) increase above 32°F.



STARR RIDGE mean maximum monthly temperature is 71.46°F, mean monthly 44.26°F and mean minimum is 21.04°F. Ratios between warmest and coolest months, JUL with 94.41°F and DEC with 4.05°F, is 23.31 to 1 in Fahrenheit. Centigrade ratios between 34.67°C and -15.53°C are 1.30 to 1 or 0.77 to 1.

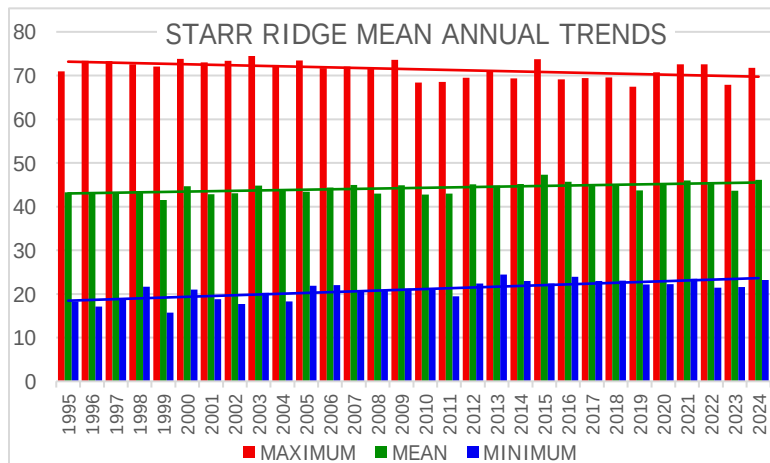


Years with maximum maximum means are 2003 (74.47°F) followed by 2000 (73.79°F) then by 2015 (73.73°F). Years with minimum maximum means are 2019 (67.43°F) followed by 2010 (68.38°F) then by 2011 (68.64°F). Ratios between maximum and minimum maximums, 74.47°F and 67.43°F, are 1.10 to 1 or 0.91 to 1.

Years with maximum means are 2024 (46.15°F) followed by 2021 (45.95°F) then by 2016 (45.71°F). Years with minimum means are 1999 (41.53°F) followed by 2010 (42.74°F)

then by 2001 (42.83°F). Ratios between maximum and minimum, 46.15°F and 41.53°F, are 1.11 to 1 or 0.90 to 1.

Years with maximum minimum means are 2013 (24.42°F) followed by 2016 (23.92°F) then by 2021 (23.47°F). Years with minimum minimum means are 1999 (15.73°F) followed by 1996 (17.03°F) then by 2002 (17.68°F). Ratios between maximum and minimum, 24.42°F and 17.68°F, are 1.38 to 1 or 0.73 to 1.



Mean maximum temperature mean linear trend line begins at 73.19°F and ends at 69.73°F, a -3.46°F decrease. Mean temperature mean linear trend line begins at 43.02°F and ends at 45.45°F, a +2.43°F increase. Minimum temperature mean linear trend line begins at 18.48°F and ends at 23.62°F, a +5.14°F increase.

STARR RIDGE is closest to the Columbia River via the John Day River. SNOTEL station Lake Creek Ranger Station (563), located to the east in the North Fork Malheur River drainage of Strawberry Ridge at 5,240

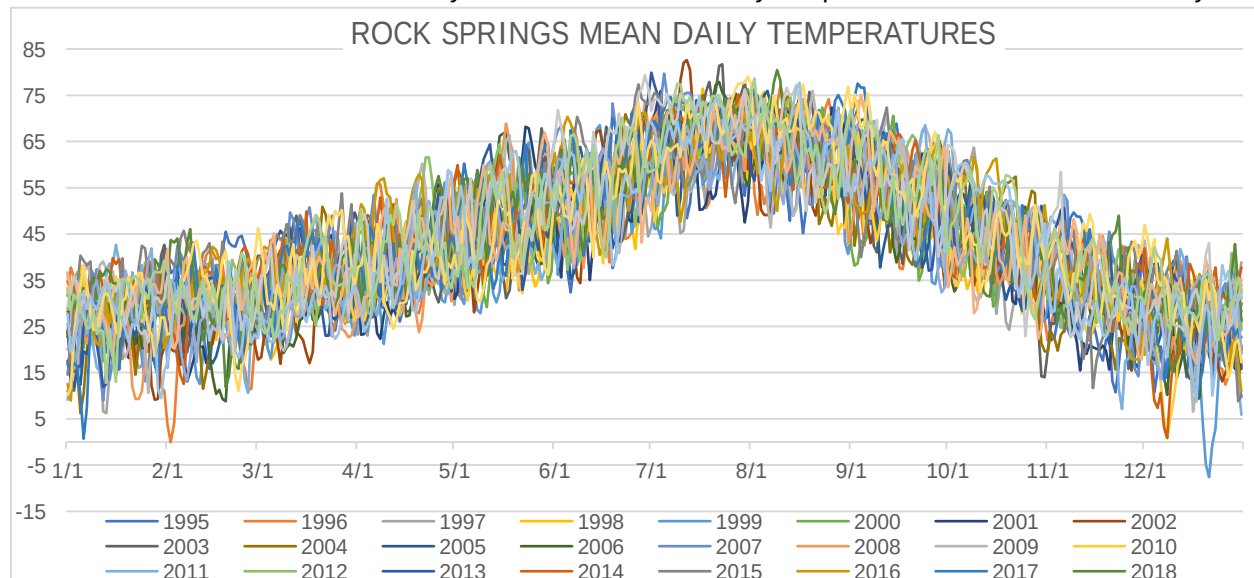
feet has similar trend characteristics and delta change rates as ROCK SPRINGS. SNOTEL station Derr (440), located to the west in the North Fork Crooked River drainage in the Ochoco Mountains at a higher 5,850 feet elevation is similar to SNOW MOUNTAIN with both having mean temperature increases.

ROCK SPRINGS TEMPERATURE

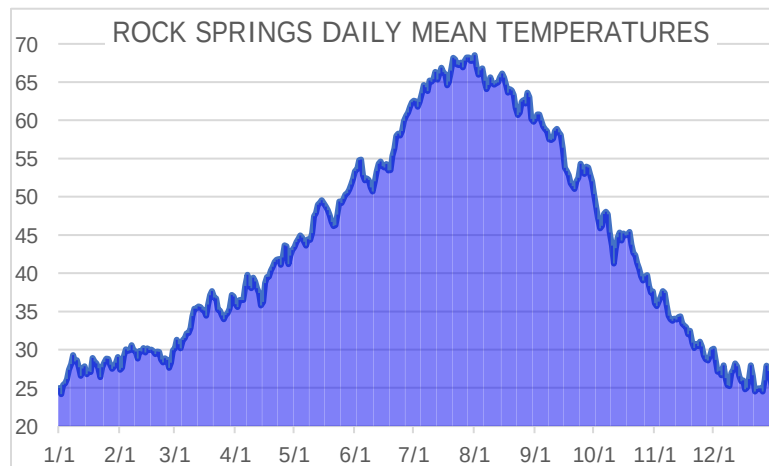


WRCC ROCK SPRINGS 7-31 AUG repeat error of 32.0°F or 0° Celsius occurs in 1988. OCT 28 error of -60.52°F occurs in 1994. Author uses the 1995 -2024 nominal 30 year period for analysis.

Absolute maximum mean temperature day is 12 JUL 2002 (82.60°F). Absolute minimum mean day is 21 DEC 1991 (17.86°F) which is not considered in analysis. Mean maximum daily high temperature during Period Of Record is 69.17°F on 28 July and mean minimum daily temperature is 24.08°F on 2 January.

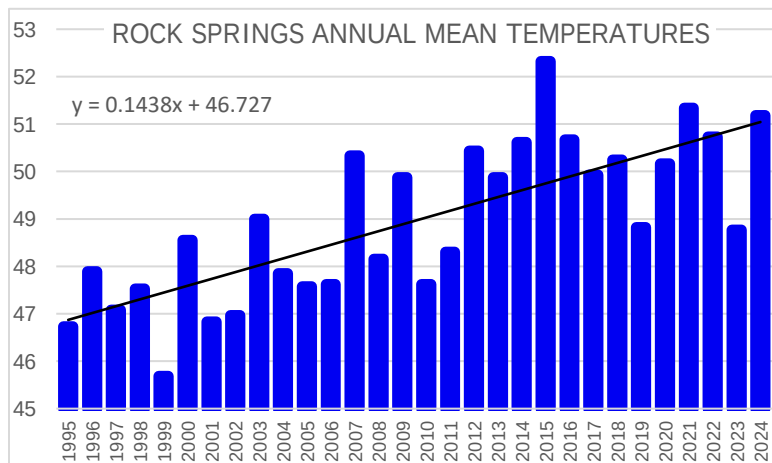


16 days including the same thirteen days missing from the STARR RIDGE record are estimated by inserting the mean of adjacent days or months. 30 year mean is 43.51°F and 365.25 day mean is 43.60°F. Maximum means are on 12 JUL 2002 (82.58°F) followed by 23 JUL 2003 (81.68°F) then by 9 AUG 2018 (80.42°F). Minimum means are on 21 DEC 1999 (-7.60°F) followed by 2 FEB 1996 (0.04°F) then by 6 JAN 2017 (0.68°F). Converting Fahrenheit to Celsius, ratios between maximum and minimum daily means, 82.58°F to 28.11°C and -7.60°F to -22.0°C (a 90.18°F or 32.32°C differential), are 1.64 to 1 or 0.61 to 1.



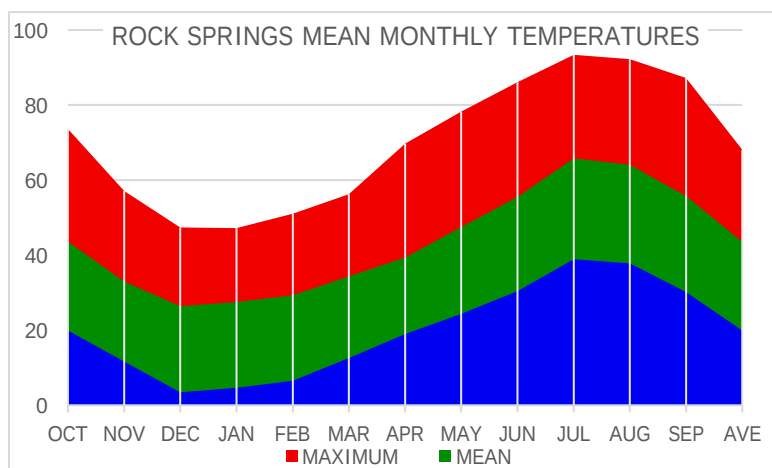
ROCK SPRINGS maximum mean day is 1 AUG (68.53°F). Minimum mean day is 2 JAN (24.17°F). Mean daily temperatures are below 32.0°F from 20 NOV to 6 MAR for 108.25 continuous days or 29.64% of the year. 19 JUN to 2 JUL has the highest positive delta change of 9.00°F. 16 SEP to 4 OCT has the highest negative delta change of -10.55°F with a short period of stable mean day temperatures between 21 and 28 SEP. There is an "Indian Summer" from 13 to 20 OCT. Ratio between maximum and minimum, 68.53°F and

24.17°F. are a high 2.86 to 1 or 0.35 to 1.



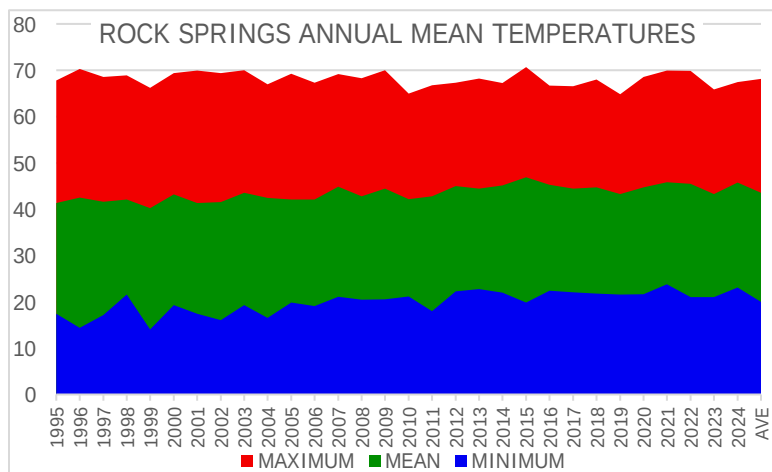
Maximum annual means are 2015 (52.32°F) followed by 2021 (51.34°F) then by 2024 (51.17°F). Minimum annual means are 1999 (45.68°F) followed by 2001 (46.83°F) then by 1995 (46.73°F). Ratios between maximum and minimum, 52.32°F and 45.68°F, are a low 1.15 to 1 or 0.87 to 1.

Linear trend line begins at 46.77°F and ends at 51.04°F, a +4.27°F (+9.16%) increase above 32°F.



WRCC records the same correct MAR mean monthly temperatures as maximums. As with STARR RIDGE, This skews ROCK SPRINGS mean maximum temperatures lower. Appears to be a record keeping error done with key strokes, cut and paste. MAR maximum mean is estimated by inserting the mean between the two adjacent months (53.83°F).

Mean maximum monthly temperature is 68.14°F, mean monthly is 43.51°F and mean minimum is 19.96°F. Ratios between warmest and coolest months, JUL with 93.39°F and DEC with 3.44°F, is 27.19 to 1 in Fahrenheit. Centigrade ratios between 34.11°C and -15.87°C are 2.00 to 1 or 0.50 to 1.



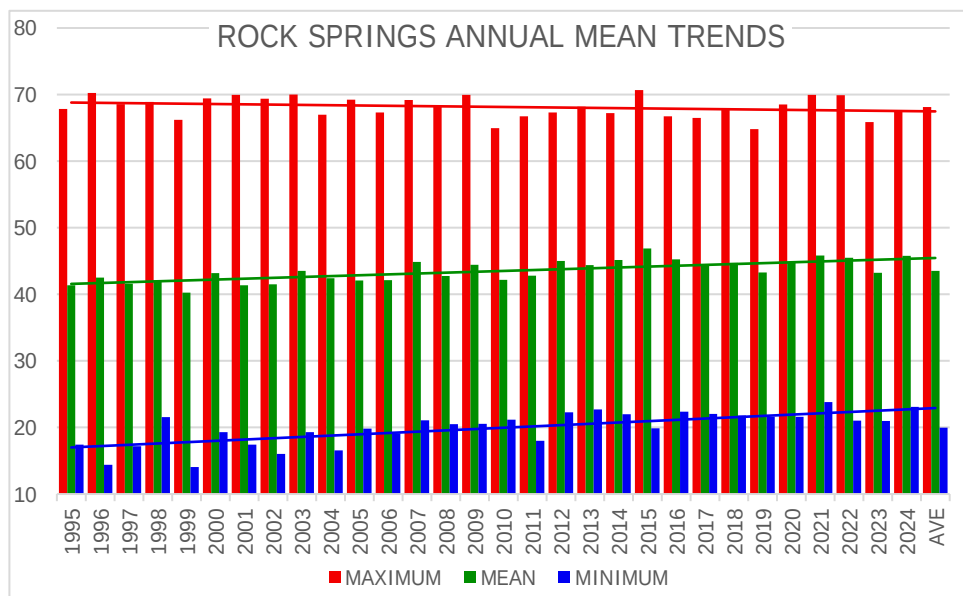
ROCK SPRINGS with the estimated MAR maximum means.

Years with maximum maximum means are 2015 (70.68°F) followed by 1996 (70.25°F) then by 2003 (69.99°F). Years with maximum minimum means are 2021 (23.79°F) followed by 2024 (23.08°F) then by 2013 (22.73°F). Ratios between maximum maximum and minimum maximum, 70.68°F and 64.82°F, are 1.09 to 1 or 0.92 to 1.

Years with maximum mean means are 2015 (46.89°F) followed by 2021 (45.84°F) then by 2024 (45.76°F).

Years with minimum mean means are 1999 (40.24°F) followed by 1995 (41.34°F) then by 2001 (41.35°F). Ratios between maximum and maximum, 46.89°F and 40.24°F, are 1.17 to 1 or 0.86 to 1.

Years with maximum minimum means are 2021 (23.79°F) followed by 2024 (23.08°F) then by 2012 (22.26°F). Years with minimum minimum monthly means are 1999 (14.04°F) followed by (14.40°F) then by 2002 (16.03°F). Ratios between maximum and minimum, 23.79°F and 14.04°F, are 1.69 to 1 or 0.59 to 1.



Maximum annual mean temperature linear trend line begins at 68.31°F and ends at 67.44°F, a -0.87°F decrease.

Minimum annual mean temperature linear trend line begins at 16.98°F and ends at 22.91°F, a +5.90°F increase. This skews mean annual mean temperatures higher.

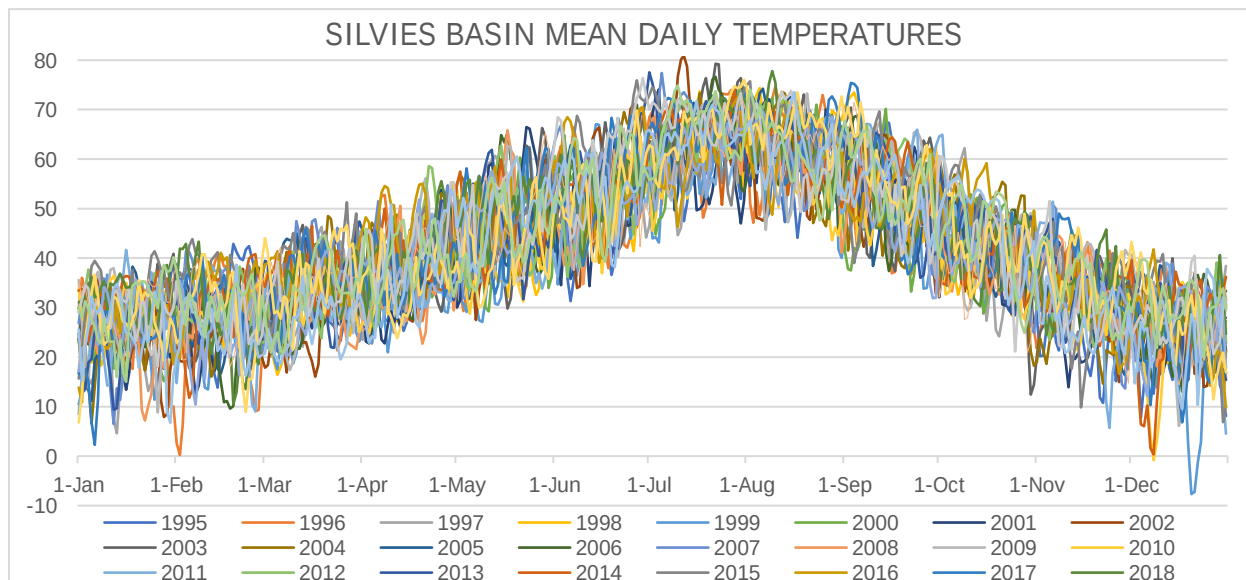
Annual mean temperature linear trend line begins at 41.57°F to 45.46°F, a +3.89°F

increase. Here and at STARR RIDGE, this increase in minimum mean temperatures over the past 30 years cannot be from anthropogenic "Global Warming" alone. Maximum mean and absolute maximum temperatures are not increasing. Minimum temperatures responsible for mean temperatures increases are from continuing Late Quaternary Holocene Era trends. 8,800 years ago, the upper Basin was still under hundreds of feet of glacial ice. Warmer winters means shorter snow periods and less snow. This trend also applies to the lower Harney Basin for the past 100 years.

SILVIES BASIN TEMPERATURE



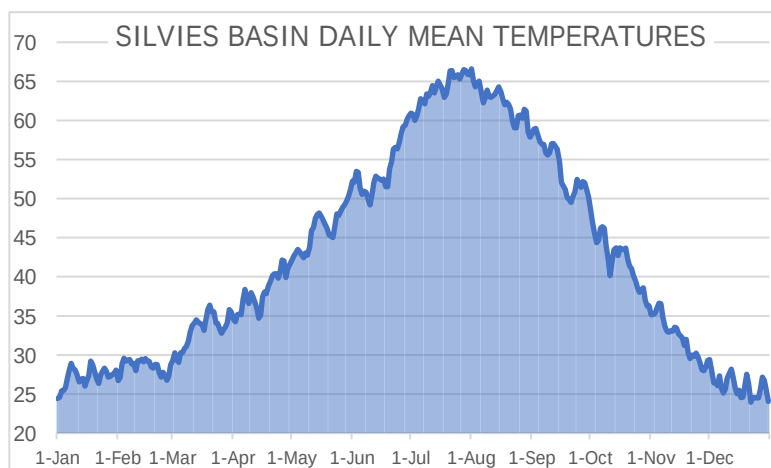
WRCC SILVIES BASIN maximum mean daily temperature is 80.97°F on 12 JUL 2002. Minimum mean daily temperature is -7.69°F on 20 DEC 1999. Both are less than three years apart. Maximum mean temperature day during period of record is 68.14°F on 28 July and minimum mean day is 23.72°F on 2 January. Ratios between maximum and minimum mean days are a high 2.87 to 1 or 0.35 to 1.



As a compilation of the three SNOTEL stations and the NWS station at the Burns Municipal Airport, there are no missing days for this record.

30 year mean is 42.38°F and 365.25 day mean is 42.37°F. Maximum means are on 12 JUL 2002 (80.87°F) followed by 22 JUL 2003 (79.30°F) then by 9 AUG 2018 (77.81°F). Minimum means are on 20 DEC 1999 (-7.69°F) followed by 2 FEB 1996 (0.165°F) then by 8 DEC 2014 (0.365°F). Converting from Fahrenheit to Celsius, ratios between maximum and minimum daily means, 80.87°F to 27.15°C and -7.69°F to -22.05°C (an 88.56°F or a 49.20°C differential), are 1.63 to 1 or 0.61 to 1.

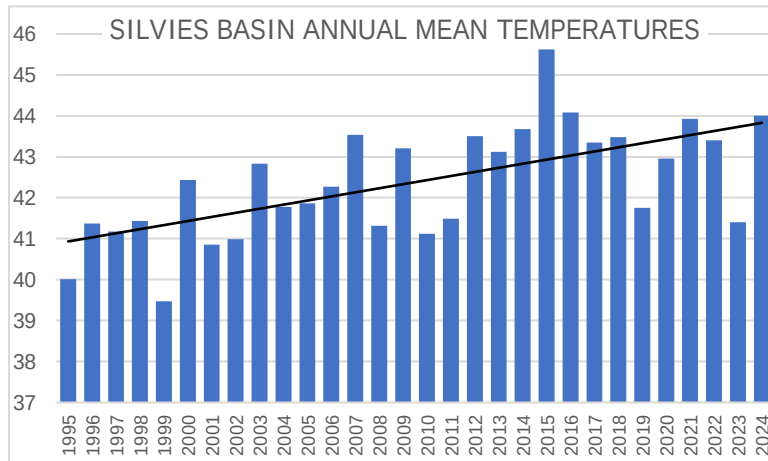
SILVIES BASIN maximum mean day is 1 AUG (68.53°F). Minimum mean day is 2 JAN (24.17°F). Mean daily temperatures are below 32.0°F from 20 NOV to 6 MAR for 106.25 continuous days or 29.09% of the year. 19 JUN to 2 JUL has the highest positive delta change of +9.26°F. 14 SEP to 4 OCT has the highest negative delta change of -11.94°F with a short period of stable temperatures from 21 to 29 SEP. Ratio between maximum and minimum, 68.53°F and 24.17°F (a 44.36°F or 25.54°C differential) are 2.01 to 1 or 0.50 to 1.



SILVIES BASIN daily maximum mean day is 1 AUG (66.60°F). Minimum mean day is 31 DEC (24.06°F). Mean day temperatures are below 32.0°F from 18 NOV to 10 MAR for 114.25 continuous days or 31.28% of the year. 19 JUN to 2 JUL has the highest positive delta change of +9.26°F. 14 SEP to 4 OCT has the highest negative delta change of -11.94°F with a short period of stable temperatures from 21 to 29 SEP. There is an "Indian Summer" from 13 to 20 OCT. Ratio between maximum and minimum, 68.53°F and 24.17°F.

are 2.01 to 1 or 0.50 to 1.⁸

8. SILVIES BASIN 10 JUN to 1 JUL has the highest positive delta change of +9.26°F among all SNOTEL stations. High delta may be due the BURNS WSO AP inclusion into the data. Ratio between maximum and minimum, 66.60°F and 24.06°F. are 2.19 to 1 or 0.46 to 1 during that three week period. SILVIES BASIN gets warm fast.



Maximum annual means are 2015 (45.62°F) followed by 2024 (44.00°F) then by 2021 (43.92°F). Minimum annual means are 1999 (39.47°F) followed by 1995 (40.00°F) then by 2001 (40.86°F). Ratios between maximum and minimum, 45.62°F and 39.47°F, are a low 1.16 to 1 or 0.87 to 1.

USDA WRCC does not publish Silvies Basin maximum and minimum mean monthly temperature estimates for analysis. SNOW/STARR/ROCK temperatures are used in a 50/30/20 ratio with BURNS WSO AP excluded to

derive the monthly SILVIES BASIN estimates. Linear trend line begins at 40.96°F and ends at 43.83°F, a +2.87°F (+7.01%) increase.

For all SNOTEL stations, the warmest day is 12 July. SILVIES BASIN mean warmest day is 28 JUL. For SNOW MOUNTAIN and SILVIES BASIN, the coolest day is 20 DEC 1999. For STARR RIDGE and ROCK SPRINGS, 21 DEC 1991. SNOW MOUNTAIN average coolest day is 25 DEC. For lower elevation STARR RIDGE, ROCK SPRINGS and the SILVIES BASIN, coolest day is one week later on 1 or 2 JAN.

SILVIES BASIN winters are warmer and appear to last longer into Spring. Lower elevation SNOTEL stations are coldest one week later than when SNOW MOUNTAIN is.

NRCS staff perform annual service visits to reset SWE zero offsets. All SNOTEL stations have maintenance issues. SNOW MOUNTAIN, being newer and more expensive, is considered the primary station for the Silvies Basin and receives more attention.

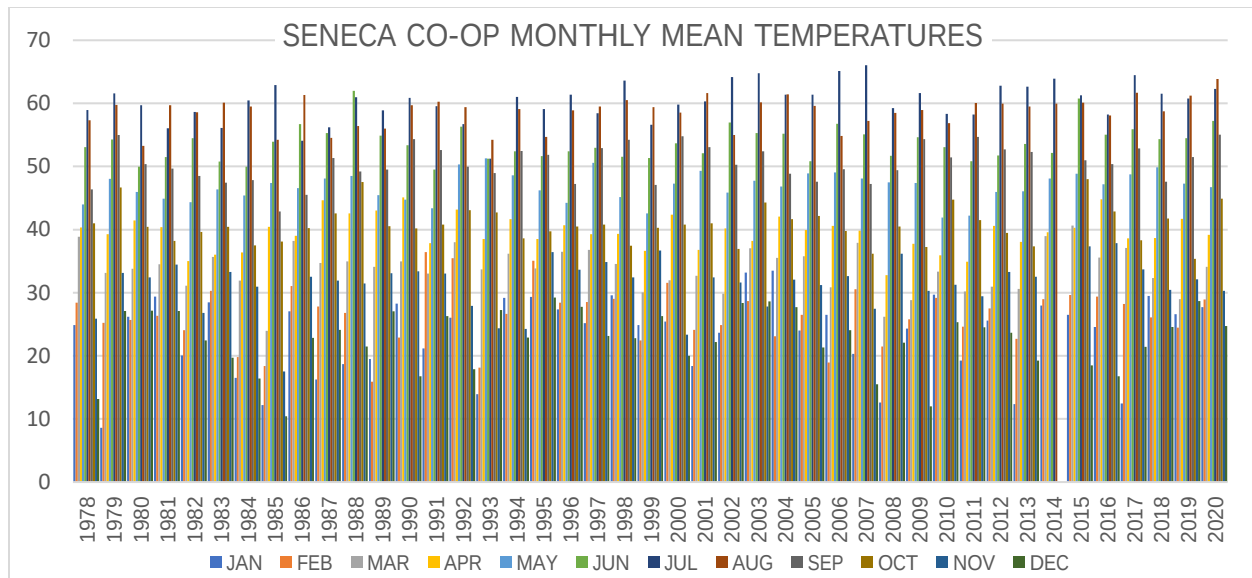
From the maintenance and service records:

SNOW MOUNTAIN: 28 MAY 1997 new transducer, 1 AUG 2010 new transducer, 18 APR 2014 suspect transducer failure – replaced 21 MAY 2014, 19 NOV 2014 100" transducer is also replaced, 30 AUG 2015 suspect steel pillow is replaced with butyl 10 NOV 2015, 13 AUG 2021 an Iridium NEXT satellite upgrade.

STARR RIDGE: 1 APR 1998 new transducer, 31 OCT 2001 pillow fails – 25 JUN 2002 pillow replaced, 20 DEC 2011 "suspect SWE for unexplained increase" – 26 APR 2012 new transducer, 26 OCT 2014 steel pillow is replaced with butyl. No iridium upgrade is reported.

ROCK SPRINGS: JUN 1998 to 18 JUN 2001 many adjustments including new transducer 16 NOV 2000, 21 DEC 2011 "suspect SWE due to unexpected decrease" – new transducer 27 JUN 2012 and again 31 OCT 2014, 20 MAR 2017 "offset SWE for unexplained reason" and suspect sensor failure, 13 JUN 2019 steel pillow replaced with butyl, 24 OCT 2023 pillow replacement. No iridium upgrade is reported.

STARR RIDGE records from 31 OCT 2001 to 25 JUN 2002 and DEC 2011 to APR 2012 are suspect. ROCK SPRINGS records from DEC 2011 to OCT 2014 are also. Some equipment in use have or soon will reach end of life or no longer have manufacturer support.

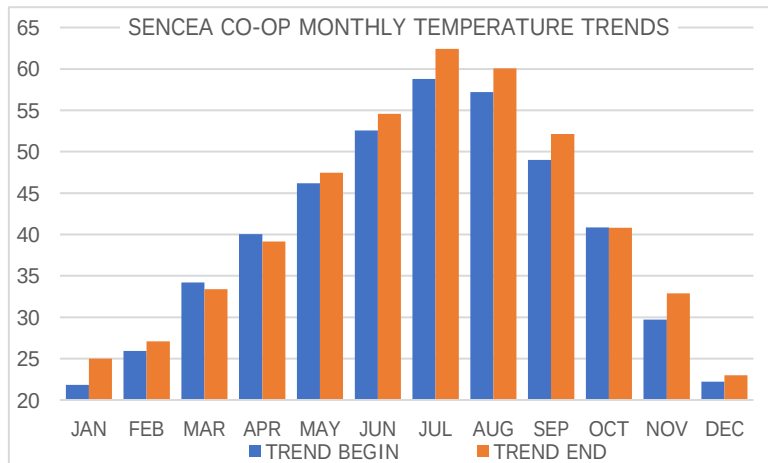


SENECA CO-OP (USC00357675) at 4,660 or 4,475 feet elevation has temperature records more complete than its precipitation records. There is no record for NOV 2014 – MAR 2015. Missing single month mean temperatures are estimated by inserting the mean of adjacent months but water year 2015 cannot be estimated. Records end July 2021. Last year is not considered for annual and monthly statistics due to it missing large number of days. While records are faulty, SENECA CO-OP is the only relative low elevation upper Basin weather station with long temperature records which have value.

Chart makes visible annual and seasonal changes during the 42 year period of record. Mean monthly temperature is 40.72°F. By definition, Seneca has a semi-arid sub-arctic climate. Maximum monthly means are in JUL 2007 (66.05°F) followed by JUL 2006 (65.15) then by JUL 2003 (64.78°F). Minimum monthly means are in DEC 1985 (10.45°F) followed by DEC 2009 (12.0°F) then by JAN 1985 (12.2°F). Ratios between highest and lowest monthly mean temperatures are a very high 5.77 to 1 or 0.158 to 1.

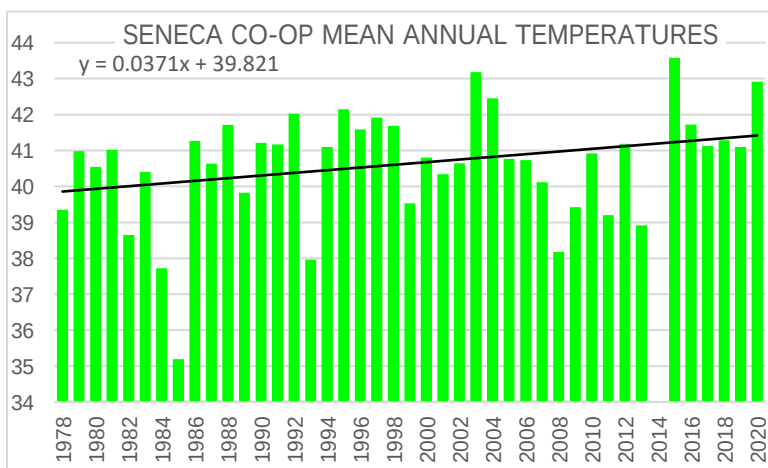
JAN linear trend line begins at 21.81°F and ends at 24.98°F, a +3.17°F increase. FEB begins at 25.93°F and ends at 27.10°F, a + 1.17°F increase. MAR begins at 34.18°F and ends at 33.38°F, a -0.80°F decrease. APR begins at 40.02°F and ends at 39.14°F, a -0.88°F decrease. MAY begins at 46.18°F and ends at 47.46°F, a +1.25°F increase. JUN begins at 52.58°F and ends at 54.56°F, a +1.98°F increase. JUL begins at 58.08°F and ends at 62.42°F, a +4.34°F increase. AUG begins at 57.22°F and ends at 60.08°F, a +2.86°F increase. SEP begins at 48.99°F and ends at 52.12°F, a +3.13°F increase. OCT begins at 40.83°F and ends at 40.78°F, a -0.05°F decrease. NOV begins at 29.73°F and ends at 32.88°F, a +3.15°F increase. DEC begins at 22.20°F and ends at 22.99°F, a +0.79°F increase. Total annual delta sums are +20.11°F or and annual monthly delta mean is +1.68°F.

From the available record, between JAN 1978 and DEC 2020, mean monthly sums of temperature trends begin at 39.81°F and ends at 41.49°F, a trend bias of +1.68°F (+4.22%).



JAN, JUL, AUG, SEP and NOV have the largest positive temperature changes. MAR, MAY and OCT are negative.

SENECA CO-OP monthly temperature trends follow BURNS WSO AP trends. There, NOV does not have such a large increase and JUL-SEP percentage increases are also not as large. Bear Valley sub-Basin summers are beginning to approach lower Harney Basin summers in temperature and duration.

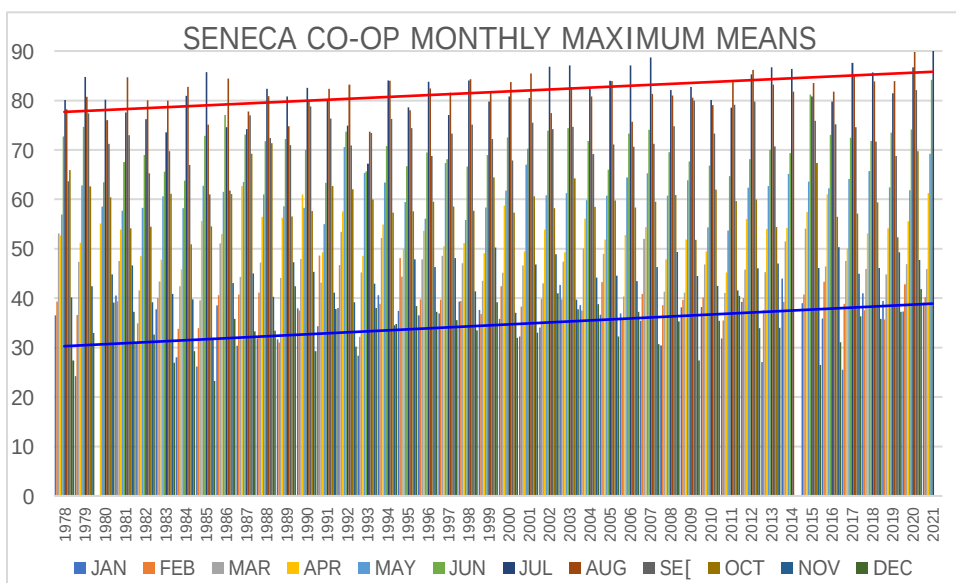


SENECA CO-OP annual mean temperature is 40.62°F. Maximum annual means are in 2015 (43.58°F) followed by 2003 (43.18°F) then by 2020 (42.91°F). Minimum annual means are 1985 (35.20°F) followed by 1984 (37.73°F) then by 1993 (37.96°F).

Ratios between highest and lowest mean temperature years is 1.24 to 1 or 0.87 to 1. Ratios between highest and lowest monthly mean temperatures are a very high 5.77 to 1 or 0.158 to 1.

Linear trend line begins at 39.82°F and ends at 41.38°F, a +1.56°F

(+3.92%) increase.



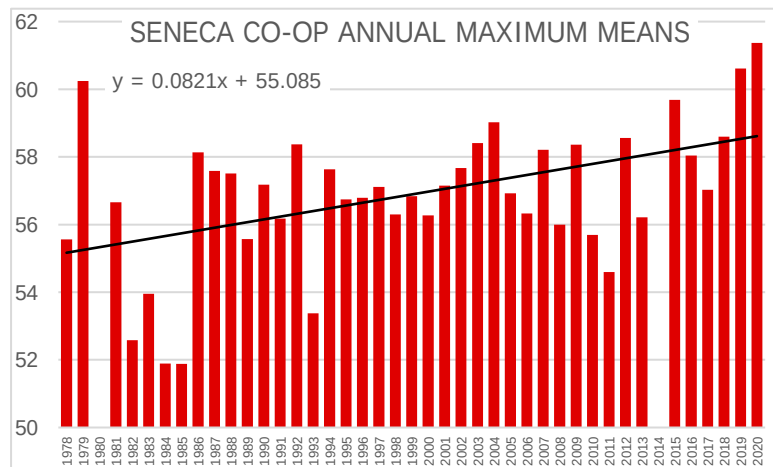
Record is missing three months in 1988 and four months in 2014. Years are not considered. Missing five months are estimated. First and last years are resumed for analysis.

40 year maximum annual mean is 56.01°F. Maximum monthly means are JUL 2021 (92.5°F, not shown in full) followed by AUG 2020 (89.79°F) then by JUL 2007 (88.61°F). Minimum monthly

means are DEC 1985 (23.26°F) followed by JAN 1979 (24.23°F) then by JAN 2017 (25.52°F). Ratio between maximum and minimum maximum monthly temperatures are a high 3.98 to 1 or 0.251 to 1.

Note the last two years of record, 2020 and 2021, have the highest annual and monthly means and rank in the top three years. These last two years of records have issues.

JAN blue linear trend line begins at 30.09°F and ends at 38.91°F, an +8.82°F increase. JUL red trend line begins at 77.63°F and ends at 85.78°F, an +8.15°F increase. Two monthly trend lines do not indicate consensus. For example, AUG trend line begins at 82.64°F and ends at 76.77°F, a -5.88°F decrease.



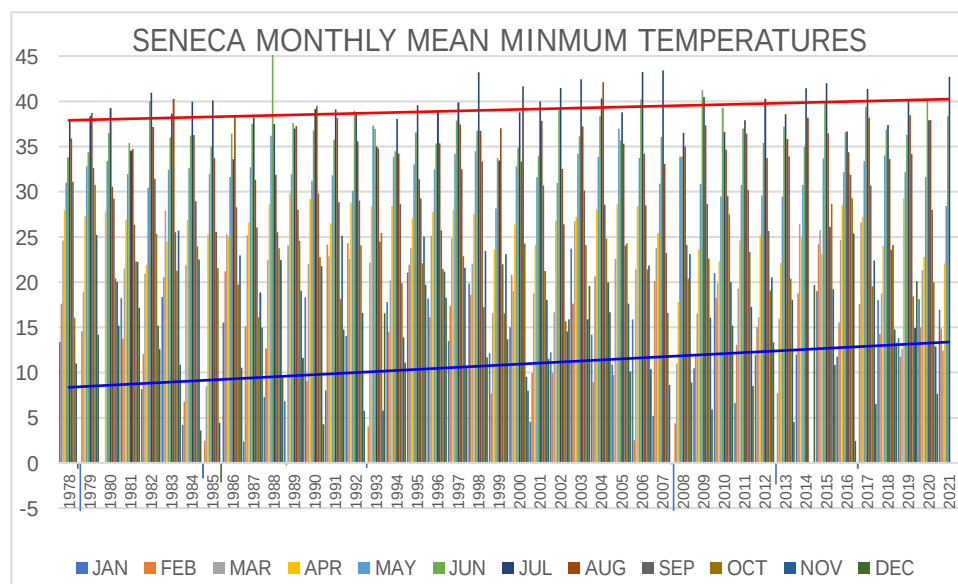
43 year maximum annual mean is 56.41°F. Maximum annual means are 2019 (60.81°F) followed by 1979 (60.24°F) then by 2015 (59.69°F). Minimum maximum annual means are 2020 (42.34°F) followed by 1978 (43.73°F) then by 1985 (51.88°F).

Ratios between highest and lowest maximum annual means (60.81°F and 42.34°F) are 1.47 to 1 or 0.70 to 1.

Months with absolute maximums are JUL 2002 and AUG 2018 (104°F) followed by AUG 2022 (102°F) then by JUL 2006 (101°F). 101°F is also

recorded JUN 2021, one month before station closes.

Linear trend line begins at 55.09°F and ends at 58.61°F, a +3.52°F (+6.39%) increase. Summers are recorded as becoming warmer.

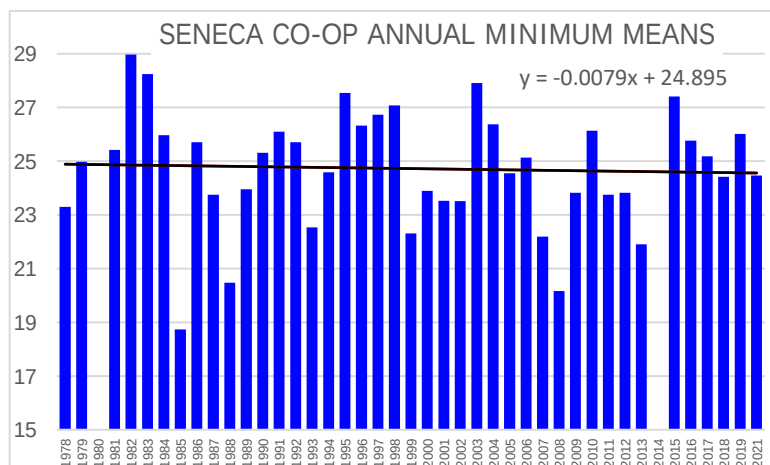


JUN 1988 extreme 51.95°F is not shown in full.

40 year maximum minimum monthly mean is 56.01°F. Maximum monthly maximum means are JUN 1998 (51.95°F) followed by JUL 2007 (43.42°F) then by JUL 2005 and 2006 (43.21°F and 43.53°F). Minimum monthly minimum means are JAN 1979 (-8.1°F) followed by JAN 2008 (-6.97°F)

then by JAN 2013 (-2.39°F). Converting to Celsius, ratios between highest and lowest monthly minimum means, 51.95°F to 11.09°C and -8.10°F to -13.78°C, are a very high 8.37 to 1 or 0.12 to 1.

JUL red linear trend line begins at 37.85°F and ends at 40.21°F, a +2.36°F (+6.24%) increase above 0°F. Converting to Celsius, JAN blue linear trend line begins at -10.35°C (8.24°F) and ends at -13.20°C (13.37°F), a +2.85°C (+7.84%) increase. Winters are becoming warmer faster than summers.



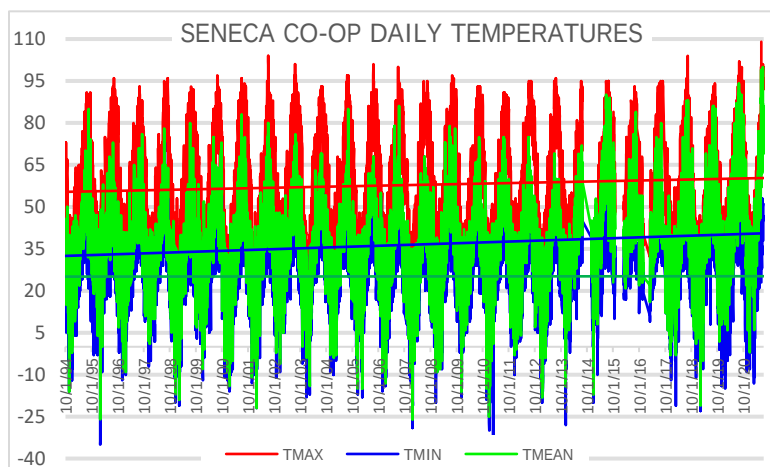
40 year annual minimum mean is 24.41°F. Maximum minimum means are 1983 (28.24°F) followed by 1984 (28.24°F) then by 2003 (27.91°F). Minimum annual means are 1985 (18.73°F) followed by 2008 (20.16°F) then by 1988 (20.47°F). Ratios between highest and lowest minimum means, 56.41°F and 18.73°F, are 1.51 to 1 or 0.33 to 1.

Months with absolute minimums are FEB 1989 (-48°F) followed by FEB 1985 (-43°F) then by DEC 1978 and JAN 1979 (-41°F and -40°F). Last month when the absolute minimum

temperature reaches -30°F is JAN 2011.

Converting to Celsius, linear trend line begins at -3.95°C (24.89°F) and ends at -4.16°C (24.59°F), a -0.21°C (-5.32%) decrease. Note JAN monthly minimum mean temperatures increase +7.84% in Celsius.

SENECA CO-OP (USC 357675) 1 DEC 1908 to 10 JUL 2022 daily Period of Record is non continuous. Author selects the longest modern period relative to SNOTEL and WRCC nominal 30 year 1 OCT 1994 to 30 SEP 2024, a period without major errors. CO-OP 1 OCT 1994 to 4 JUN 2021 period is most error free. Maximum mean daily temperature is 57.70°F, mean daily is 36.30°F and minimum mean is 25.15°F.



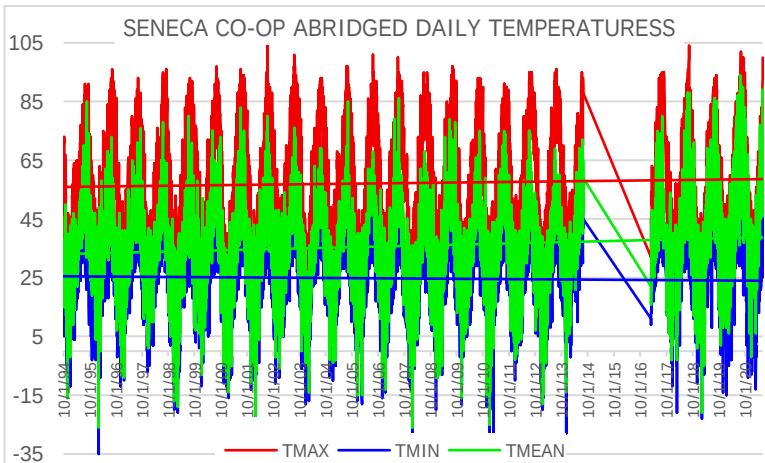
However, 11 DEC 2009 to 1 JAN 2010 has no maximum daily temperature records and cannot be estimated. MAR 2014, 1 AUG 2014 to 1 APR 2015 and 1 NOV 2015 to 29 FEB 2016 are missing and 1 MAR 2016 to perhaps 28 FEB 2017 have defective minimal temperature numbers which cannot be estimated. 1,116 of the 10,957 days record has many missing days and defective maximum daily temperatures.

5 JUN 2021 to 10 JUL 2022 at end of service have more missing days and many defective mean temperatures

and are not considered. 96 of the 10,957 daily records with 151 missing temperatures are estimated by inserting the mean of adjacent days. A total 1,212 days with missing numbers (11.06%) are eliminated from daily analysis. Note the chart shows mean trend line beneath the minimum trend line.

SENECA CO-OP monthly and annual means from MAR 2014 to FEB 2017 are derived from their recorded daily temperatures and are defective. Period reported annual and monthly mean temperatures should not be considered.

However, eliminating or "abridging" those missing three years from mean, absolute and trend analyses will reveal more correct temperature estimates.



Abridged SENECA CO-OP daily maximum, mean and minimum temperatures from 1 OCT 1994 to 4 JUN 2000 with 1 AUG 2014 to 1 MAR 2017 omitted.

Abridged maximum mean daily temperature is 57.14°F, mean daily is 35.67°F and minimum mean is 24.84°F. By definition, Seneca is a semi-arid sub-arctic climate.

Maximum daily temperatures (TMAX) occur on 12 JUL 2002 and 14 AUG 2018 (104°F) followed by 13 JUL 2002 and 4 AUG 2020 (102°F) then by 11 JUL 2002, 23 JUL 2003

and 2006 (101°F). After the period of analysis, 29-30 JUN 2021 101°F and the 7 JUN 2021 109°F absolute maximums are suspect.

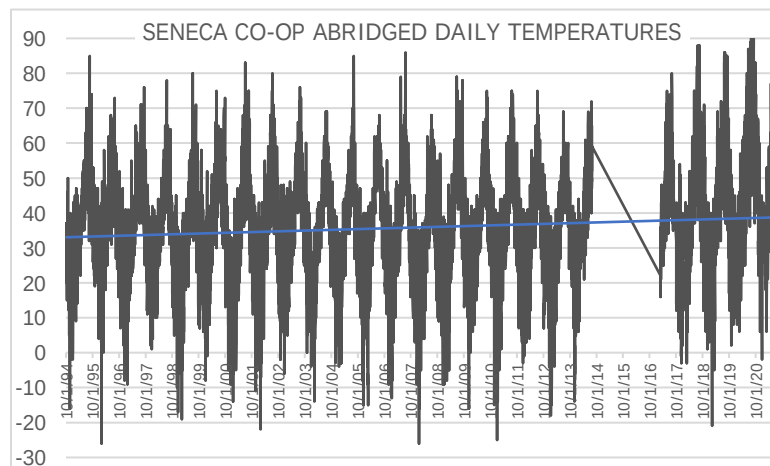
Minimum daily temperatures (TMIN) occur on 2 and 3 FEB 1996 (-35°F and -32°F) followed by 7 DEC 2013 (-28°F) then by 22 and 23 JAN 2008 (-26°F and -29°F). Ratios between maximum and minimum temperatures, 104°F in 2002 and -35°F in 2006, is 3.14 to 1 or 0.32 to 1. Converting Fahrenheit to Celsius, 104°F to 40.0°C and -35°F to -37.22°C, ratios are 1.66 to 1 or 0.45 to 1.

Ratios between mean maximum and minimum, 57.14°F and 24.82°F, is a high 2.30 to 1 or 0.43 to 1. Abridged JUL mean monthly temperature is 54.01°F, DEC mean is 21.15°F. Ratios between maximum and minimum months are a high 2.55 to 1 or 0.39 to 1.

Mean temperature linear trend line begins at 33.10°F and ends at 38.55°F, a +5.45°F increase.

Maximum temperature linear trend line begins at 55.96°F and ends at 58.51°F, a +2.55°F increase.

Minimum temperature linear trend line begins at 25.51°F and ends at 23.98°F, a -1.53°F decrease. Note abridged minimum temperature trend decreases but unabridged minimums indicate winters are becoming warmer faster than summers.



Mean daily temperature chart shows abridged mean maximums after MAR 2017 are a mean +2.93°F more than before SEP 2014. Maximum daily means occur in 30 JUL 2020 (94°F) followed by 5 AUG (91°F) then by 3 SEP also in 2020 (90°F). These temperatures are recorded near the end of SENECA CO-OP service and are suspect. Appears thermal sensor or thermometer is relocated and becomes exposed to more direct sun light and wind after August 2014.⁹

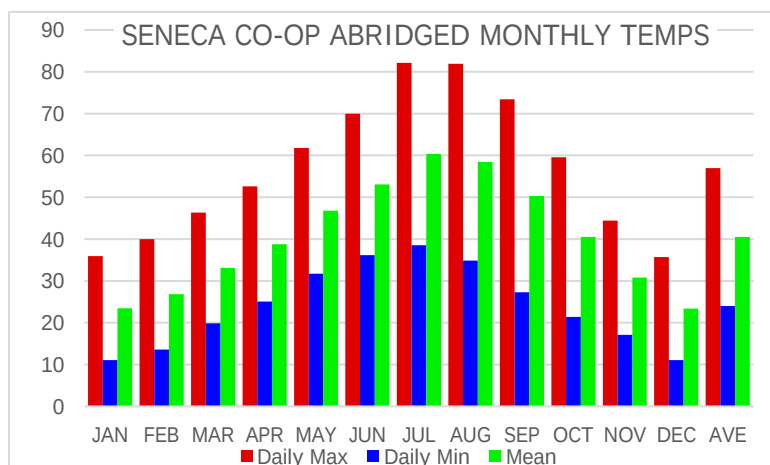
Otherwise, maximum daily mean temperatures occur earlier in 19 JUL

2007 (86°F) followed by 2 AUG 1995 and 7 AUG 2005 (85°F) then by 4 JUL 2001. Minimum daily mean temperatures are 2 FEB 1996 and 22 JAN 2008 (-26°F) followed by 31 DEC 2010 (-25°F) then by 29 JAN 2002 (-22°F).

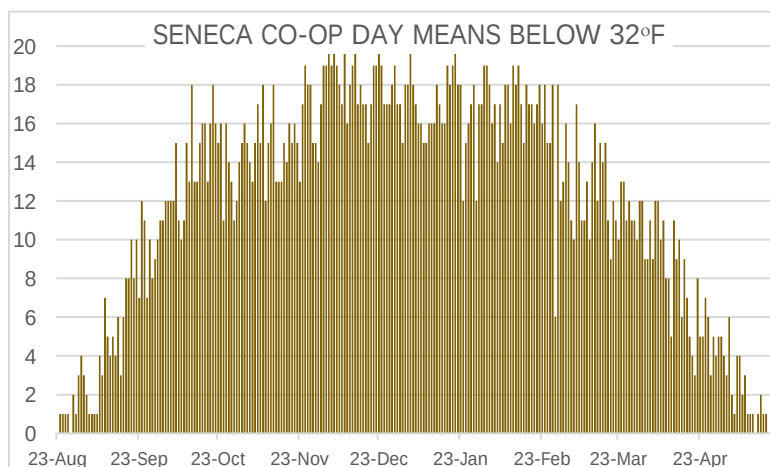
Ratios between maximum and minimum daily means, 78.33°F and -18.33°F, are 2.18 to 1 or 0.46 to 1. Converting from Fahrenheit to Celsius, 25.74°C and -27.96°C, are 1.75 to 1 or 0.57 to 1.

Linear trend line begins at 38.19°F and ends at 40.48°F, a +2.29°F (+6.00%) increase. 2001-2002 and 2020-2021 are warmest, 2018-2019 and 2013-2014 are coolest.

9. Absolute maximum daily temperatures in JUN 2021 (109°F and 100°F), two consecutive 101°F days and one 100°F day in JUN and JUL 2021 are suspect and not considered.



Abridged 1991-2020 nominal 30 year period mean monthly temperatures. Waveforms conform more to NRCS and WRCC monthly estimates and is more accurate.



SENECA CO-OP abridged mean daily temperature days with less than 32°F. 130 days with missing temperatures are estimated by inserting the mean of adjacent days. However, recorded temperatures can vary by 40°F day to day with a small few days recorded in 5°F increments. There are errors in daily temperatures such as a 71°F mean between two 33°F days.

Earliest "freeze" occurs on 25 AUG 2013, the latest on 19 MAY 2001. 29 FEB is in six leap years. Graph shows the 23 year 228 calendar day record.

3,288 days of the 8,442.50 days are recovered or 38.94% of annual days with mean daily temperature below 32°F. SNOW MOUNTAIN freeze days are 33.74% of the year. Maximum days are 21 for 15 DEC followed by five 20°F days with the largest cluster between 19 and 22 DEC. Annual mean is 142.91 days or 39.15% of 365.25. Recall MAR 2014 is missing and AUG 2014 to FEB 2017 are omitted. Annual mean may be 143.48 days of the 365.25 day year (39.28%).

From this abridged record, maximum annual means are 2007-2008 and 2009-2010 (192 days of 365.25 or 52.60%). Minimum annual mean is 1995-96 (88 days). 1996 has the lowest and second lowest SNOTEL minimum monthly and annual mean temperatures, SNOW MOUNTAIN SWEs are the eighth highest year of 30 and both NRCS and WRCC report maximum precipitations in 1995-96. 2014-2020 days and mean daily temperatures below 32°F are also under reported. There is no MAR 2014. Water year 2015-2016 is omitted.

SENECA CO-OP used a roll and pen recorder which required transcription and a dial-up or telephone call relay to the NRCS and its predecessors. Daily mean temperature is derived from the recorded maximum and minimum.

As elevations decrease, temperature means should increase by 5.4°F for every 1,000 feet (9.8°C/1,000 meters). SENECA CO-OP is at least 2,690 feet below SNOW MOUNTAIN. Yet its 30 year mean daily temperature is 40.77°F while SENECA CO-OP daily mean is 35.67°F. Seneca gets cold. West and south Bear Valley have some of the lowest winter temperatures in the entire Harney Basin.

From the numbers:

1995-2024 Mean Annual Temperatures (°F)								
	Period of Record	Max Year	Mean Temp	Min Year	Mean Temp	Ratio (°F)	30 Year Mean	10,957 Day Mean
SNOTEL								
Snow Mountain	OCT 94-SEP 24	2015	44.15	1999	37.15	1.19	40.74	40.77
Starr Ridge	OCT 94-SEP 24	2015	52.72	1999	41.67	1.27	44.22	44.22
Rock Springs	OCT 94-SEP 24	2015	52.32	1999	51.17	1.15	43.51	43.60
Silvies Basin ^E	OCT 94-SEP 24	2015	45.62	1999	39.47	1.16	42.34	42.37
Seneca Co-Op ^F	OCT 94-JUN 20	2015	43.58	1993	37.96	1.15	40.72	40.62

E. Western Regional Climate Center (WRCC), Reno – NV, produces Silvies Basin temperature estimates.

F. Seneca Co-Op Period of Record is shortened or abridged between 1 OCT 1994 to 31 JUL 2014 and 2 MAR 2017 to 4 JUN 2020.

Absolute Mean Annual Temperatures (°F)						30 Year Annual Delta (°F)		
	Max Year	Mean Max Temp	Min Year	Mean Min Temp	Ratio (°F)	Max	Mean	Min
SNOTEL								
Snow Mountain	2009	66.63	2024	21.59	3.07	+1.45	+3.46	+3.70
Starr Ridge	2003	74.47	2013	24.42	3.05	-3.46	+2.43	+5.14
Rock Springs	2015	70.68	2021	23.79	2.97	-0.87	+3.89	+5.90
Silvies Basin	X	X	X	X	X	-0.23	+3.38	+4.65
Seneca Co-Op ^G	2015	59.69	2017	25.52	2.59	(+5.45)	(+2.55)	-1.53

G. After the Summer of 2014, Seneca Co-Op weather station changes location on Seneca Schoolhouse property and begins to record higher daily maximum mean and absolute (extreme) temperatures. Station records an unofficial 109°F 7 JUN 2021, 13 months from end of service. National Weather Service BURNS WPO AP at the Municipal Airport records 101°F on the same day.

SENECA Co-Op mean maximum record years are a suspect 2019 (60.81°F) followed by 1979 (60.24°F) which is before analysis period.

Co-Op prior 20 year OCT 1994 – JUL 2014 delta or rate of change for annual maximum temperature is -1.21°F. The record +5.45°F mean maximum should not be considered. Estimated annual max delta mean of +2.29°F is more accurate.

Mean Monthly Temperatures (°F)								
	Mean Max	Mean	Mean Min	Max Month	Mean Temp	Min Month	Mean Temp	Ratio (°C)
SNOTEL								
Snow Mountain	62.61	40.74	18.47	JUL	85.89	DEC	4.42	1.94
Starr Ridge	71.46	44.22	21.04	JUL	94.41	DEC	4.05	2.03
Rock Springs	68.14	43.51	19.96	JUL	93.39	DEC	3.44	2.00
Silvies Basin ^H	66.37	42.34	19.54	JUL	89.95	DEC	4.11	1.98
Seneca Co-Op ^I	57.14	35.67	24.84	JUL	81.90	DEC-JAN	11.10	1.64

H. WRCC STARR and SILVIES BASIN mean monthly temperature estimates during the period are the 44.26°F and 42.38°F.

I. Seneca Co-Op mean monthly temperatures are abridged.

Absolute Annual Temperatures by Monthly Mean Temperatures						Mean Days Below 32°F ^J	
	Absolute Max Year	Absolute Annual Mean	Absolute Min Year	Absolute Annual Mean	Ratio (°C)	Dates	Days
SNOTEL							
Snow Mountain	2024	42.62	1999	12.53	1.72	16 NOV - 17 MAR	123.25
Starr Ridge	2024	46.15	1999	15.73	1.38	21 NOV - 4 MAR	105.25
Rock Springs	2015	46.89	1999	14.04	1.69	20 NOV - 6 MAR	108.25
Silvies Basin	2015	45.62	1999	13.79	1.69	20 NOV - 8 MAR	114.85
Seneca Co-Op	2007	43.58	2009	13.97	1.75	26 AUG - 19 MAY	142.91

J. Mean Days below 32°F numbers for the NOAA NRCS SNOTEL stations and USDA WRCC SILVIES BASIN are for continuous days. Seneca Co-Op are total continuous and non-continuous days.

Mean Date Temperatures (°F) ^K						Absolute Daily Temperatures				
	Max Day	Day Temp	Min Day	Day Temp	Ratio	Absolute Max Day	Absolute Temp	Absolute Min Day	Absolute Temp	Ratio (°C)
SNOTEL										
Snow Mountain	29-Jul	65.88	25-Dec	23.63	2.17	12-Jul-02	80.78	20-Dec-99	-9.94	2.01
Starr Ridge	1-Aug	69.07	31-Dec	25.54	2.27	12-Jul-02	83.12	20-Dec-99	-6.16	1.72
Rock Springs	1-Aug	68.53	2-Jan	24.17	2.22	12-Jul-02	82.58	21-Dec-99	-7.60	1.96
Silvies Basin	1-Aug	66.60	31-Dec	24.06	2.20	12-Jul-02	80.87	20-Dec-99	-7.69	1.96
Seneca Co-Op	23-Jul	66.45	2-Jan	20.72	2.48	12-Jul-02	104.0	2-Feb-96	-35.0	3.14

K. Seneca Co-Op mean maximum and minimum dates are from 1 JAN 1995 to 27 JUL 2014.

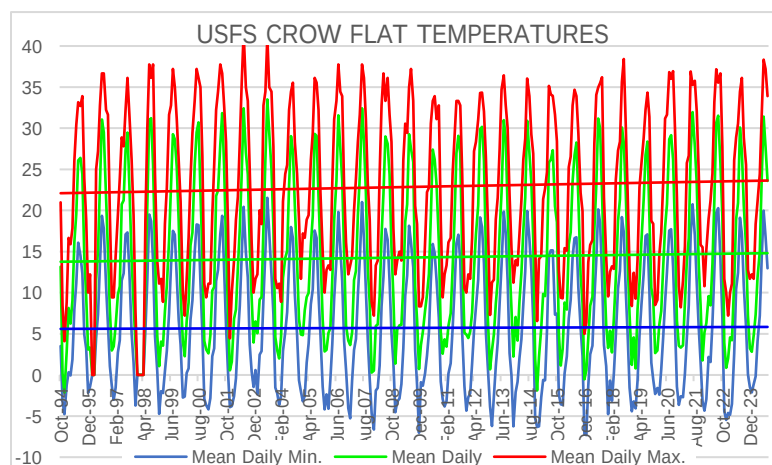
WRCC estimates Silvies Basin maximum mean date is 28 JUL (68.14°F) and mean minimum date is 2 JAN (23.72°F). Converting to Celsius, WRCC ratios are 2.22 to 1 and 2.19 to 1, respective.

Somewhat accurate 210 year temperature projections are futile. SNOTEL records are missing many months and days which cannot be estimated. Reported annual and monthly means differ from daily records. In particular, STARR RIDGE. Converting to Celsius or Kelvin temperature scales have different results. SNOTEL increasing minimum and declining maximum annual and monthly means do not conform to their mean daily temperatures and with a definite warmer bias. WRCC SILVIES BASIN mean trends do conform more to its maximum and minimum trends. SENECA CO-OP 2017-2022 recorded temperatures also have a warmer bias.

From the monthly and daily numbers:

	Mean Trend Percentage			Temperature Gain or Loss by the Year 2235 (°F)		
	Mean	Maximum	Minimum	Mean	Maximum	Minimum
Snow Mountain	9.95%	1.45%	12.83%	9.95	6.64	24.52
Starr Ridge	5.82%	-3.46%	7.85%	5.82	-15.61	14.66
Rock Springs	9.16%	-0.87%	9.02%	9.16	-4.04	19.96
SNOTEL means	8.31%	-0.96%	9.90%	14.98	-13.01	19.71
Silvies Basin	7.01%	0.96%	9.90%	7.01	-4.33	18.03
Seneca Co-Op	3.92%	2.55%	5.99%	3.92	11.00	12.49

According to the numbers, SILVIES BASIN minimum and mean annual temperatures will increase to 37.57°F and 49.39°F in 210 years. Maximum annual temperatures will decrease to 62.04°F.



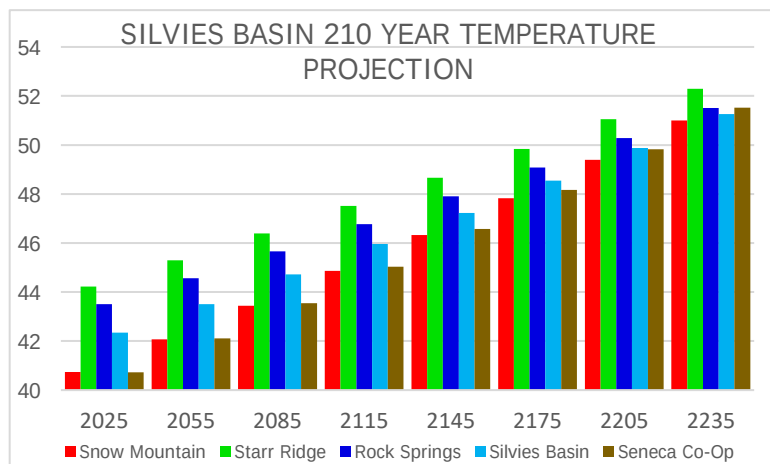
For comparison, USDA USFS Remote Automatic Weather Station [RAWS] at CROW FLAT, located east of US 395 at the T-section for USFS Road 3935 - King Mountain Road is at 1,115.1 meters (WRCC 5,102 or NRCS 5,130 feet) elevation. ROCK SPRINGS is the nearest SNOTEL station. Temperatures are in Celsius.

30 water year daily mean temperature is 14.53°C (58.15°F), maximum is 23.26°C (72.25°F) and minimum is 5.82°C (42.48°F). Minimum and mean temperatures are much higher than WRCC SILVIES BASIN estimates.

Maximum daily temperatures occur in JUN 2002 (41.67°C / 107.0°F) followed by JUL 2003 (41.11°C / 106.0°F) then by AUG 2018 (38.44°C / 101.2°F). Minimum daily temperatures occur in DEC 2014 (-6.33°C / 20.61°F) followed by DEC 2022 (-5.46°C / 22.17°F) then by JAN 2007 (-5.28°C / 22.50°F). Ratios between maximum and minimum temperatures in Celsius, 41.67°C and -6.33°C, is 2.23 to 1 or 0.45 to 1.

In Fahrenheit, mean daily temperature linear trend line begins at 56.79°F and ends at 58.62°F, a

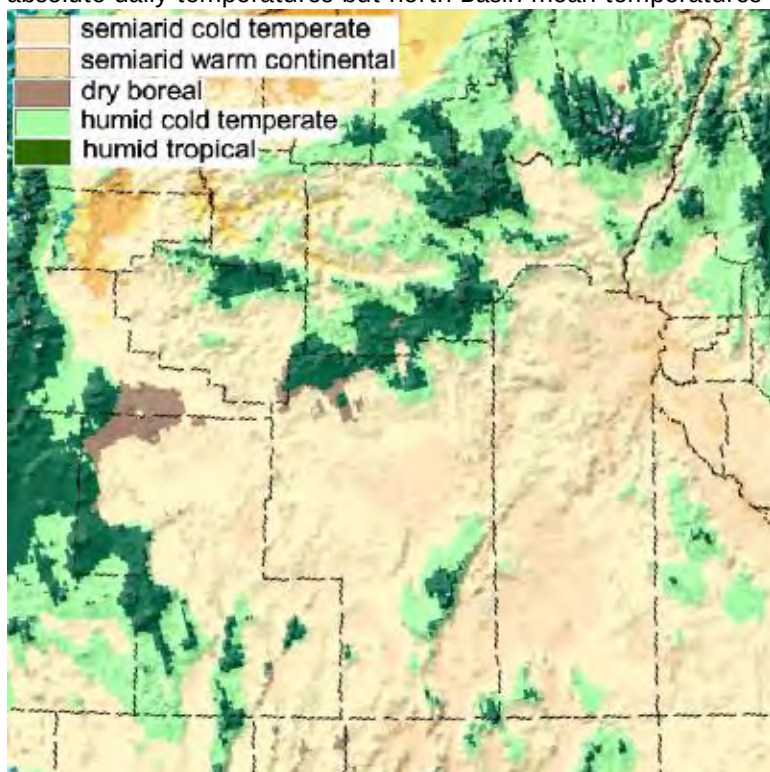
+3.23% increase. This confirms SENECA CO-OP +3.92% increase but is near half of SILVIES BASIN +7.01%. However, while CROW FLAT JAN 2000 to MAY 2023 monthly mean temperatures (42.00°F) is very near to SILVIES BASIN 42.34°F, mean temperatures are trending -3.28% less.



When it comes to Silvies Basin future temperature changes, your guess is as good as mine. An 8°F to 10°F increase in mean annual temperatures by 2235 can be projected. Of course, this won't happen. North Harney Basin weather is too dynamic.

Silvies Basin meteorology and microclimates are unique in the Inter-Mountain West. Relative higher elevations differentiate it from the other like areas with semi-arid Continental and semi-arid sub-Arctic climates. Pocatello – Idaho and Bend – Oregon may have higher and lower

absolute daily temperatures but north Basin mean temperatures are lower.



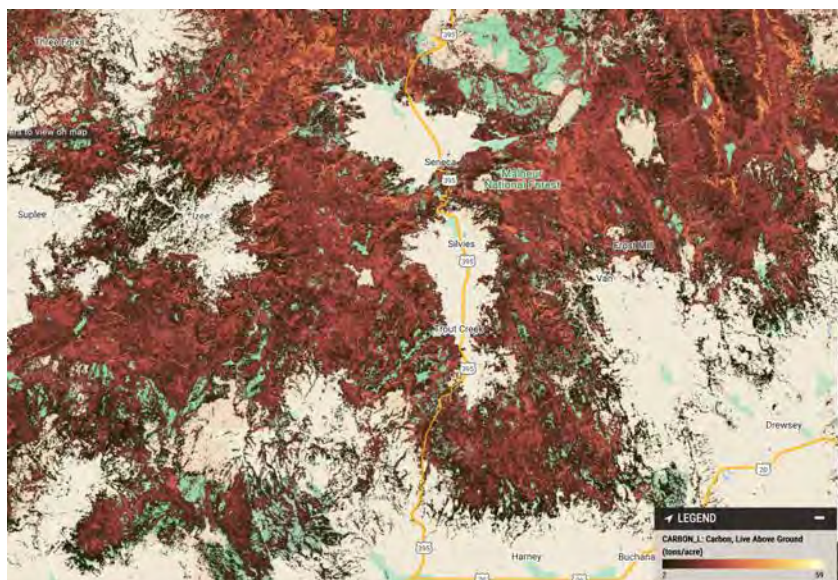
NOAA National Centers for Environmental Information [NCEI] publishes a digital climate map from 1991-2020 precipitation and temperature records using modern classifications.

According to the Merriam – Webster dictionary, *boreal* means “of, relating to, or comprising the northern biotic area characterized especially by dominance of coniferous forests”. There is no humid boreal climate classification.

Bear Valley is identified as humid tropical or boreal, Seneca is considered as dry boreal as is the Yellowjacket Creek area and near the Middle Silvies River / Emigrant Creek confluence. Silvies Valley has the same climate classification as Harney Valley. Note NOAA identifies no humid boreal to humid cold temperate transition south of the Snow Mountain “rain / snow shadow”. The “green” spot in the lower Emigrant Creek

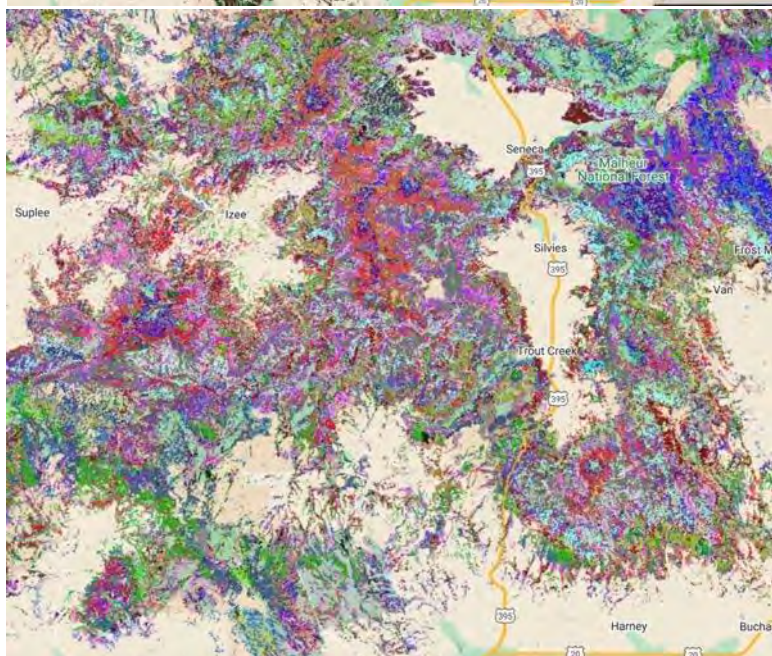
“brown” area are Green and Bald buttes at 5,883 and 5,689 feet which separate the Malheur and Silver Creek sub-basins.

There is evidence of “Climate Change”. However, if the change rate is impacted by human activity, it is not making us warmer but not as cold.



USDA Forest Service Geodata Clearinghouse presents 21 data layers of tree species and forest structures available in 30 meter resolution. They are the 2021 estimate using a 2016 tree level model. Not all upper Basin quadrangles have data.

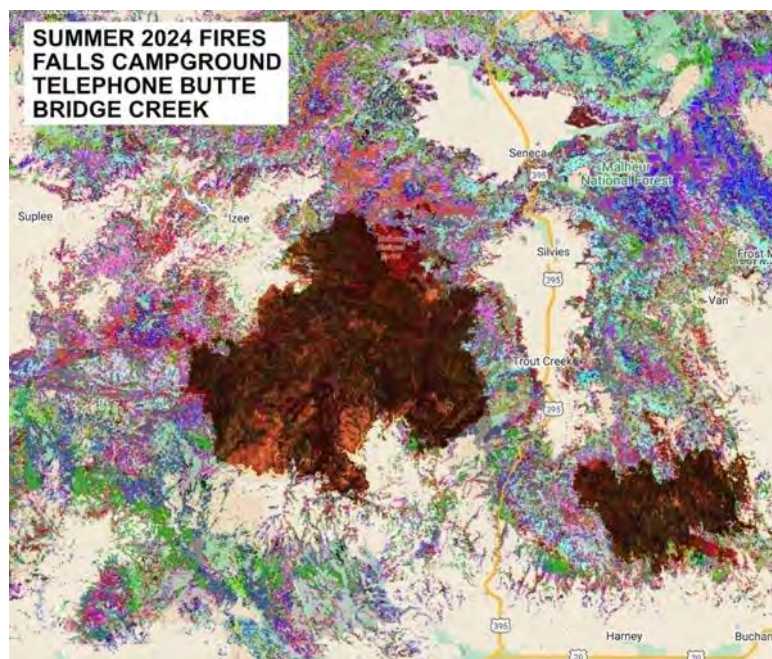
This map shows CARBON_L tons per acre or live above ground carbon vegetation. North and east Bear Valley, Bear Creek headwaters, King Mountain area and the Silves River / Myrtle Creek watersheds have the highest densities per acre.¹⁰



Bear and Silves valleys, middle and lower Emigrant sub-Basin, Silves Canyon and the Harney Basin are Big Sagebrush zones [tan]. At about 4,700 feet, Western Juniper zones transition into mixes of Western Ponderosa Pine and Grand Fir around Snow Mountain. At about 4,600 feet, zones transition into mixes of Lodgepole Pine, Douglas and Pacific Silver Fir east of the Silves Valley and around Strawberry Mountain.

The middle Silves River and Emigrant Creek relative small precipitations and watersheds support boundary or fringe forested areas. Trees attract and retain humidity and moisture. Conifers much less than deciduous leaf trees.

10. USFS Treemap legend identifies 36 different North American herbaceous and conifer trees. It is available at <https://apps.fs.usda.gov/lcms-viewer/treemap.html>.



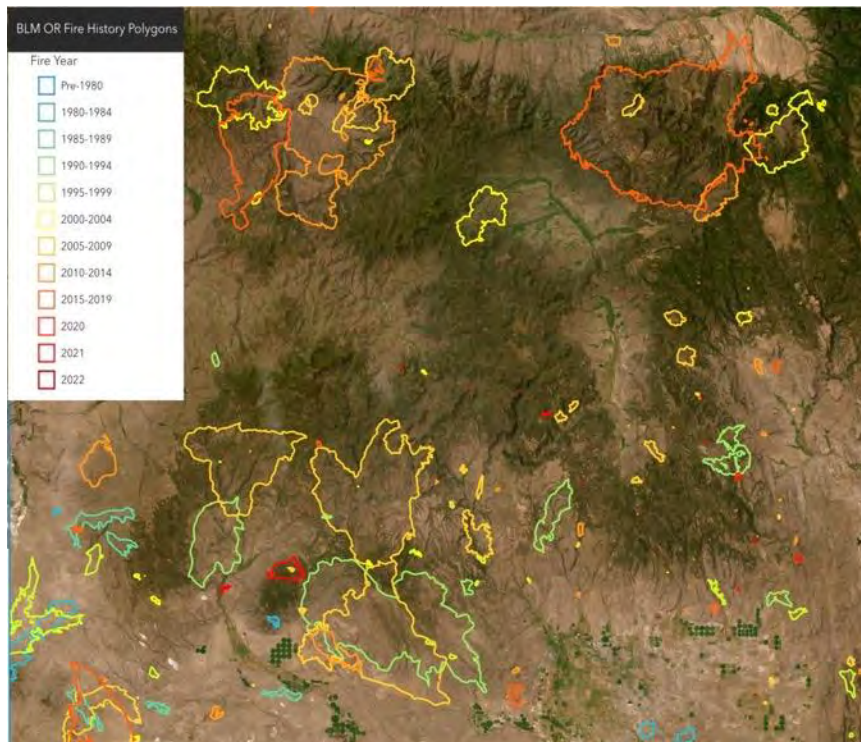
The Oregon 2024 fire season is the largest in modern history. The Durkee Fire in Baker and Malheur counties is the fifth largest wildfire in Oregon history and was at the time the nation's second largest. Grant County Battle Mountain Complex and Harney County Falls and Telephone forest and wildfires, among many others, make breathing difficult for almost eight weeks in southeast Oregon and south-west Idaho.

2024 Upper Harney Basin fire map is created using European Space Agency Copernicus SL-2A imageries in vivid color and three infrared spectrums then are placed over the USDA Treemap. Overlay shows relative burn intensities.

The Falls Campground fire is a human-caused wildfire that started on 10 July in the Malheur National Forest. The fire burns over 151,680 acres and destroys 23 homes and other structures. A pilot dies in a tanker plane crash. Fire starts on the Emigrant Creek Ranger District.

The Telephone Butte fire started on 22 July afternoon south of King Mountain also in the Emigrant Creek Ranger District. Cause is lightning. The fire burns over 64,034 acres. Strong winds pushed the fire south then east toward Drewsey. Silvies sub-Basin Trout Creek watershed and lower Harney Basin Rattlesnake, Coffepot and Cow creek watersheds and drainages will have long term impacts.

National Weather Service station at the Burns Municipal Airport [KBNO] reports the highest maximum daily temperatures since 2002, 105°F on 21 JUL and 104°F on 2 AUG. However, this is not confirmed by 14 Remote Access Weather Stations [RAWS] in and around the Harney Basin. Perhaps the thermal heat generated by increases daily maximum temperatures at KBNO by two to three degrees. Perhaps the larger Durkee Fire to the east generates the Malheur and Harney county dry lightning storms which start the Telephone and Bridge Creek fires.



Reforestation benefits versus the price must be weighed.

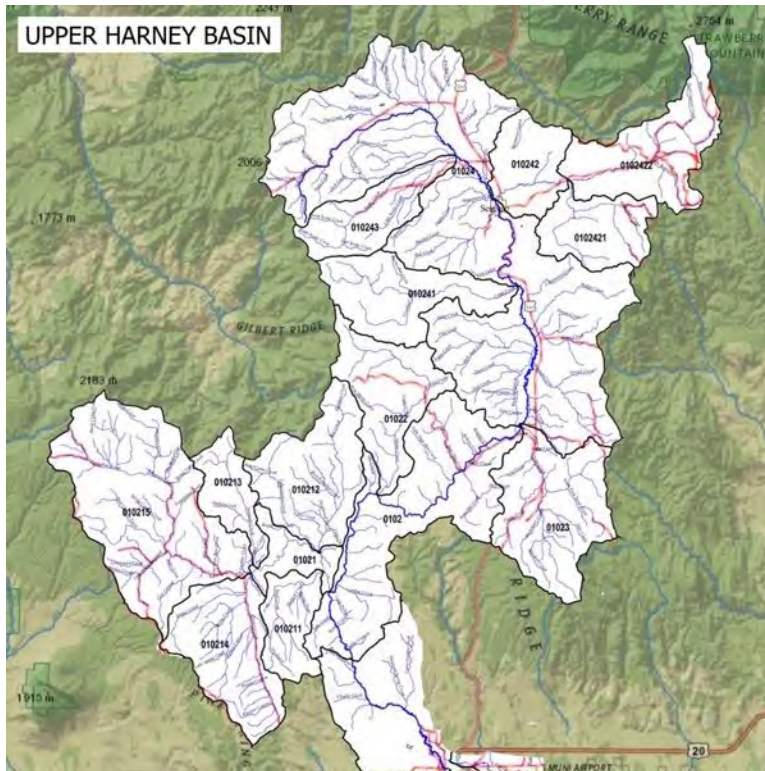
Interior Department Bureau of Land Management [BLM] publishes through ARCGIS polygonal layers of wildfire by years pre-1980 to 2022.

The 2024 fire season burns hundreds of square miles of sage and forest lands which have not burned since before 1980. Many more acres had desiccated under storys ready to burn.

Note the vegetation recovery mixes within the Bear Valley 2015 Canyon Creek Complex fire boundary with little to no recoveries after more than nine years. And, in the middle Emigrant Creek area from the 2009 Skull Creek Fire with no recovery.

These are fringe forests. Some will never recover without Federal assistance.

FLOW



USGS identifies the *Upper Silvies Basin* as HUC-8 sub-basin (4th level) hydrologic unit 17120002.

USGS identifies 22 HUC watersheds within the northern Harney Basin.

There are no closed watershed or sub-basins. This Report identifies four sub-Basins for surface water flow analysis; Bear, Silvies, Silvies Canyon and Emigrant.

USGS LIDAR composite of the upper Basin using the 3D Elevation Program (3DEP) with three meter (10 foot) resolutions compiled from 2011 to 2023 mosaics. Source is apps.nationalmap.gov/3depdem/. Blue circles are surface water sources and major perennial tributaries. Light blue circles are sources for minor intermittent flow or ephemeral creek and stream tributaries.

River and creek sources by elevation:

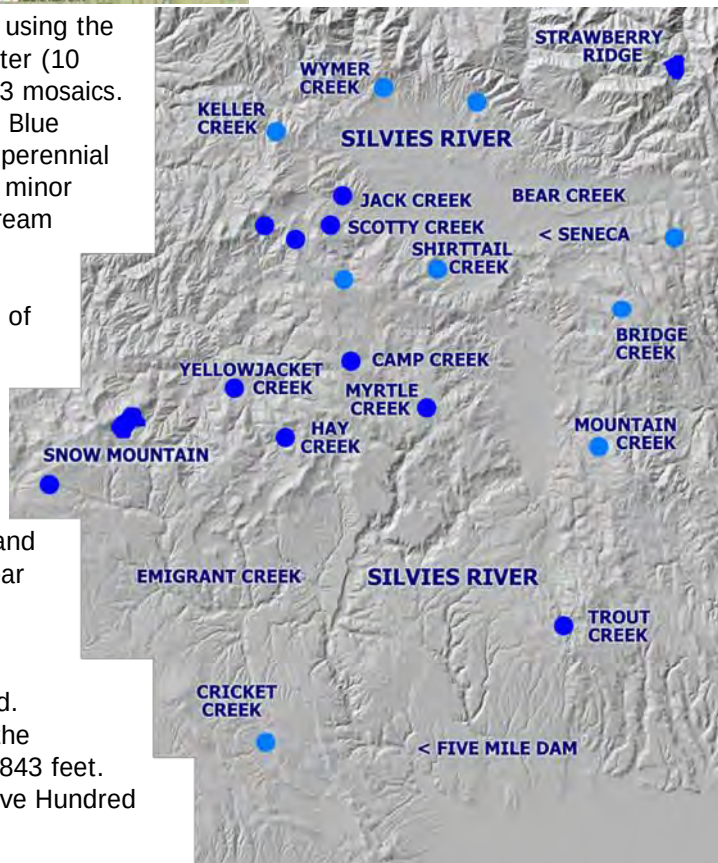
Bear Creek sources on the southwest flank of the Strawberry Range are springs at about 5,610 feet and the southeast drainage from Indian Springs Butte at 7,010 feet.

Emigrant Creek main sources are the Snow Mountain south and southeast flanks at around 5,886 feet with tributaries from Upper Crowsfoot Spring at 5,840 feet and Burnt Cabin Creek drainage at 6,213 feet near USFS 43 - Snow Mountain Road intersection and the SNOTEL station.

Trout Creek sources are springs at about 5,950 to 6,000 feet above Call Meadow Road.

Camp Creek sources are springs between the Elkhorn Cow Camp and USFS 31 at about 5,843 feet.

Myrtle Creek sources are springs around Five Hundred Flat near USFS 4896 at about 5,821 feet.



North Scotty Creek watershed sources are Elk Spring near the USFS 31 and 3190 intersection at 5,782 feet and butte cliff drainages at 5,380. South Scotty Creek watershed source drainages and an intermittent spring at around 5,677 feet adjacent to the North Scotty Creek watershed.

Hay Creek sources are springs above a small valley meadow at about 5,809 feet.

Silvies River headwaters are Carson Spring at 5,560 feet.

Yellowjacket Creek headwaters are intermittent drainage confluences near Myrtle Park Road at about 5,202 feet. West Yellowjacket Creek sources are from intermittent springs at around 5,360 feet and below.

River and creek drainage and spring sources above 5,600 feet tend to have annual flows.

Bear and Silvies sub-Basins are not considered to be in the Environmental Protection Agency designated Northern Basin and Range of Nevada. Trout Creek (King Mountain) and the middle to lower Emigrant Creek areas have Level III characteristics of the Oregon High Lava Plains physiographic province as does the upper Harney Basin. Nor are they considered to be in the Columbia River Basalt Group or Province as the middle Silvies River, Emigrant sub-Basin and lower Harney Basin are. They are in the Blue Mountain Province. Devine Ridge, north and east of U.S. 20 and U.S. 395, is considered in the same geophysical province with exposed andesite and rhyolite near 25 million years old. 24.75 ± 0.15 Ma ($^{40}\text{Ar}/^{39}\text{Ar}$). Ridge is the subject of two known geology studies.

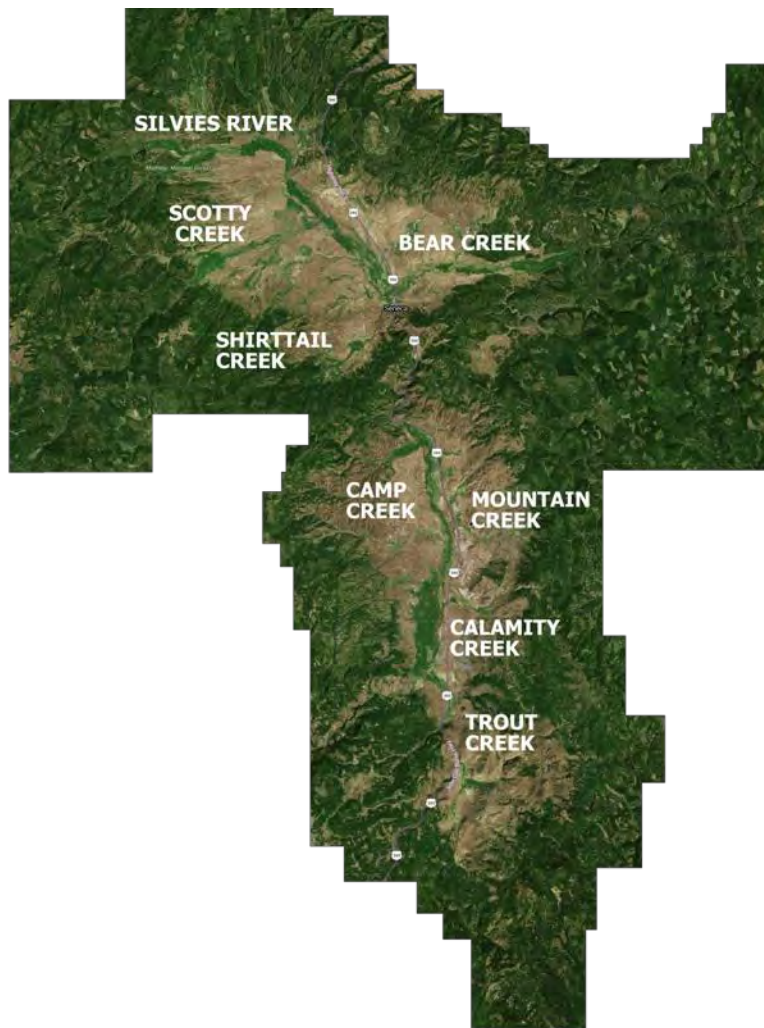
160-200 million years ago during the Triassic Period, the Aldrich – Rattlesnake formations of sedimentary sandstone, shale and volcanic ash faults and divides the Bear sub-Basin from the John Day Formation and its River. From 10 to 20 million years ago during the Miocene – Pliocene periods, the Strawberry Volcanics cover much of the northern sub-Basins with igneous diorite granite, mineral rich serpentine and gabbro.

West Bear Valley alluvium has more of the Aldrich Mountains sandstone and shale while the East Bear Valley alluvium has more of the Strawberry volcanics. Silvies Valley alluvium has both with more alluvium from the west. There are “spots” of alkali and ash in the few depressions of both valleys from Mount Mazama 7,700 years ago.

Middle Silvies River after the Myrtle Creek confluence becomes more a basalt tuff and sandstone alluvium as is the Harney Valley. Both are in the High Lava Plains Region and have some of the most recent faulting and youngest volcanic activity in Oregon producing many mesas and buttes. Snow Mountain may have formed 2.5 million years ago during the Pliocene Period.

The resultant stratigraphy and the prior Steens Mountain Complex incline make the River, creeks and streams flow toward their terminus at Malheur Lake. Playa flooding into a closed sagebrush steppe basin.

Mosaic is from apple maps enhanced color mode from MAXTOR 30 MAY 2024 imagery.



Bear Valley sub-Basin has the Silvie River, a major tributary, Bear Creek from the east, the minor tributaries Jack, Eddington and Scotty creeks from the west and Shirttail Creek from the south. Shirttail flows during March through May floods. Surface water retention and use absorbs most flow and U.S. 395 elevated embankment and pipe culverts prevent constant direct contact with the River.

Upriver, from above the Izee-Paulina Road to near two miles above the Bear Creek confluence, the upper Silvie River has been dammed, diked and diverted as much as can be. Eddington and Scotty creeks more so.

Bear Creek has defined channels with little diversion.

Bear Valley has the largest drainage area and lowest mean temperatures. However, late summers are warm and the OWRD SENECA gauge will measure 0.1 cfs to no flow between late July to late September. Peak daily and weekly flows can be larger than the Silvie River-Emigrant Creek confluence some years. Bear Creek transit losses are the lowest in the north Basin.

Silvie Valley sub-Basin has the Silvie River and two major tributaries, Camp Creek from the northwest and

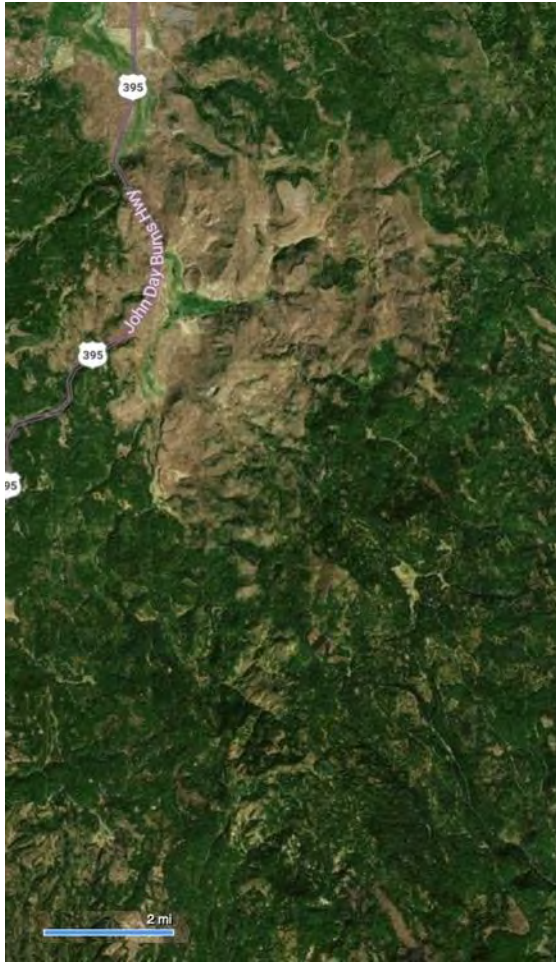
Trout Creek from the southeast and two minor tributaries, Mountain and Calamity creeks from the east. Last two are considered ephemeral. Only Camp Creek makes constant direct contact with the River.

Transit losses through absorption and evaporation must be considered. Both Bear and Silvie valley south hills and flanks show evidence of glacial scouring during the last Holocene Ice Age advance and debris deposits during its rapid retreat 10,800 – 8,800 years ago. Continuing geological faulting and erosion leave valleys and canyons with a mix of soil materials including low permeable silts and clays. Bear and Silvie valleys alluvial composition is much like Harney Valley but is thinner with more organic materials.

Silvie Valley has the second largest drainage area and second highest mean temperatures. Late summers are warmer than Bear Valley and OWRD SILVIE gauge will measure 0.1 cfs to no flow between late July to mid-October with 347 days during the past 10 years. SENECA has 246 days.

Silvie Valley has warmer winters and summers than Bear Valley by the same degree. It receives much less precipitation from late MAY into October. Occasional summer storms will pulse SILVIE flows more than SENECA. Silvie Valley has more surface irrigated acres but less watershed than Bear. Long term surface and in-stream water retention practices are more necessary.

Artificial Beaver Dams on Camp Creek which appear beginning in 2016-17 (and on private land) attracted beaver. By Spring 2024, the beavs have extended their activities farther upstream into the National Forest and downstream toward the golf course. There are other streams and creeks with artificial water retention devices, but Camp Creek is the best example of riparian restoration in the upper

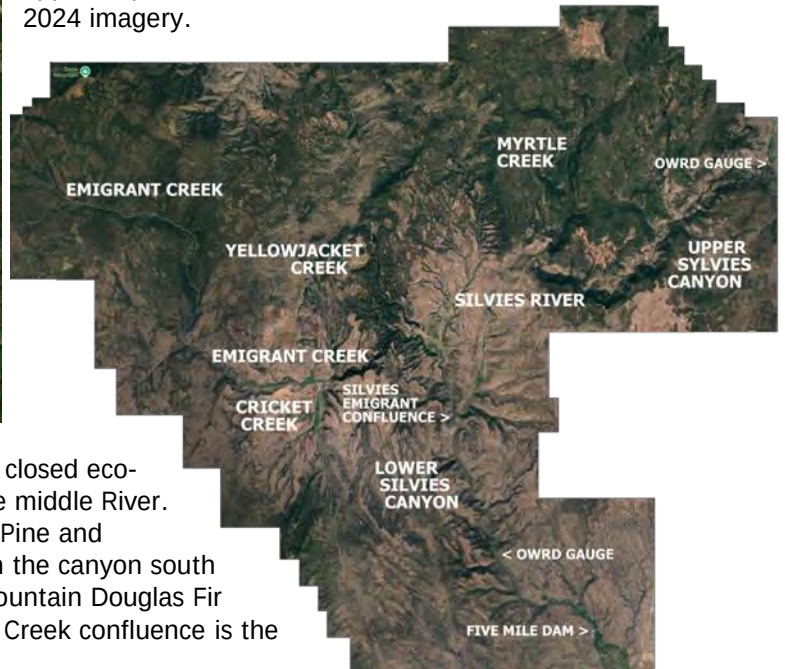


Harney Basin. Below the golf course, Most Camp Creek flows during most of the year are sub-surface to the Silvies River. Golf course does not consume Camp Creek flows.

Image is from Bing Maps Terrago enhanced color mode imagery. Date unknown.

Trout Creek upstream has defined channels with little diversion. It was the major tributary to the Silvies River in the valley but no longer makes direct contact. Dams, dikes, diversions and culverts retain surface water in the south valley east of U.S. 395. Flows are contained by the defunct Oregon & Northwestern Railroad berm. Sub-surface flows will reach the Silvies River most years.

Silvies Canyon and Emigrant Creek mosaics are from apple maps natural color mode from MAXTOR 30 MAY 2024 imagery.



The Upper Silvies Canyon is a remote narrow closed eco-system separate from the Silvies Valley and the middle River. Conifer (Rocky Mountain Douglas Fir, Western Pine and Western Juniper) and some deciduous trees on the canyon south flanks provide some solar shade. The Rocky Mountain Douglas Fir stand at the canyon south end near the Myrtle Creek confluence is the



farthest south grove in Oregon. Near half is burned in the 2024 Falls Campground fire.

Relative sharp elevation drops create 13 step pools which now exist only after annual floods.

Myrtle Creek headwaters and watersheds are off West and East Myrtle buttes near eight

miles north of the Silvies River confluence. Watershed size is substantial. It has forested ravines with different gradients. Transit losses for both areas may be third lowest in the Basin.



Below the Myrtle Creek confluence, the Silvies River changes character. There are only two working cattle ranches between the SILVEIS and BURNS flow gauges, near 28 miles of River, for a reason.

Winters are warmer and summers are drier. Erosions from peak flood flows support little perennial riparian vegetation excepting small clumps of willow. There is no broad leaf herbaceous vegetation below the Myrtle Creek confluence to below the Emigrant Creek confluence. Streams are rare and ephemeral. River will stop flowing here after SENECA and SILVIES do near 2.8 miles upstream from the Emigrant Creek confluence.

Transit losses vary by season more. Straight evaporation is much larger than vegetable absorption and perspiration (ET) This River section has low absorption during flood periods and perhaps the highest evaporation rates, but not by volume, from late Spring to early Fall in the upper Basin. There are clumps of juniper trees along the west bank that do not survive the 2020-2022 drought period.

A diversion dam near 2.87 straight miles upstream from the Emigrant Creek confluence creates a west canal along the River. Other diversion dams and berms, some with gates, further divert in-stream flows into sloughs and ditches for near

2.0 miles along the River which resemble Harney Valley irrigation practices. Cattle are seen grazing here.



The confluence joins two distinct watershed systems. Bear and Silvies sub-Basins along with the Myrtle Creek watershed meet the Emigrant Creek sub-Basin. Emigrant, Hay, Yellowjacket and Cricket creek watersheds now provide more than 56% of BURNS measured mean annual flow. From May to October, with much lower acre feet volume flows, Emigrant watersheds provide as much as 64% with wide daily variances.

Emigrant Creek never runs dry. There is physical and numerical evidence Emigrant Creek will flow up the Silvies River channel for some distance during some summers. Numbers indicate reverse is also true but flows are not measurable. Confluence is a natural reservoir. Both meander at the confluence and Emigrant Creek side has less erosion, less juniper and more willow.

Both flows are identifiable by color. Silvies flows tend to be blue-brown while Emigrant flows tend to be green-grey with more suspended organic-inorganic materials and more soluble O₂ oxygen. Flows do not mix at the confluence. Water temperature differential between Emigrant and Silvies at the confluence can be felt by hand. In

late May 2024, Author measures a four degree difference, 40°F vs. 44°F, and Emigrant colder waters tend to submerge. The Silvies River green-brown color appears downstream some distance which varies

with flow amounts from each. The surface water and ambient air temperature differentials between March – May and July – September may be the largest in the upper Basin.

Emigrant sub-Basin has two distinct micro-climates. Upper watershed is the largest with the highest precipitation and lowest mean temperatures in the Silvies Basin. Lower watersheds, Yellowjacket / Hay and Cricket, share many characteristics with the adjacent Silvies River canyon area but with lower mean monthly temperatures, higher precipitation and more watershed.

Yellowjacket and the once tributary Hay Creek both source between Cougar Mountain at 5,867 feet separated by Sugarloaf Mountain at 6,126 feet. At near 4,783 feet, Clemens Lake / Yellowjacket Reservoir and its 300 foot long berm dam is a popular NFS campground until the 2024 Falls Campground fire closure. Yellowjacket Dam screw gates are “stuck” for many years but maintain reservoir levels. The spill way on the west edge of the berm dam relieves excessive reservoir levels above near 35 surface acres. East side of the Dam still seeps. Culvert constant pass through flow amounts are unknown. Reservoir and lake are in the National Forest. Yellowjacket dam is operated and maintained by OWRD and stocked with sterile Rainbow Trout by the Oregon Department of Fish and Wildlife. Restocking the past 10 years have diminished as the fishery is under utilized. There are late summer algae blooms. Clemens Lake is the only reservoir in the north Basin with state operated recreational facilities.

Yellowjacket Creek was at times the major tributary to Emigrant Creek. Adjacent Hay Creek, with a smaller watershed and drainage area, supplies more surface water than Yellowjacket Creek at their confluence 4.52 straight miles from Yellowjacket Dam. Either or both will lose direct contact with the Emigrant Creek confluence at 4,742 feet most years.



Mosaic is from google maps Terra-metrics natural color mode 15-16 MAY 2024 imagery.

Emigrant Creek watershed alone is the largest, wettest and coolest. It has the largest elevation gradient, from near 4,234 feet at its confluence with the Silvies River to 7,163 feet on the Snow Mountain south flank for 2,929 feet total over 24.4 miles of creek and stream. An overall gradient of 120 feet per mile in comparison to the one to two feet per mile in the middle Silvies River and Lower Silvies Canyon.

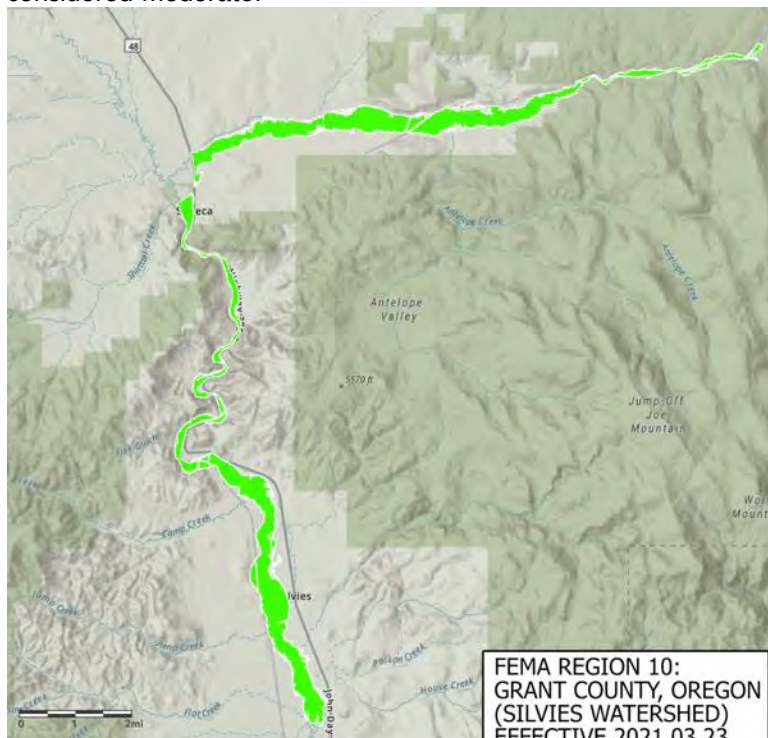
It has two major tributaries downstream, Cricket and Yellowjacket / Hay creeks. and two ephemeral

tributaries, Sawtooth and Skull creeks. There is a wide concrete spillway near 4.0 creek miles upstream from the Silvies River confluence which limits maximum flow. There is evidence flood flows are impounded upstream by the spillway some years. There is another smaller spillway 4.9 miles from the confluence.

All Forest Service roads over the creek are bridges except further upstream where the Emigrant Campground access road over the creek and Coyote Springs access road to Forest Service Road 43 which are berm roads with large pipe culverts. Further upstream where Emigrant Creek turns north toward the Snow Mountain south flank before the Forest Service Road 4360 intersection which also parallels the creek north, there is a recent near ten foot by near 60 foot pipe culvert installation under FS 43 which is set eight to ten inches higher than the upstream base height resulting in upstream pooling during medium to low flow periods. Pipe dimension seems to follow whatever the estimate peak flow rate is, then double the size.

Transit losses are the lowest in the Emigrant sub-Basin until the Creek passes through a National Forest area which burns south and west of the creek 15 to 20 years ago with a near 20% recovery until the 2024 Falls Campground fire burns the same area and more further east.

Only the most western and most highest in elevation burn areas recover with Western Pine and aggressive Western Juniper regrowth and herbaceous vegetation (grass) in some wet meadows along the creek. Many desiccated trees from the fire have flooded into the creek bed slowing flows. Some of these natural water retention devices will move downstream during spring floods. This 1,200 foot section of habitat would have offered an interesting study in contrast to the willow shrouded creek banks downstream if not for the Falls Fire. Transit losses increase closer to the Silvies River confluence and may be considered moderate.



In 2021, the Federal Emergency Management Agency [FEMA] Flood Map Service Center publishes new and reduced 100 year flood plain areas for Grant County. Possible 200 year events are no longer considerations as Federal policy acknowledges precipitations are decreasing.

Note the Silvies River up river from Bear Creek and Scotty Creek are not identified as flood plains although they are.

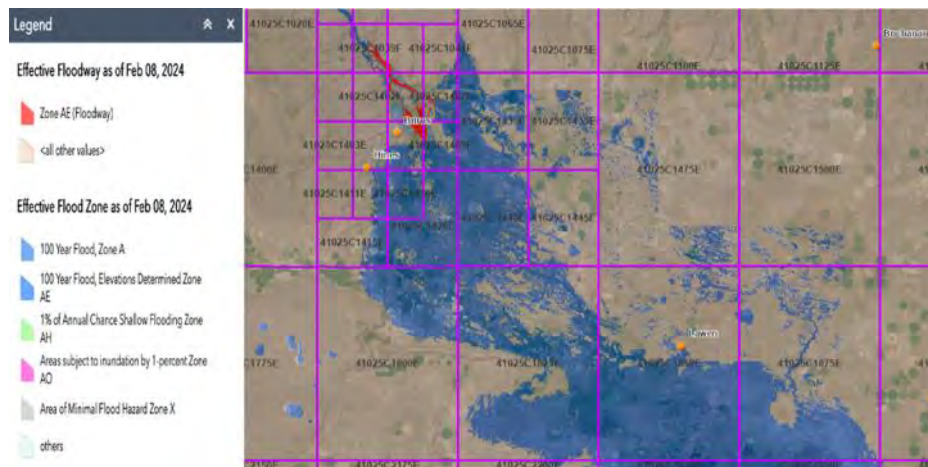
Map shows where flow controls such as roads and culverts restrict Bear Creek flows and separate the flood plains. Seneca is two feet above the average terrain.



In 2024, FEMA also reduces the Effective Flood Hazard Area from the Harney County line to State Route 78. The Silvies River flood plain in Harney County now includes Emigrant, Spring, Hay and Trout creeks.

MAR 1952 high velocity rain on snow melt flood some Burns and Hines neighborhoods. During the 1982-86 "Great Harney Basin Flood", majority of flows came from two direction, the "cold" Silvies River the first two years, followed by the Donner und Blitzen the following year then by a "warm" Silvies during the 1985-1986 high precipitation period. 1997-1999 and 2023- 2025 are also high flood years.

Preliminary 15 May 2019 study area map with one foot step markers. 2024 Flood Plain for Burns and Hines is reduced from the FEMA 1991 Flood Hazard Area map.



Lower Silvies River with revised 2024 FEMA flood zones. Note FEMA map does not show Coffeepot, Rattlesnake and Cow creek at times substantial spring melts from King Mountain which once flowed to the Lake via Ten Mile and Malheur sloughs.

OWRD 10393500 [SENECA] shape area elevation is at 4,505.2 feet elevation. Silvies

River - Myrtle Creek confluence is at 4,324.1 feet for a 181.1 foot elevation drop. Silvies River - Emigrant Creek confluence is at 4,222.8 feet for another 101.3 foot drop. Five Mile Dam shape area is at 4,167.6 feet for a further 55.2 foot drop. Total elevation drop from OWRD SENECA to Five Mile Dam is 337.6 feet in near 30.35 straight miles (48.80 km). Seneca town is at 4,675-92 feet. OWRD SILVIES flow gauge elevation is 4,195.6 feet. Malheur Lake boundary is at 4,093.2 feet. OWRD SENECA is near 412.0 feet higher and 50.8 straight miles (81.77 km) north of Malheur Lake.¹¹

The April 2022 USGS *Hydrologic Budget of the Harney Basin Groundwater System*, pgs. 30-34 available at <https://pubs.usgs.gov/sir/2021/5128/sir20215128.pdf>, discusses upper Harney Basin ground water source springs in context with the lower Basin north of Malheur Lake.



"The upland groundwater budget is minimally affected by groundwater development and generally represents the budget of the natural system. In upland areas during 1982–2016, mean-annual recharge totaled 288,000 acre-feet (acre-ft) and mean-annual discharge totaled 239,000 acre-ft, resulting in a net recharge of 49,000 acre-ft.

"Upland groundwater recharge occurs as infiltration of precipitation and snowmelt and was estimated using the USGS Soil-Water-Balance model calibrated to estimates of runoff, evapotranspiration (ET), base flow, and snow-water equivalent. Groundwater discharge to streams is the predominant discharge mechanism in upland areas and was

estimated as 225,000 acre-feet per year (acre-ft/yr) during 1982–2016 using hydrograph separation and summer low-flow estimates in stream gaged watersheds and a linear relation between estimated stream-flow and base flow in ungaged watersheds.

"The remaining upland discharge occurs through springs (14,000 acre-ft/yr) that either emerge down-gradient of locations where groundwater discharge to streams was estimated or are routed to irrigated areas. Spring discharge was estimated as a compilation of current and historical measurements. The net upland recharge, which is 17 percent of total upland recharge, ultimately recharges lowland areas as groundwater flow from uplands to lowlands.

11. Elevations in meters: 1,678 m, 1,318 m, 1,287 m and 1,270.3 meters, respective. Malheur Lake is at 1,248 meters.

"Groundwater discharges to springs throughout the study area (fig. 10). The National Hydrography Dataset (NHD; U.S. Geological Survey, 2016) contains nearly 2,600 springs in the Harney Basin, which likely represents a minimum number since springs in forested areas and within deep canyons are difficult to identify. Most springs discharge in the uplands (97 percent of NHD springs; fig 10) at small volumes reflecting discharge of local, recently recharged ground-water...

"The NHD contains 2,474 mapped springs that discharge from upland areas of the Harney Basin. Of these, 12 have documented discharge measurements (table 7). Measured discharge from upland springs totaled 14,200 acre-ft/yr and is 30 percent of the total measured spring discharge in the Harney Basin. Discharge from unmeasured upland springs was estimated to range from 500 to 9,800 acre-ft/yr based on the spring discharge from measured springs elsewhere in southeastern Oregon. The smaller estimate is calculated from the median discharge from all springs and the larger estimate is calculated from the 75th percentile of discharge from all springs. ...

"Spring discharge varies regionally from a maximum of about 24,600 acre-ft/yr (34 ft³/s a month) in the western region (Silver Creek watershed) to a minimum of about 2,500 acre-ft/yr (3.5 ft³/s a month) in the northern region. The upper range of unmeasured spring discharge discussed earlier was used to calculate total spring discharge by region and is used to provide an upper limit on the estimated discharge from springs for these areas. In the northern region, spring discharge primarily occurs in the uplands (94 percent) and measured spring discharge accounts for 28 percent of the total estimated spring discharge ...

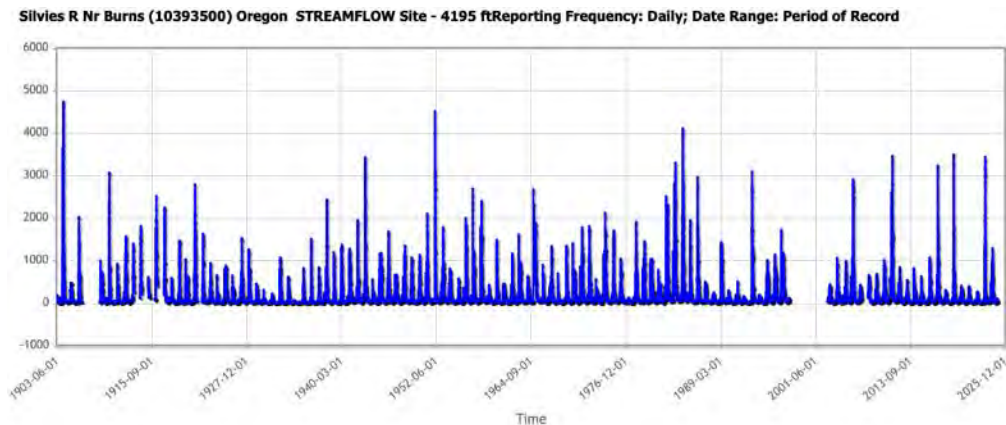
"Natural groundwater discharge to streams or base flow is the primary groundwater discharge mechanism in upland areas and occurs in limited areas in the Harney Basin lowlands. Base flow is the primary source of water in streams of the Harney Basin in late summer and autumn, when runoff from rain and snow-melt is minimal. ...

"Groundwater recharge is largest in the uplands—however, the rocks that underlie most upland areas limit groundwater flow. Most upland rocks have low permeability. Because of low permeability, groundwater-flow paths in upland areas generally are short and shallow. More than 80 percent of water that recharges the upland groundwater system discharges to nearby streams and springs rather than flowing deep underground. This upland groundwater discharge is crucial to maintaining flow in streams, springs, wetlands, and meadows during the dry summer months. A portion of the groundwater exiting to upland streams eventually flows as surface water to the lowlands where it sustains wetlands (such as the Malheur National Wildlife Refuge), is diverted for irrigation, or seeps into the ground recharging the lowland groundwater system." ¹²

There are no published estimates of upper Basin spring outputs alone. However, USFS and BLM register permits with the Oregon Water Resources Department [OWRD] for springs with 0.1 cfs or more of mean daily outputs. OWRD internet dashboard does not allow for easy Point of Source permit tabulations. Author estimates there are 472.

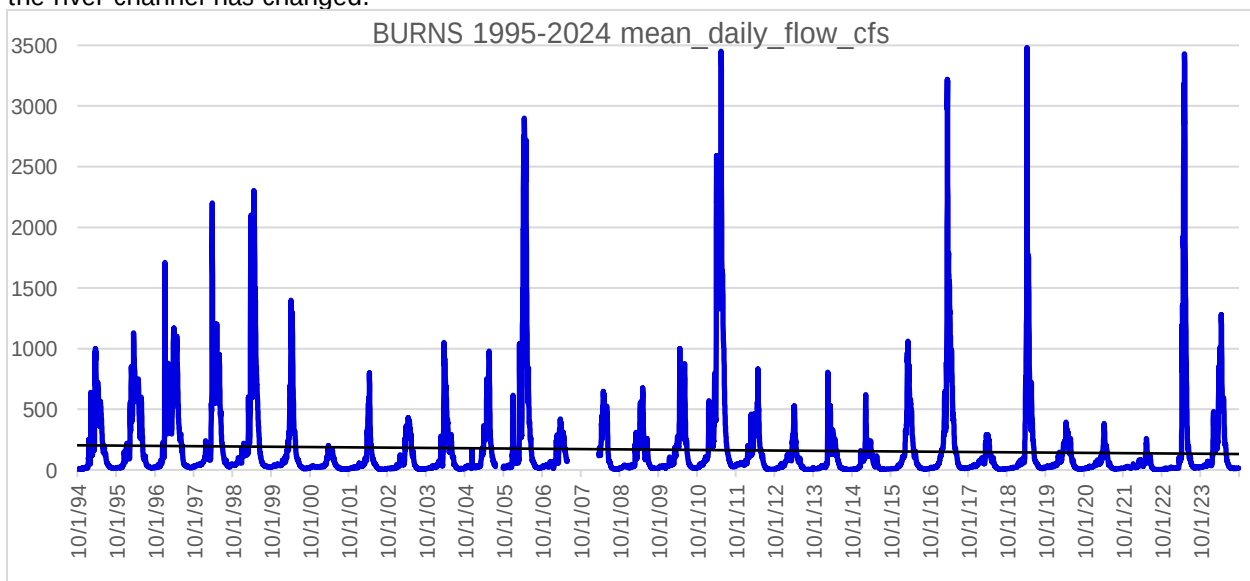
There are three OWRD flow gauges on the Silvies River. OWRD 10392400 SILVIES R BL SODA SPRINGS NR SENECA where near the Silvies River exits Bear Valley [SENECA], OWRD 10392500 SILVIES R NEAR SILVIES where the river exits the Silvies Valley [SILVIES] and enters the Upper Silvies Canyon and USGS/OWRD 10393500 SILVIES R NR BURNS above Five Mile Dam [BURNS].

12. <https://www.usgs.gov/publications/hydrologic-budget-harney-basin-groundwater-system-southeastern-oregon>
Hydrologic budget of the Harney Basin groundwater system, southeastern Oregon. April 11, 2022 Abstract. C. Amanda Garcia, Nicholas T. Corson-Dosch, Jordan P. Beamer, Stephen B. Gingerich, Gerald H. Grondin, Brandon T. Overstreet, Jonathan V. Haynes, Mellony D.



Historic BURNS flow from three different gauge locations. 1 JUN 1903 to 1 DEC 2024 Period of Record annual Discharge Observed Mean in cubic feet per second. USGS 1039500 gauge below Five Mile Dam

(BUR01) relocates 28 SEP 1991 up river in the Lower Silvies River Canyon (BUR02) then ends service 25 MAY 2007 when there is no more federal interest in a possible Silvies Dam. Oregon Water Resources Department (OWRD) resumes service near the same location 18 MAR 2008 (BUR03). OWRD reformats USGS flow numbers to its existing format which again changes in the 2016-17 water year to meet federal universal reporting standards. Graph shows the relative changes or errors between the two recording and reporting agencies. OWRD 1039500 SILVIES RIVER NR BURNS record indicates it may need relocation as the river channel has changed.



OWRD record is missing 19 JUL – 26 SEP 2005 and 26 MAY 2007 - 17 MAR 2008. Record reports 18 JAN 1998 to 30 AUG 2004 flows in 2, 5, 10 and 50 cfs increments and does not report less than 10 cfs in tenths (0.1) until 19 JUL 2003. 22 APR 2010 annual peak mean daily flow (1,000 cfs) is suspect. Not until 1 OCT 2016 does the record report single digits and tenths. **THIS RECORD IS NOT ACCURATE.**

From the numbers, daily mean flow during the nominal 30 year period is 166.72-75 cfs. Maximum peak daily flows are 10 APR 2019 (3,480 cfs) followed by 17 MAY 2011 (3,450 cfs) then by 6-7 MAY 2023 (3,430 cfs). Maximum minimum peak daily flows are 25 MAR 2001 (200 cfs) followed by 27 APR 2017 (240 cfs) then by 11 MAY 2002 (259 cfs). Ratios between maximum and minimum mean daily peaks, 3,480 and 200 cfs, are an extraordinary 17.4 to 1 or 0.057 to 1.

Linear trend line begins at 202.86 cfs and ends at 131.03 cfs, a -35.41% decrease. During the same period, the National Regional Climate Service [NRCS], a co-agency of the NOAA National Environmental Information Center, reports SILVIES BASIN precipitation decreases -15.84% during the past 30 years. USDA Western Regional Climate Center [WRCC] estimates a -14.86% decrease. NRCS SNOTEL reports

the three stations snow/water equivalent [SWE] sums in and around the upper Basin decrease a defective -13.99%.

For comparison, USGS 1040300 SILVER CR BL NICHOLL CR NR RILEY, in reliable service since 1 OCT 2010, its 15 year linear trend begins at 52.86 cfs and ends at 38.26 cfs, a -27.68% decrease. SNOTEL reports SNOW MOUNTAIN, which combined Silver Creek watershed is adjacent to the Emigrant Creek watershed to the east and north, decreases -18.98% from OCT 1994 to OCT 2024. However, SNOW MOUNTAIN same OCT 2010 - OCT 2024 annual precipitation sums begin at 894.5 inches and ends at 1,248.1 inches, a +39.53% increase. Same period monthly precipitation sums begin at 76.57 inches and ends at 104.50 inches, a +36.48% increase. During the past 10 years, SNOW MOUNTAIN precipitations increase over +35% while Silver Creek flows decrease over -25%. Expanding surface water use for agriculture in the Silver Creek sub-Basin under the 1928 Silver Creek Water Decree does not concern the north Harney Basin and is not considered for analysis. Except to confirm during the past 30 years, north Basin precipitations decrease -15% to -19% while BURNS flows decrease -35% for the same reasons.

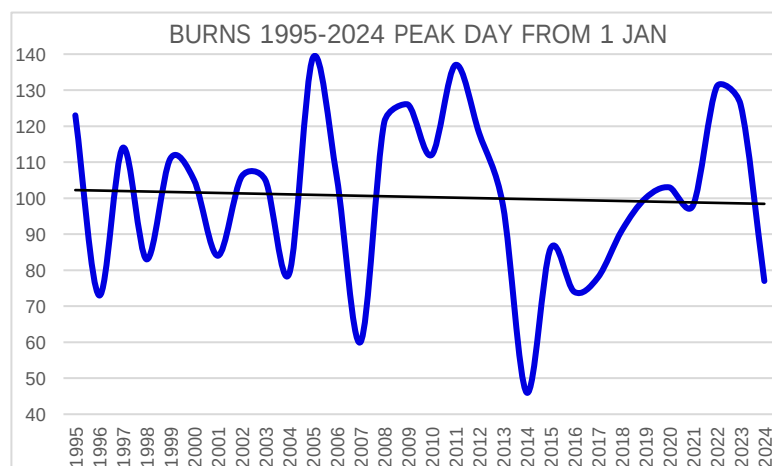


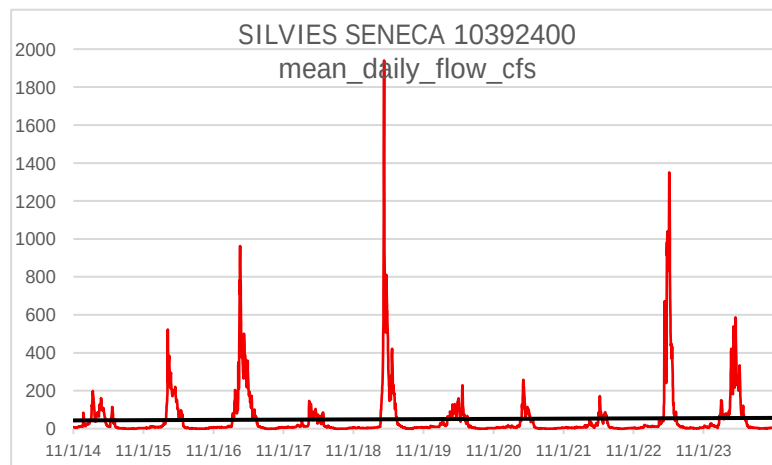
Chart shows the annual peak day as the number of days from 1 JAN of its calendar year.

Annual peak flow days vary from 15 FEB (2014) to 19 MAY (2005), a 66 day spread during the latest 30 year period. Peak mean and median day is 10 APR. Period peak daily mean is 1,241.8 cfs. Trend is moving earlier from 12 to 9 APR. However, last 20 year deltas or rates of change are extraordinary.

1998, 1999, 2001, 2014 and 2018 have double peak flows separated by two weeks or longer. Early peak flow

days tend to be in low SWE precipitation years with warmer winters.

OWRD installs two more Silvies River flow gauges which start official service 1 NOV 2014 over Department concerns of Silvies Valley surface water retention and consumption increases. OWRD 10392400 SILVIES R NR SODA SPR is located between Bear and Silvies valleys near Seneca [SENECA]. OWRD 10392500 SILVIES R NR SILVIES is located between Silvies Valley and the Upper Silvies Canyon [SILVIES]. Both measure Silvies River flows leaving their respective sub-Basins. Oregon Department of Fish and Wildlife total Bear and Silvies sub-Basin areas are 784 sq. km. / 302.7 sq. mi. RAIN chapter PRISM analysis identifies Bear and Silvies sub-Basin areas are 318.15 sq. miles. PRISM boundary quadrangles include areas outside the sub-Basins.

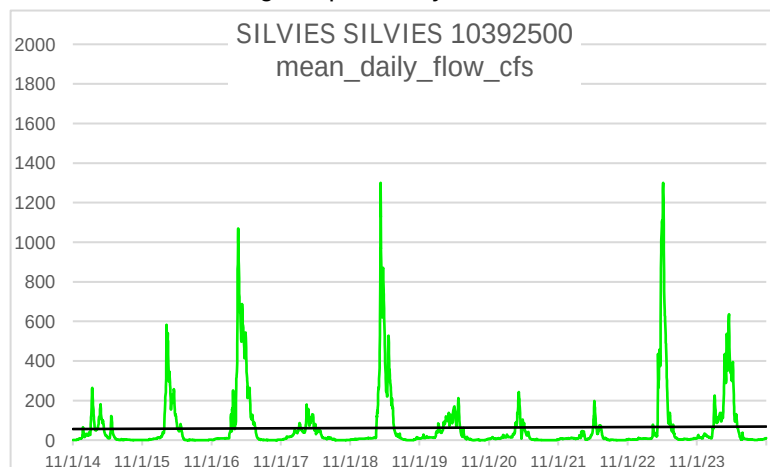


SENECA OCT 2014 to SEP 2024 10 year period mean daily flows. OWRD begins reporting tens with tenths 17 MAR 2022.

Mean daily flow is 50.19 cfs. Annual maximum mean daily flow occurs on 9 and 10 APR 2019 with 1,940 and 1,400 cfs respective followed by 6 and 8 MAY 2023 with 1,350 and 1,320 cfs respective then by 19 MAR 2017 with 963 cfs. Minimum mean daily flow of less than 0.1 cfs occurs in the first eight of ten years. Longest periods of little or no flow are 1 AUG to 16 SEP 2021 (47 days) followed by 6 AUG to

19 SEP 2017 (45 days) then by 9 AUG to 21 SEP 2016 (44 days). Silvies River above the Silvies Valley does have minimum summer flows of 1.0 cfs or more in 2023 and 2024. Period of Record maximum to minimum mean daily ratios cannot be considered.

Linear trend line begins at 43.63 cfs and ends at 56.92 cfs, a +30.46% annual or a +30.79% daily record increase during the past ten years.



SILVIES OCT 2014 to SEP 2024 10 year period mean daily flows. OWRD begins reporting tens with tenths 17 MAR 2022. Chart horizontal Y scale, 0 to 2,000 cfs, matches SENECA graph above for direct comparisons.

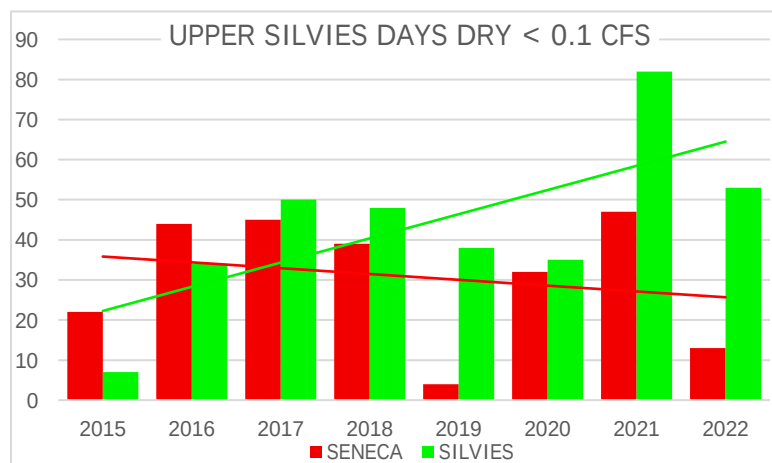
Mean daily flow is 62.45 cfs. Annual maximum mean daily flow occurs on 10 APR 2019 and 7 May 2023 with 1,300 cfs followed by 20 MAR 2017 with 1,070 cfs. 2023 has four days above 1,220 cfs and 2019 has three days above 1,130 cfs. Minimum mean daily flow of less than 0.1 cfs occur in the first eight of ten years. Longest

periods of little or no flow are 4 AUG to 24 OCT 2021 (82 days) followed by 1 SEP to 23 OCT 2022 (53 days) then by 13 to 15 AUG and 24 AUG to 12 OCT 2002 (48 days). Silvies River below the Silvies Valley has minimum summer flows of 1.0 cfs or more in 2023 and 2024. Maximum to minimum mean daily ratios cannot be considered.

Linear trend line begins at 56.17 cfs and ends at 68.82 cfs, an +22.52% annual or a +22.79% daily increase record increase during the past ten years.

DAYS WITH DAILY MEAN FLOW LESS THAN 0.1 CFS

	SENECA		SILVIES	
2015	13 AUG to 3 SEP	22 DAYS	10 to 14 SEP, 15 to 16 SEP	7 DAYS
2016	9 AUG to 21 SEP	44 DAYS	24 JUN to 24 JUL, 26 to 28 JUL	34 DAYS
2017	6 AUG to 19 SEP	45 DAYS	17 to 18 AUG, 24 AUG to 12 OCT	50 DAYS
2018	21 AIG to 28 SEP	39 DAYS	13 to 15 AUG, 24 AUG to 12 OCT	48 DAYS
2019	3 SEP to 6 SEP	4 DAYS	25 AUG to 1 OCT	38 DAYS
2020	25 AUG to 25 SEP	32 DAYS	8 to 16 AUG, 13 SEP to 10 OCT	35 DAYS
2021	1 AUG to 16 SEP	47 DAYS	4 AUG to 24 OCT	82 DAYS
2022	29 AUG to 10 SEP	13 DAYS	1 SEP to 23 OCT	53 DAYS
2023		0 DAYS		0 DAYS
2024		0 DAYS		0 DAYS
Total Days		246		347



High water years 2023 and 2024 with no little or no flow days are omitted. During this condensed eight year period, ratios between SENECA longest and shortest dry periods, 47 and 4 days, are 11.75 to 1 or 0.085 to 1. SENECA has 246 of 3,652 days with little to no flow (6.74%).

SILVIES ratios between longest and shortest dry periods, 82 and 7 days, are 11.71 to 1 or 0.085 to 1. Both ratios are identical but SILVIES has more days. SILVIES has 347 of 3,652 days (9.50%).

Days with annual minimal flows of 0.1 cfs or less for SENECA is 35.71 days and for SILVIES is 51.14 days. Median between highest and lowest number of days for SENECA is 37 days and SILVIES is 68 days. SENECA differential between mean and median is 0.965. SILVIES is 0.752.

SENECA linear trend line begins at 35.83 days and ends at 25.67 days, a -23.86% decrease. SILVIES linear trend line begins at 22.25 days and ends at 64.50 days, a +289.89% dry day increase. This may indicate expanding use of Silvies sub-Basin surface waters for agriculture and habitat restoration since 2016.

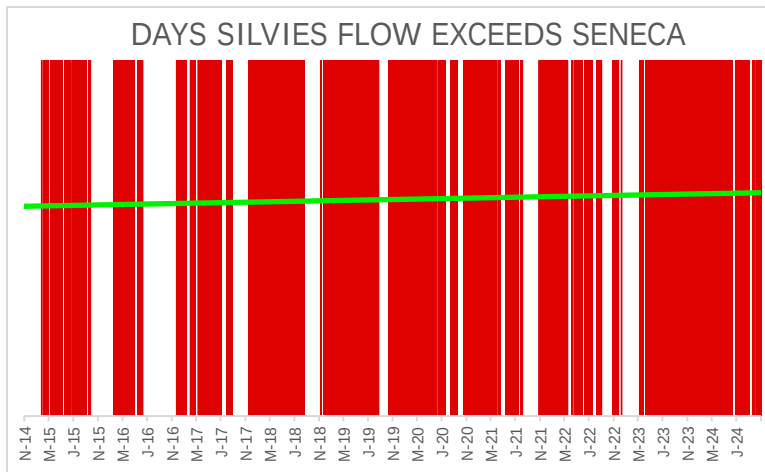
Exempting 2023 and 2024 water years, days with annual minimal flows of 0.1 cfs or less for SENECA is 35.71 days and 51.14 days for SILVIES. Median between highest and lowest number of days for SENECA is 37 days and SENECA is 68 days. SENECA differential between mean and median is 0.965. SILVIES is 0.752. SILVIES means are lower than medians.

SENECA linear trend line begins at 38.19 days and ends at 33.23 days, a -12.99% decrease. SILVIES linear trend line begins at 40.31 days and ends at 61.97 days, a +53.73% increase. Ratios between highest and lowest number of days for SENECA (50 / 13) is 3.85 to 1. SILVIES is (81 / 13) is 6.23 to 1.

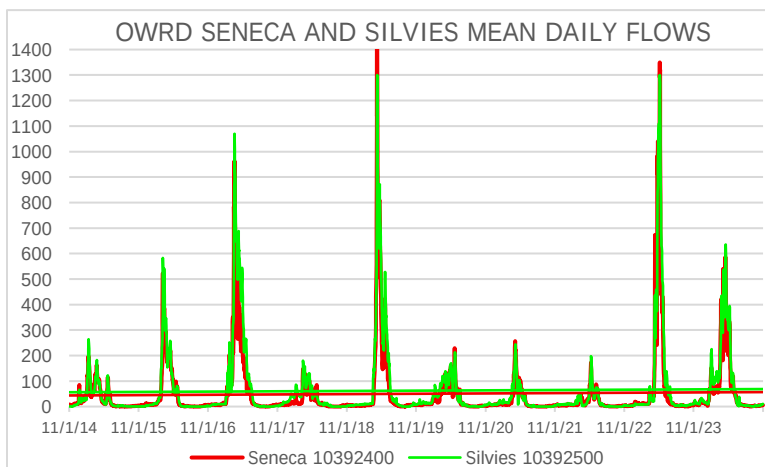
Silvies River at the exit of the Silvies Valley has 1.43 times more number of days with little to no flow than at the Bear Valley exit. More in-stream flow is distributed and retained for agriculture and habitat, livestock and recreation. Mid to late summers are much warmer. Silvies sub-Basin River and Trout Creek transit losses are second highest in the north Basin.

BURNS flow gauge never runs dry. Maximum minimum flow days are 19 SEP 2023 (17.6 cfs) followed by 5 SEP 2017 (12.2 cfs) then by 1 SEP 2024 (11.9 cfs). Minimum minimum flow days are 3 SEP 2022 (1.71 cfs) followed by 25 JUL 2015 (4.5 cfs) then by 11 AUG 2018 (4.87 cfs). Mean high flow day is 1 APR. Mean low flow day 31 AUG, a five month spread.

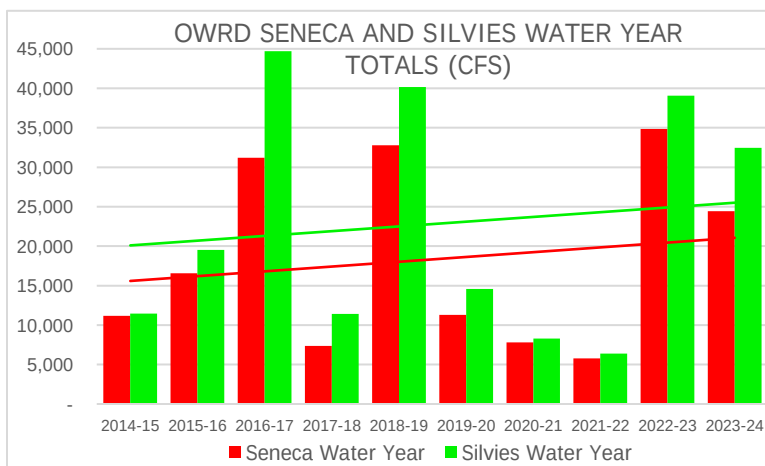
During the 2022-23 and 2023-24 high water years, SENECA minimal mean daily flow is 1.75 cfs. SILVIES minimal mean daily flow is 0.4 cfs. They are never "dry". During the Period of Record, mean annual minimal flows of 1.0 cfs or less days for SENECA is 27.78 and 39.78 days for SILVIES. SENECA linear trend line begins at 46.03 days and ends at 9.49 days, a -79.38% decrease. SILVIES linear trend line begins at 56.92 days and ends at 22.57 days, a -60.35% decrease.



Linear trend line begins at 0.59 days and ends at 0.627 days, a +6.27% increase.



flow in 2022-23, Silves Valley has 53.



Mean maximum daily flows in first rank of occurrence:

25-27 MAR 2015, SENECA 162 cfs followed by SILVIES 182 cfs then by BURNS 240 cfs.

14-15 MAR 2016, SILVIES 541 cfs followed by BURNS 1,060 cfs followed by SENECA 384 cfs.

19-20 MAR 2017, SENECA 963 cfs followed by BURNS 3,220 cfs followed by SILVIES 1,070 cfs.

8 APR and 17-18 APR 2018, BURNS 291 cfs followed by SENECA 104 cfs then by SILVIES 130 cfs.

SILVIES flow exceeds SENECA 2,218 of 3,652 days or 60.73% during the past ten years. SENECA tends to flow more than SILVIES from mid-October to mid-March or when melt run-offs begin (once in MAY) then from July to August or when river flows return (once in OCT). But not always every year. Longest period SILVIES has more flow is 261 days from 29 APR 2023 to 17 JAN 2024, a high snow flow period. Longest period SENECA has more flow is 169 days from 9 JUN to 24 NOV 2016, a moderate snow flow period.

SENECA peak mean daily flows of 9-10 APR 2019 with 1,940 and 1,400 cfs respective are not shown in full.

During the past ten years, SILVIES ultimate minimum flows are 6.0 days later and 9.6 days longer than SENECA. Summer flows from Bear and Silves valley convective storms are measurable. SILVIES has 132.9% more mean water year flow than SENECA and 124.43% more mean daily flow. SENECA provides 80.37% of SILVIES total water year and total daily flows. In comparison to the Bear Valley with 15 days of 1.0 cfs or less

SENECA linear trend line begins at 15,580 cfs and ends at 21,030 cfs, a +34.98% increase. SILVIES linear trend line begins at 20,080 cfs and ends at 25,510 cfs, a +27.04% increase.

During the past ten years, SENECA provides 35.10% of BURNS mean daily flow. Along with the SENECA 80.36% of SILVIES flow, both provide 43.68% of BURNS mean daily flow.

BURNS peak periods appear to be sooner than the two upriver gauges after 2021.

9-10 APR 2019, SENECA 1,940 cfs followed by SILVIES 1,300 cfs and BURNS 3,480 cfs. The highest total peak daily maximum flows.

12 APR and 2-3 MAY 2020, BURNS 394 cfs followed by SENECA 159 cfs then by SILVIES 170 cfs.

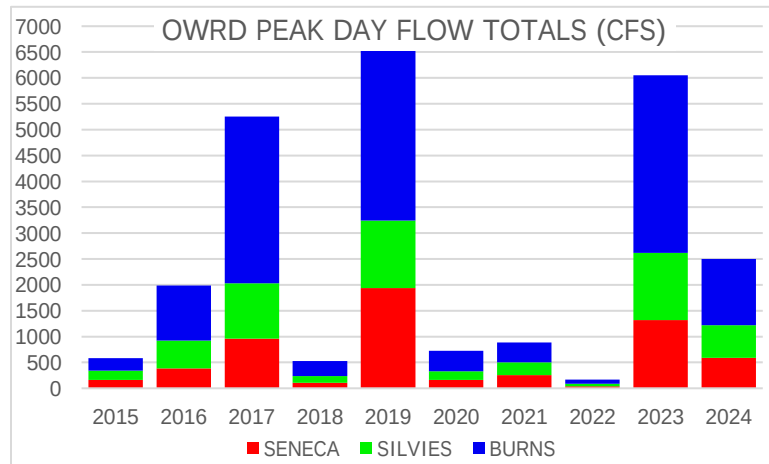
5, 7-8 APR 2021, SENECA 257 cfs followed by SILVIES 244 cfs then by BURNS 384 cfs.

16-18 MAY 2022, SILVIES 45.2 cfs followed by BURNS 81.9 cfs then by SENECA 41.2 cfs. The lowest total peak daily maximum flows.

6-8 MAY 2023, BURNS 3,450 cfs followed by SILVIES 1,300 cfs then by SENECA 1,320 cfs.

16 and 18 APR 2024, SENECA 586 cfs followed by BURNS 1,280 cfs then by SILVIES 636 cfs.

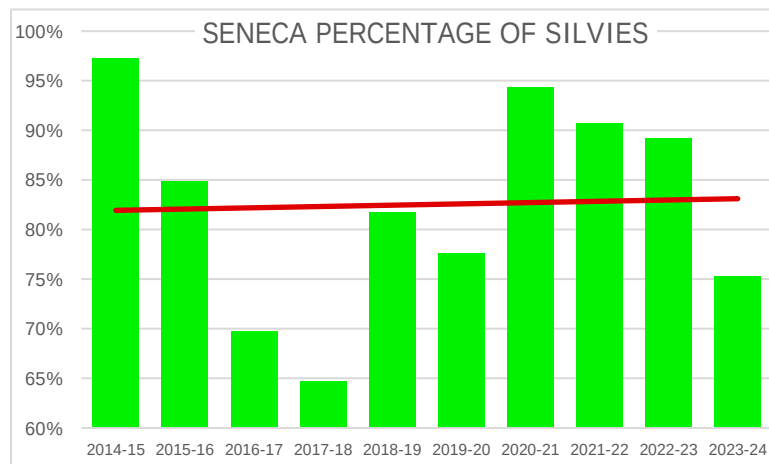
SENECA is the first gauge to peak for half of the occurrence years. BURNS being first is during low flow years with Emigrant Creek being dominant.



During their annual mean peak flow days, the total for SENECA is 5,916.2 cfs, SILVIES is 5,618.2 cfs and BURNS is 13,860.9 cfs. All peak days are in 2019.

One day of a 365 day year is 0.274%. SENECA peak one day flow is 3.27% of its total water year 183,340.34 cfs or 11.93 times the daily mean. SILVIES is 2.46% of its total 228,137.83 cfs or 8.98 times the daily mean. BURNS peak one day is 2.65% of its total 522,289.67 cfs or 9.67 times the daily mean. BURNS ratio between highest and lowest

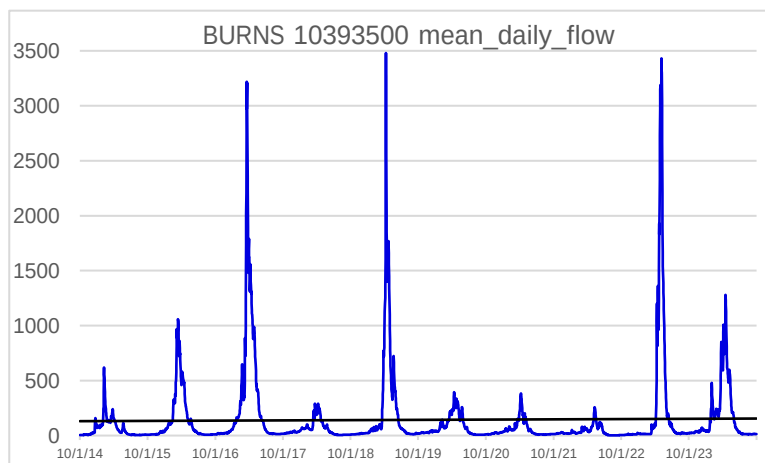
daily flows (3,480 / 1.71) is a very high 2,035.09 to 1.



SENECA mean percentage of SILVIES mean daily flows is 80.37%. Linear trend line begins at 81.92% and ends at 83.11%, a +1.45% increase in SENECA contributions to SILVIES flows. Ratio between high and low (97.29% and 64.67%) is 1.50 to 1.

SENECA and SILVIES flow numbers as presented in the OWRD 2014-2024 records.

Water Year	Silvies vs. Seneca Start	Silvies vs. Seneca Duration	Seneca Water Year	Silvies Water Year	Silvies % Above Seneca	Seneca % of Silvies	Silvies CFS Above Seneca
2014-15	7 days later	15 days less	11,153.98	11,464.78	102.77%	97.29%	310.8
2015-16	15 days earlier	5 days more	16,552.20	19,506.54	117.85%	84.85%	2,954.34
2016-17	16 days later	6 days more	31,187.35	44,716.96	143.38%	69.74%	13,529.51
2017-18	same day	14 days more	7,369.61	11,394.88	154.62%	64.67%	4,025.27
2018-19	18 days later	6 days less	32,792.30	40,144.90	122.42%	81.68%	7,385.60
2019-20	6 days later	34 days more	11,305.16	14,564.62	128.83%	77.62%	3,259.46
2020-21	6 days later	20 days more	7,800.92	8,273.34	106.06%	94.29%	472.42
2021-22	3 days later	39 days more	5,786.65	6,380.32	110.26%	90.70%	593.67
2022-23	4 days later	1 day each	34,849.03	39,081.71	112.15%	89.17%	4,187.68
2023-24	15 days later	1 day less	24,414.00	32,445.35	132.90%	75.25%	8,031.35
Averages and Sums	6.0 days later	9.6 days more	183,211.20	227,973.40	124.43%	80.37%	44,750.1

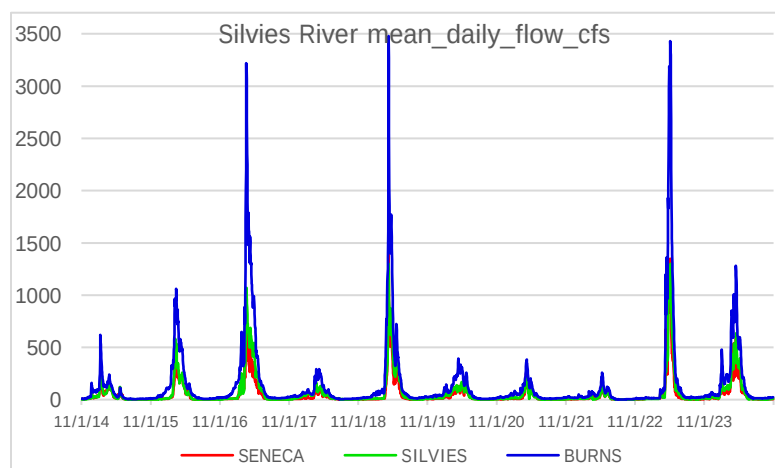


BURNS OCT 2014 to SEP 2024 10 year period mean daily flows. BURNS always reports in tens with tenths.

Mean daily flow is 142.84 cfs. Annual maximum mean daily flow occurs on 10 APR 2019 with 3,480 cfs followed by 5 May 2023 with 3,430 cfs follow by 19 MAR 2017 with 3,320 cfs. 2023 has eight days and 2019 has three days above 3,000 cfs. Minimum mean daily flow occurs on 3 SEP 2022 with 1.71 cfs followed by 11 AUG 2018 with 4.87 cfs then by 7 SEP 2020 with 6.9 cfs and by 17 AUG 2021 with 8.2. Ratios between

maximum and minimum mean daily flows, 3,480 cfs and 1.71 cfs, is an enormous 2,035 to 1.

Linear trend line begins at 130.97 cfs and ends at 154.73 cfs, an +18.06% annual or a +18.14% daily increase the past ten years.



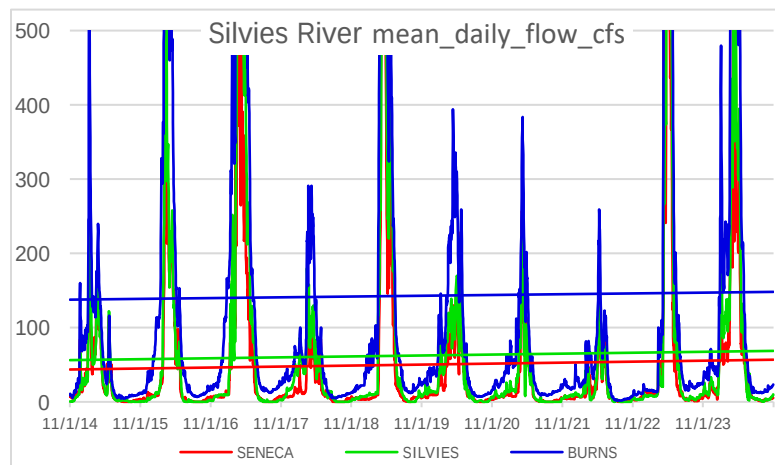
2020-2022 drought is the third most severe in 100 years. Adjacent 2019 and 2023 are the seventh and tenth highest flow years.

North Basin ten year daily flow mean at SENECA is 50.19 cfs, SILVIES is 62.45 cfs and BURNS daily mean is 142.95 cfs. SILVIES mean flow is 43.96% of BURNS.

North Basin ten year annual sum at SENECA is 188,340.34, SILVIES is 228,137.83 cfs and BURNS sum is 522,197.77 cfs. SILVIES sum is 43.69% of BURNS.

Current OWRD 10939500 (BUR03) gauge location is more volatile after its relocation and resumption on 18 MAR 2008. A third gauge relocation should be considered as the river channel has moved.

Ratios between absolute maximum and minimum daily mean flow are very large. Such large increases during the past ten year period may be due to the three relative high flow years. Note 2023 has the shortest nominal flow duration. A "flash" flood.

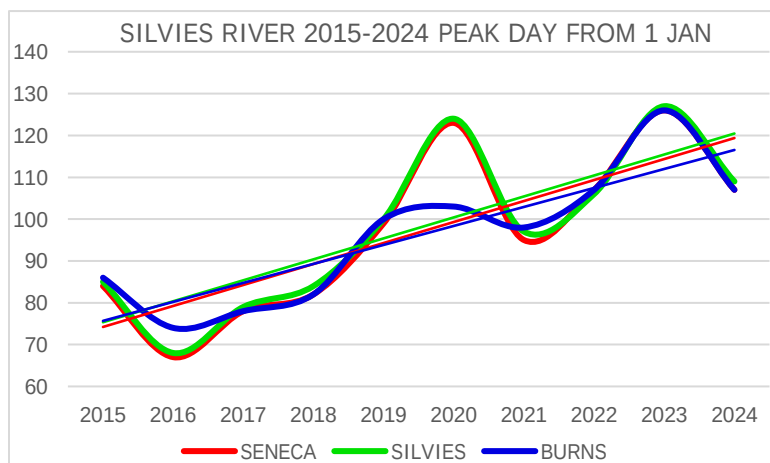


Silvies River OCT 2014 to SEP 2024 10 year period mean daily flows below 500 cfs.

SENECA annual mean linear trend line begins at 43.61 cfs and ends at 56.68 cfs, a +13.07 cfs (+29.97%) increase.

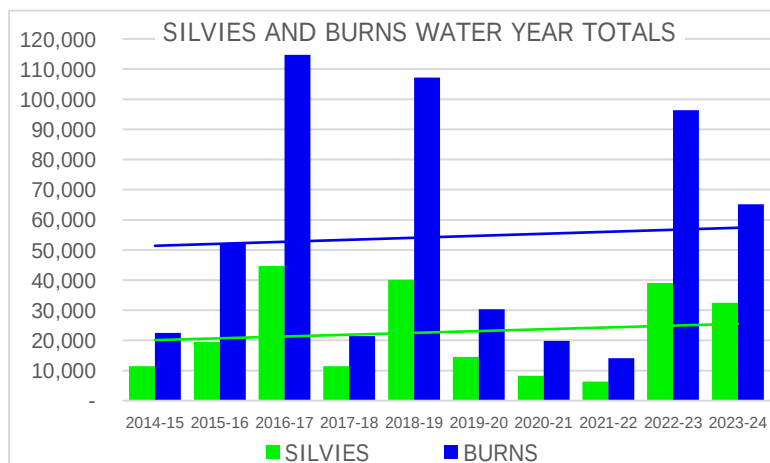
SILVIES annual mean linear trend line begins at 56.25 cfs and ends at 68.67 cfs, a +12.42 cfs (+22.08%) increase.

BURNS annual mean linear trend line begins at 137.61 cfs and ends at 148.19 cfs, a +10.58 cfs (+7.69%) increase.

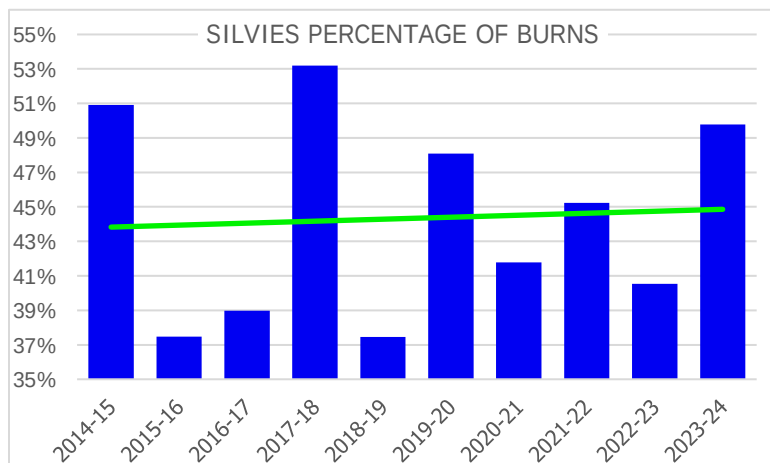


SENECA. BURNS also begins on 16 MAR at 6 PM and ends on 26 APR at 12 PM (+40.75 days).

During the past decade, annual peak flow periods are coming much later into Spring. Combined 10 year record counters the BURNS 30 year record when the trend is moving earlier from 12 to 9 APR (-4 days).

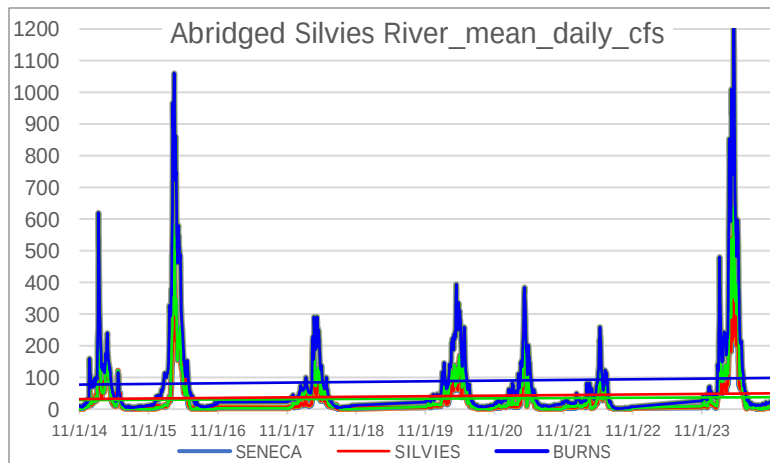


SILVIES linear trend line begins at 20.06 cfs and ends at 25.57 cfs, a +5.51 cfs (+27.47%) increase. BURNS begins at 51.33 cfs and ends at 57.28 cfs, a 5.95 cfs (+11.61%) increase.



SILVIES mean percentage of BURNS water year flows is 41.95%. SILVIES measures 43.68% of BURNS mean daily flow. From the 2017-18 high of 53.20% to the 2015-16 and 2018-19 lows of 37.47%. Linear trend line begins at 43.91% and ends at 44.95%, a +2.37% increase in SILVIES contributions to BURNS flows. Ratio between SILVIES annual maximum and minimum contribution percentages, 53.20% and 37.47%, is 1.42 to 1.

Silvies sub-Basin tends to be more self-sufficient during high flow years and consumes more during low flow drought periods. At times during most water years, sub-Basin will retain and consume more surface water than it is supplied.



16 and 17 APR 2024 1,280 and 1,230 cfs daily means are not shown.

Omitting the maximum annual flow years 2016-17, 2018-19 and 2022-23, the more average seven year SENECA linear trend begins at 28.49 cfs and ends at 37.52 cfs, a +9.03 cfs (+37.70%) increase. SILVIES linear trend line begins at 31.67 cfs and ends at 49.71 cfs, a +18.04 cfs (+56.96%) increase. BURNS linear trend line begins at 77.36 cfs and ends at 98.23 cfs, a +20.87 cfs (+26.98%) increase.

Abridged SENECA seven year daily

mean is 32.98 cfs, SILVIES is 40.56 cfs and BURNS daily mean is 87.65 cfs.

Abridged SENECA seven year cfs sum is 84,367.23, SILVIES is 103,753.09 cfs and BURNS sum is 224,207.19 cfs. SILVIES flow is 46.27% of BURNS flow during mean and below mean water years.

Abridged seven year daily means at the BURNS gauge is 38.68% and annual is 42.96% of the ten year daily and annual means. Omitted 2016-17, 2018-19 and 2022-23 are 48.68% of the ten year daily mean and 57.04% of the ten year annual sum. The past three high flow years of ten have half the total period flows.

The large differentials between SILVIES and BURNS flows may be due to large percolation, absorption and evapo-transpiration [ET] losses during the River transit between the gauges through the Upper and Lower Silvies canyons.

Using the NWS Burns Municipal Airport WSO AP [KBNO] monthly 1991-2020 nominal Period of Record as the data base, five months have COOLING DAYS at the Normal Base of 65°F and above. Four days in MAY, 30 in JUN, 150 in JUL, 102 in AUG and 16 CCD days in SEP. ¹³

Using the number of CCD 65° days during the latest 30 water year period as the basis, then by adjusting the number of days with the monthly maximum temperature means, transit losses during transit for MAY are -3.7% of total monthly mean flow, for JUN -5.55%, JUL -11.28%, AUG -9.59% and for SEP -4.17% of total monthly flows. Mean five month (Spring – Summer) flow sum is 34.29% of annual during the past ten years. These are estimates of how much surface water losses may occur during these transit months in the Silvies Canyon.

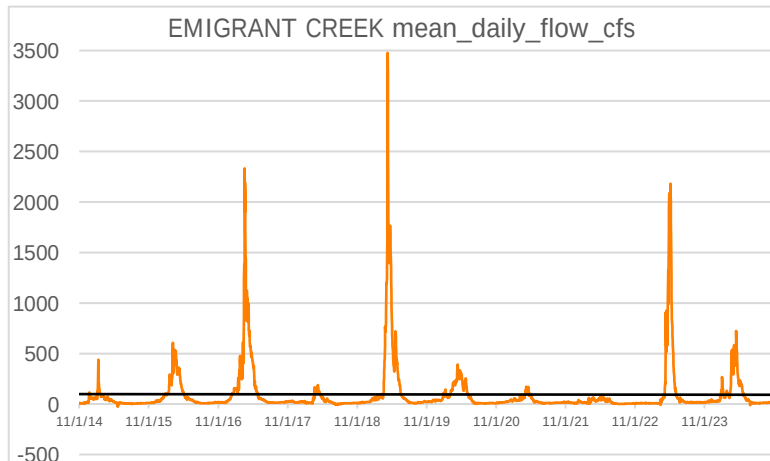
Gets hot there at the airport. Also gets hot from the Silvies River - Myrtle Creek confluence to Five Mile Dam. Animal water tanks there do evaporate quickly. See TEMP chapter.

Excepting MAY and early JUN, most ET is evaporation with little absorption or transpiration. Not much annual vegetation is there.

These estimated month to month transmission and ET losses do not include OCT to APR which have no 65° CCD Days. MAR and APR most often have the annual peak daily flows. The middle River channel beds are basalt silts and clays as is the alluvial or fan-out soils in the Harney Valley and have limited vegetation absorption and soil percolation percentages. Fringe flood areas at the Myrtle and Emigrant creek confluences are often mafic basalt with higher percolation percentages. An assumed -10% estimate for all flow losses from OCT to APR or by 1.43% per month, is in addition to the MAY to SEP -34.29% sum which may also prove to be too high.

Estimate only uses months with CCD days as other monthly loss percentages cannot be determined with any accuracy. Often, DEC to APR mean annual temperatures are at least -2.2°F lower than the PRISM quadrangle at Five Mile Dam. Perhaps due to more distance from lower Harney Basin high barometric pressure inversions than being at higher elevations (+337.4-6 feet from OWRD SILVIES to Five Mile Dam). Middle Silvies River and Lower Silvies Canyon quadrants most often have the second highest spring-summer temperatures in the upper Basin.

10 year estimates -44.29% less daily SILVIES flow than BURNS between MAY and SEP. Maximum monthly ET losses are during minimal or no flow periods. 164.43 cfs or 352.92 ac/ft/day of the SILVIES ten year annual mean. 228,137.83 cfs less 227,973.40 cfs, or -0.07% of annual Silvies Canyon flows are lost in transit due to percolation, vegetable absorption and transpiration, high spring-summer evaporation rates and the occasional animal drinking the water. The large SILVIES and BURNS flow differentials are not from transit losses.¹³

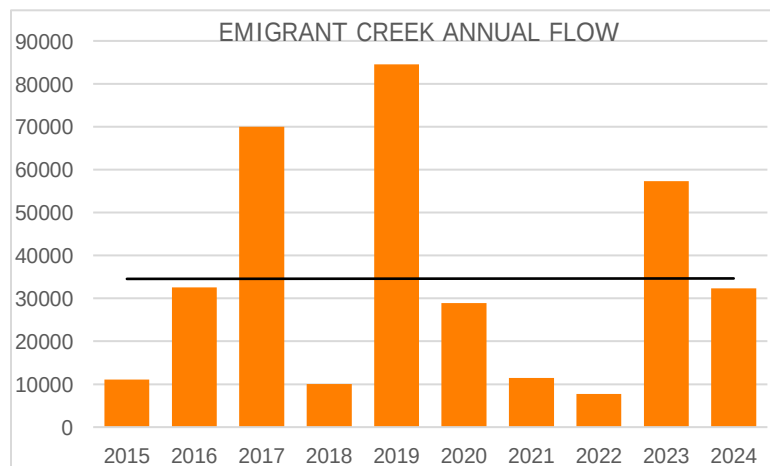


EMMIGRANT CREEK NOV 2014 to SEP 2024 10 year period mean daily flows. Its share of BURNS mean daily flows are calculated by subtracting SILVIES numbers, less transport losses through percolation and evaporation, from BURNS numbers.

Mean daily flow is 80.50 cfs. Maximum mean daily flow occurs on 10 APR 2019 with 3,476.43 cfs with three adjacent days above 2,500 cfs followed by 21 MAR 2017 with 2,200 cfs with one adjacent day above 2,100 then by 6 MAY 2023 with 2,180 cfs with four days above 2,000 cfs.

Maximum negative mean daily flow occurs on 22 MAY 2015 with -27 cfs and six adjacent days of negative flow followed by 28 JUN 2024 with -11.7 cfs with a next day -4.2 cfs then by 15 MAR 2023 with -9.0 cfs. Longest period of reverse flows up the Silvies River is from 6 JUL to 7 AUG 2018 with a peak -8.47 cfs on 20 JUL with 19 days of 31 with negative flows. EMIGRANT CREEK ratios between maximum and minimum mean daily flows, 3,476.43 cfs and 1.70 cfs, are an extraordinary 2,449.95 to 1 or 0.00049 to 1. Silvies River ratios there cannot be calculated. Confluence is a natural reservoir.

Linear trend line begins at 98.12 cfs and ends at 91.62 cfs, an estimated -6.62% daily decrease during the past ten years.



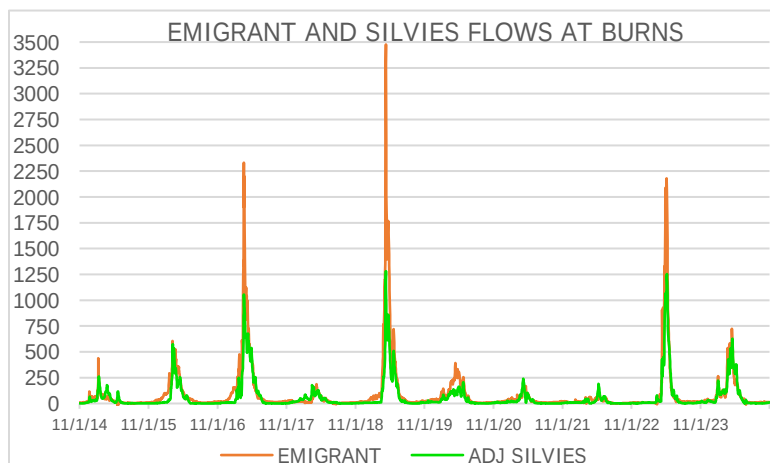
Mean annual flow is 34,448.50 cfs. Maximum year is 2019 with 84,550.80 cfs. Minimum year is 2022 with 7,726.59 cfs. Ratios between maximum and minimum flows are 10.94 to 1 or 0.09 to 1.

EMIGRANT CREEK maximum mean daily flows occur during mid APR 2019 (peak 3,476.43 cfs) followed by mid MAR 2017 (peak 2,323.0 cfs) then by early MAY 2023 (peak 2,180.0 cfs).

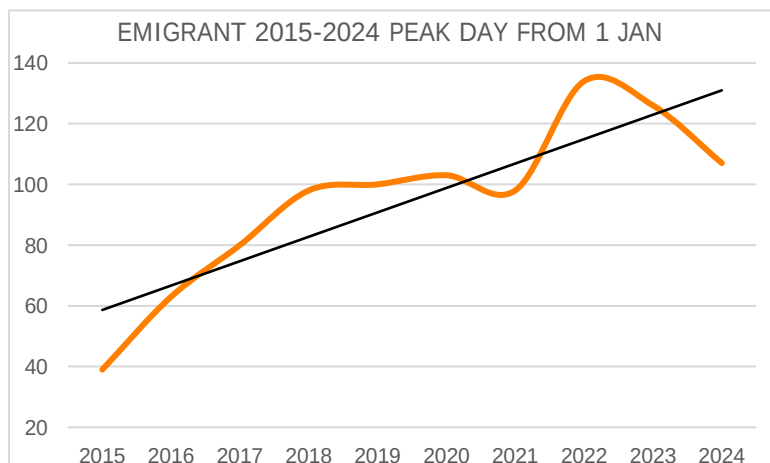
Linear trend line begins at 34,518 cfs and ends at 34,649 cfs, an +0.39% annual increase the past 10 years.

Numbers and estimates during the past ten years indicate EMIGRANT CREEK is (142.95/80.50 cfs less 142.95/62.45 cfs) 56.31% of BURNS gauge mean daily flows. Ten year mean daily flow sums (346,381.88 cfs less 222,776.11 cfs) are 60.86%. Below period mean annual daily flows (155.8/94.82 cfs less 155.8/60.98 cfs) is 64.32% of BURNS flow during dry years.

13. NWS KBNO JUL and AUG 2024 monthly means are records (95.7° and 87.8°) and meet or beat the Summer of 2021 records (95.4° and 87.9°). Adjacent to the north USFS CROW FLAT records a daily temperature maximum of 101°F in JUL 2024. Fourth highest there with JUL 2002 and 2003 having the record maximums, 107°F and 106°F respective.



(2017) to 35.94% (2023). EMIGRANT CREEK determines the extent but not the length of Harney Valley Spring freshets.¹⁴



EMIGRANT 10 year record counters the BURNS 30 year record where the trend is moving earlier from 12 to 9 MAY (-4 days). NRCS SNOW MOUNTAIN has the highest temperature and percentage increases as winter temperatures are no longer as cold.

Since European exploration and settlement, common knowledge was the Silvies River is the primary surface water source for the lower Harney Basin with more direct contacts with Lake Malheur. Emigrant Creek is not shown on legacy maps. This is no longer accurate.

From the numbers:

	Period of Record	Total Daily Sum (cfs) ^L	Mean Monthly Flow (cfs)	Mean Daily flow	Mean Max. Day	Max. Day Amount	Mean Min. Day	Min. Day Amount	Max/Min Ratio ^M
OWRD Seneca	OCT 14-SEP 24	188,340.34	5,916.20	50.19	9-Apr-19	1,940.00	246 days	< 0.1	-
OWRD Silvies	OCT 14-SEP 24	228,137.83	5,618.20	62.45	10 APR 19	1,300.00	347 days	< 0.1	-
					20 MAR 23	1,300.00			
Emigrant Creek	NOV 14-SEP 24	346,381.88	10,459.86	80.50	10-Apr-19	3,476.43	22-May 15	-27 ^N	499.12
OWRD Burns	OCT 14-SEP 24	522,197.77	13,860.90	142.84	10-Apr-19	3,480.00	3-Sep 22	1.71	2,035

L. Total Daily Sum does not sum due to River transit losses between SILVIES and BURNS.

M. SENECA and SILVIES maximum and minimum daily flows cannot be calculated.

N. Emigrant Creek negative minimum day flow is due to reverse flow up the Silvies River at their confluence.

14. Only known prior estimate for Emigrant Creek share of Silvies River flow is from the *1957 Survey Report on Silvies River and Tributaries, Oregon*, p.6, published by the U.S. Army Corps of Engineers, Engineer District Office, Portland-OR: "Emigrant Creek is one of the largest tributaries of the Silvies River with a drainage area of 11,400 acres. ... and a runoff of about one-fourth the total flow of Silvies River."

The Oregon State Water Resources Board 1967 *Malheur Lake Basin* study quotes the same 75/25 ratio on page 5.

After adjusting the SILVIES gauge numbers for seasonal transit losses to BURNS, Silvies River maximum percentage of BURNS flows are early MAR 2019 (peak 1,772.98 cfs) followed by early MAY 2023 (peak 1,223.01 cfs) then by mid MAR 2017 (peak 1,054.70 cfs).

SILVIES measures less than 0.1 cfs flow from one week (SEP 2016) to near 12 weeks (AUG-OCT 2021) but not during the wet 2022-2024 water years. SILVIES percentage of BURNS absolute maximum and minimum mean daily flows are from 68.77%

During the past decade, EMIGRANT peak day linear trends are moving later into Spring. Linear trend begins on 27 FEB at 12 PM and ends on 11 MAY at 12 AM (+84.5 days). SNOW MOUNTAIN and SILVIES BASIN on average now tend to complete melt offs on 5 and 6 MAY.

Recall SENECA begins on 15 MAR at 6 AM and ends on 29 APR at 12 PM (+46.25 days). SILVIES begins on 16 MAR at 12 PM and ends on 30 APR at 12 AM (+46.5. days). BURNS also begins on 16 MAR at 6 PM and ends on 26 APR at 12 PM (+40.75 days).

	Annual Trend	Daily Trend	Daily CFS Gain or Loss	Percent of Burns Flow
OWRD Seneca	+34.98%	+29.97%	+13.07	35.10%
OWRD Silvies	+27.04%	+22.08%	+12.42	43.68%
Emigrant Creek	+0.39%	-6.62%	-6.5	56.31-.87%
OWRD Burns	+18.06-.14%	+7.69%	+10.58	100.00%

SNOTEL STARR RIDGE station is in the north Bear Valley and ROCK SPRINGS is in the east Silvies Valley. Mean monthly precipitation peaks occur within one month and amounts are near equal during the OWRD 10 year period. STARR RIDGE receives 203.2 inches and ROCK SPRINGS receives 181.9 inches.

STARR RIDGE 1995-2024 monthly linear trend line begins at 1.761 inches and ends at 1.598 inches, a -0.63 inch (-9.26%) decrease during the past 30 years. ROCK SPRINGS linear trend line begins at 1.516 inches and ends at 1.489 inches, a -0.27 inch (-1.78%) decrease. During those 30 years, STARR mean water year loss is 1.88 inches a year and ROCK loss is 0.32 inches a year.

Yet, OWRD SENCA and SILVIES mean daily flows increase +29.97% and +22.08% respective during the past 10 years. This is due to the Aldrich and Strawberry Range south flanks receiving more precipitation as snow and Bear Creek having more flow in recent years. It may have more flow near the Silvies River confluence at times. Some is diverted for irrigation.

Silvies sub-Basin should be impacted most by the ROCK precipitation -1.8% loss. This is also due to the Strawberry Range south flanks receiving more precipitation as snow and its east flank creeks and streams having more flow in recent years. All numbers being equal, Silvies Sub-Basin is -26.10% less efficient in pass through flows than Bear Sub-Basin.

Recall that between water years 2014 and 2024 inclusive, the WRCC SILVIES BASIN cume precipitation increases from 45.19 inches to 55.82 inches, a +23.52% increase.

SENECA has higher peak daily flows and absolute minimums than SILVIES as the Silvies Valley acts as a sponge absorbing and delaying initial flood and storm flow pulses from upstream.

Evidence indicates, long term, winters are not as cold and snow precipitation is decreasing while rain amounts are increasing. During the past 10 years, Bear and Silvies sub-Basins experience more surface water flows due to increasing precipitation. Emigrant sub-Basin flows are decreasing slightly as SNOW MOUNTAIN snows decrease significantly.

RESTATEMENT OF FACTS AND CONCLUSIONS

Winters are becoming warmer in some sub-Basins while winters are not as cold as before in others. 2020-23 winter minimum temperatures are among the warmest on record in most areas. Snow seasons appear to have the same durations but are moving later into Spring and with less snow.

Silvies Basin Snow/Water Equivalencies decrease -35.4% during the past 47 years. However, depends on where the time ruler is placed. 10 year OCT 1982 to SEP 1991 trend line has an -81.0% decrease while 33 year OCT 1992 to SEP 2024 has a -19.4% decrease. Harney Basin 1982-86 "Flood Years" skews the trends negative and make for great news headlines.

Statistical analysis of 30 years snow only months with SWE amounts of 0.2 inches and more reveal a different story.

During this condensed 30 year period, SNOTEL SWEs decreases -5.55%. STARR RIDGE increases +10.16% yet, monthly sums decrease -7.49%. Its SWE increase may not last. North Basin SWEs decline -14.0% in the past 30 years.

Total SNOTEL SWEs may decline -50.00% by 2185 or -59.22% by 2235. Condensed SNOTEL mean SWEs may be half the 1995-2024 annual means by 2195, $\pm$ five years, and by -57.38% by 2235 $\pm$ ten.

SNOW MOUNTAIN measures it has 48.3% of the three station sum. Mean first snow to last melt is 179 days. The other two lower elevation SNOWTEL stations mean is 134 days. SNOW MOUNTAIN mean days below 32°F is 123. The others are now 105 to 108 days long.

The 55/25/20 ratio among the three stations is becoming 50/30/20 as STARR RIDGE north of Bear Valley precipitations increase while SNOW MOUNTAIN decreases.

According to OSU PRISM 30 year precipitation estimates, East Bear and the Emigrant sectors, where the Strawberry Range and Snow Mountain are the Basin's snow sentinels or "magnets", provide a mean annual 44.3% of upper Basin precipitation as snow and rain. Myrtle Creek - Silvies Canyon and Emigrant Creek watersheds are 43.9% of its size and 48.2% of its total precipitation.

North Basin mean annual precipitation, snow and rain, is 18.03 inches per quadrant. WRCC estimates SILVIES BASIN has a mean 18.87 inches per year. NWS station at the Burns Municipal Airport measures 10.83 mean inches per year. DEC 1996 is the peak precipitation month for all stations and the 2010-11 water year has the most for all except for SENECA CO-OP (1995).

SNOTEL precipitation trends range from -12.2% (STARR RIDGE) to -19.0% (SNOW MOUNTAIN) or from -0.19 to -0.42 inch a year. SNOTEL Silvies Basin sums decrease -15.8% or -0.31 inch a year the past 30 years. WRCC SNOTEL annual trend is a -6.57 inch (-11.41%) decrease the past 30 years.

North Basin peak monthly precipitations occur first between DEC and JAN followed by MAR then by a lower MAY and do not have the nominal "bell curve" characteristics of coastal ranges. They oscillate.

MAR-MAY rain on snow events impact Snow Mountain more. Its more rapid snow run-offs determine the extent but not the length of Harney Basin spring freshets.

During the Period, the median difference between extreme precipitation and extreme drought is a 57.01% in annual precipitation above or below the 30 year annual mean measured at the three Silvies Basin SNOTEL stations. WRCC measures the mean difference as 54.25%.

According to 30 years of NRCS numbers, Total SNOTEL SWEs may decline -50.0% by 2185 and -59.2% less by 2235. WRCC numbers estimate the Silvies Basin will have 55.6% less precipitation than it does now by 2190 and Bear Valley will by 2210.

Silvies Basin weather is dynamic. Meteorology and micro-climates are unique in the Inter-Mountain West. Relative higher elevations differentiate it from the other like areas with semi-arid Continental and semi-arid sub-Artic climates. Pocatello – Idaho and Bend – Oregon may have higher and lower absolute daily temperatures but Silvies Basin mean temperatures are lower. Upper Harney Basin 30 year mean temperature is 42.35°F, mean maximum is 66.4°F and mean minimum is 19.5°F. Seneca is 35.7°F / 57.1°F / 24.8°F. Town can be colder than SNOW MOUNTAIN. Yet, north Bear Valley has the highest winter means from warmer air coming south from Canyon Creek and the lower elevation John Day River Basin.

Summers are warmer in some areas and cooler in others while winters are not as cold. SNOTEL high elevation station is becoming warmer while the lower elevation stations are not.

North Basin mean maximum temperatures decrease -0.2°F or are “flat”, mean temps increase +3.4% due to mean minimum temps increasing by +4.7%. However, while CROW FLAT JAN 2000 to MAY 2023 monthly mean temperatures (42.00°F) are very near to SILVIES BASIN 42.34°F, mean temperatures are trending -3.28% lower there. 10 year periods of record reveal the north Basin is becoming wetter and cooler than the 30 year mean. Weather is changing, again.

For all SNOTEL stations, the warmest day is 12 July. SILVIES BASIN mean warmest day is 28 JUL. For SNOW MOUNTAIN and SILVIES BASIN, the coolest day is 20 DEC 1999. For STARR RIDGE and ROCK SPRINGS, 21 DEC 1991. SNOW MOUNTAIN average coolest day is 25 DEC. For lower elevation STARR RIDGE, ROCK SPRINGS and the SILVIES BASIN, one week later on 1 and 2 JAN.

While records are faulty, SENECA CO-OP is the only relative low elevation Silvies Basin weather station with long temperature records which have value. A RAWS “meteo-station” should be placed here. According to the record, Bear Valley sub-Basin summers are beginning to approach lower Harney Basin summers in temperature and duration. Winters are becoming warmer faster than summers.

SENECA CO-OP is at least 2,690 feet below SNOW MOUNTAIN. Yet its 30 year mean daily temperature is 40.77°F while SENECA CO-OP daily mean is 35.67°F. Seneca gets cold. West and south Bear Valley have some of the lowest winter temperatures in the upper Basin yet temps along the Aldrich Ridge can be the highest. SNOW MOUNTAIN north flank permanent snow field disappears after 2002 then reforms in 2023.

Silvies Basin variable temperatures mirror the Harney Basin. Over the past century, Harney Basin shows little change except summers and especially winters have become warmer while springs and falls are the same or cooler. Annual frost free days are also variable. Warm 2020-2023 has more growing days above 32°F with an annual mean of 99 days (MAY 24 to SEP 1). Cooler 2000-2019 has an annual mean of 77 growing days. Yet 1994 has the most with 117 growing days (MAY 2 to SEP 27).

ROCK SPRINGS and at STARR RIDGE, their increase in minimum mean temperatures over the past 30 years cannot be from anthropogenic “Global Warming” alone. Maximum mean and absolute maximum temperatures are not increasing. Minimum temperatures responsible for mean temperatures increases are from continuing Late Quaternary Holocene Era trends. 10,800 years ago, the north Basin was under hundreds of feet of glacial ice. Warmer winters means shorter snow periods and less snow. This trend also applies to the lower Harney Basin for the past 100 years.

North BASIN winters are warmer and appear to last longer into Spring. Lower elevation SNOTEL stations are coldest one week later than when high elevation SNOW MOUNTAIN is.

There is evidence of “Climate Change” from high elevation SNOTEL stations. For example, SNOTEL MOUNT HOOD station (651) at 5,380 feet during its Period of Record from OCT 1990 to SEP 2024 records mean maximum temperatures increase +4.47°F while minimums increase +4.91°F. High altitude jet streams from East Asia are warmer producing more “atmospheric rivers” over the North America west coast. However, if the change rate is impacted by human activity, it is not making us much warmer but not as cold.

The 2024 fire season burns near 218,717 acres or near 342 square miles of sage and forest lands which have not burned since before 1980. For comparison, the upper Basin watershed is estimated to be 568 square miles. These are fringe forests. Some will never recover without Federal assistance. Reforestation benefits versus the price must be weighed.

River and creek drainage and spring sources above 5,600 feet tend to have annual flows.

OWRD 1039500 SILVIES RIVER NR BURNS (BUR03) record indicates it may need relocation as River channel measurements has changed. Gauge location is more volatile after its 18 MAR 2008 relocation and resumption.

BURNS annual peak flow days vary from 15 FEB (2014) to 19 MAY (2005), a 66 day spread during the latest 30 year period. Peak mean and median day is 10 APR. Period peak daily mean is 1,241.8 cfs. Trend is moving earlier from 12 to 9 APR. However, last 20 year deltas or rates of change are extraordinary. 10 year record shows peak daily flows are occurring later into spring.

1998, 1999, 2001, 2014 and 2018 have double peak flows separated by two weeks or longer. Early peak flow days tend to be in low SWE precipitation years with warmer winters.

SENECA gauge longest and shortest dry periods, 47 and 4 days, are 11.75 to 1 or 0.085 to 1. SENECA has 246 of 3,652 days with little to no flow (6.74%). SILVIES gauge ratios between longest and shortest dry periods, 82 and 7 days, are 11.71 to 1 or 0.085 to 1. Both ratios are identical but SILVIES has more

low or no flow days. SILVIES has 347 of 3,652 days (9.50%). Both have no low flow days during the 2023 and 2024 water years.

Days with annual minimal flows of 0.1 cfs or less for SENECA is 35.71 days and is 51.14 days for SILVIES. Median between highest and lowest number of days for SENECA is 37 days and SENECA is 68 days. Yet, SILVIES has 132.9% more mean water year flow than SENECA and 124.43% more mean daily flow. This is due to more current water use and storage practices as valley ranches have large senior water rights.

Silvies Basin tends to be more self-sufficient during high flow years and consumes more during low flow drought periods. At times during most water years, Silvies Valley will retain and consume more surface water than it is supplied. Current consumption and retention may exceed the 1924-26 Silvies River Water Decree. Most Bear Valley ranches do the same but by how much cannot be calculated without more flow gauges.

BURNS flow gauge never runs dry. During the past ten years, mean high flow day is 1 APR. Mean low flow day 31 AUG, a five month spread.

During the past ten years, SENECA provides 35.10% of BURNS mean daily flow. Along with SENECA 80.36% of SILVIES flow, both provide 43.68% of BURNS mean daily flow.

SENECA annual mean linear trend line begins a +13.07 cfs (+29.97%) increase.

SILVIES annual linear trend line begins a +12.42 cfs (+22.08%) increase.

BURNS annual linear trend line begins a +10.58 cfs (+7.69%) increase.

Ratio between SILVIES annual maximum and minimum contribution percentages to BURNS flows, 53.20% and 37.47%, is 1.42 to 1.

Numbers and estimates during the past ten years show SILVIES percentages of BURNS absolute maximum and minimum mean daily flows are from 68.77% (2017) to 35.94% (2023). EMIGRANT CREEK determines the extent but not the length of Harney Valley spring freshets.

SILVIES and BURNS flow differentials are not from ET transit losses.

BURNS peak periods appear to be sooner than the two upriver gauges after 2021. 2023 has the shortest nominal flow duration. A "flash" flood.

EMIGRANT CREEK dialy linear trend line begins at 98.12 cfs and ends at 91.62 cfs, an estimated -6.50 cfs (-6.62%) decrease during the past ten years. NRCS SNOW MOUNTAIN has the highest temperature and percentage increases as winter temperatures are no longer as cold. North Harney Basin prime surface water source is decreasing while the Silvies River sources and uses are increasing.

EMIGRANT CREEK never runs dry. There is physical and numerical evidence Emigrant Creek will flow up the Silvies River channel for some distance during some summers. Numbers indicate reverse is also true but flows are not measurable. Confluence is a natural reservoir.

Since European exploration and settlement, common knowledge was the Silvies River is the primary surface water source for the lower Harney Basin with more direct contacts with Lake Malheur. This is no longer accurate. The Silvies River is now a tributary to Emigrant Creek by a 60/40 ratio. USACoE 1957 estimate ratio for Emigrant Creek share of Silvies River flow at 25/75. At times during most years, Silvies River is tributary to Bear Creek at their confluence

Numbers indicate, long term, winters are not as cold and snow precipitation is decreasing while rain amounts are increasing in northern quadrants. Bear and Silvies sub-Basins experience more surface water flows. However, short term Emigrant sub-Basin flows are decreasing slightly as SNOW MOUNTAIN snows decrease significantly.

SILVIES and BURNS flow differentials are not from ET transit losses.

Recall the 1994-2024 period contains two severe droughts, 2000-2003 and 2020-2022. Most severe drought in the past century is 1928 to 1933 and by extension to 1935.

There is not enough water and there is less and less of it reaching the Harney Basin from the north.

28 February 2025
Mario Petrilli
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SILVIES SUB-BASIN ASSESSMENT

**Written by Erin Maupin
For the Harney County Watershed Council**



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for the Harney County Watershed Council

**This project was funded in part by the
Oregon Watershed Enhancement Board**

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CHAPTER ONE

INTRODUCTION

The purpose of this document is to provide a basis for future watershed management plans. The Silvies Sub-basin Assessment will serve as a planning tool for the Harney County Watershed Council (HCWC) and others.

This assessment was developed as an agreed upon action with the Oregon Watershed Enhancement Board (OWEB) as outlined in a grant to the HCWC.

The Council enjoys the active involvement of the following entities: private land owners, Oregon Water Resources Department, Harney County Court, USDI Bureau of Land Management, Burns Paiute Tribe, OWEB, USDA Forest Service, Izaak Walton League, Malheur National Wildlife Refuge, Oregon Department of Environmental Quality, U.S. Fish and Wildlife Service, USDA Farm Service Agency, Oregon Department of Fish and Wildlife, Harney Soil and Water Conservation District, Oregon State University, USDA Natural Resources Conservation Service, USDA Agriculture Research Service, and the Malheur Lake Basin Working Group.

The purpose of the Harney County Watershed Council is to address issues and concerns about watershed health in Harney County and to promote existing good and beneficial conditions. The Council will provide a framework for education, coordination, and cooperation among all interested parties for the development and implementation of watershed action plans beneficial to the people and the environment.

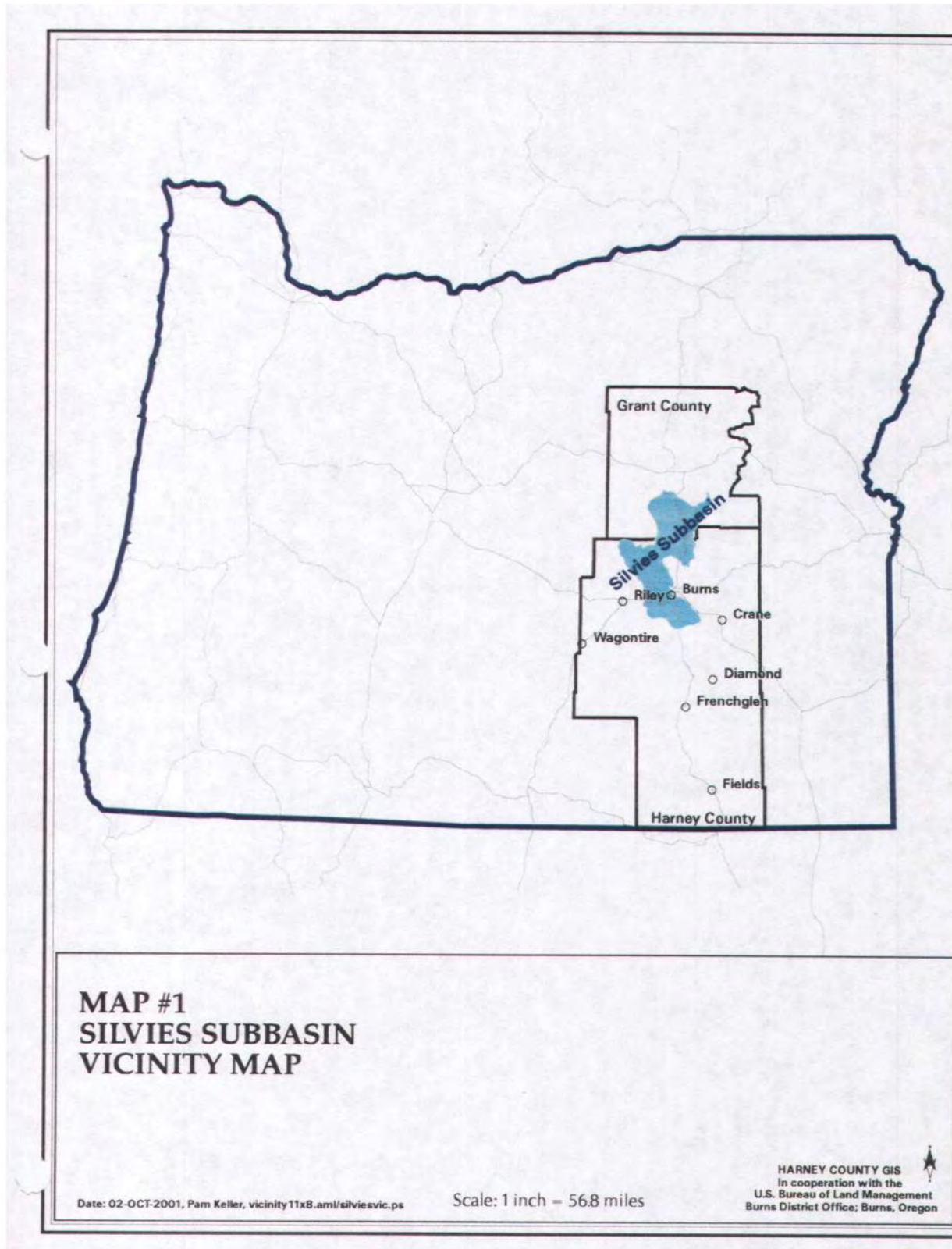
The Council recognizes that local economic and ecological prosperity is dependant upon the current and future availability and quality of water; therefore, the Harney County Watershed Council is committed to this three-part goal:

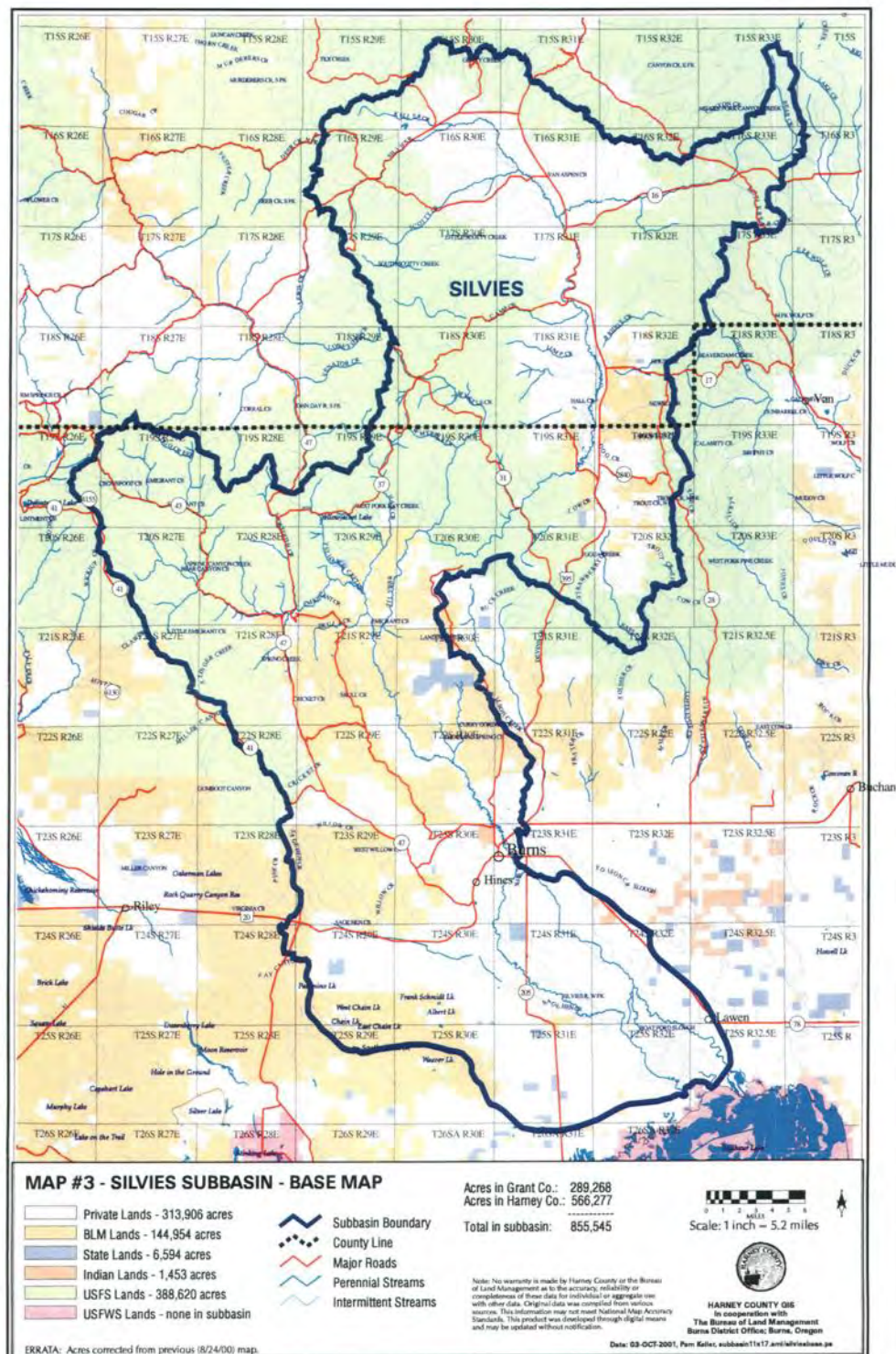
1. Determine the health of individual watersheds or watershed segments.
2. Retain the health of high quality watersheds.
3. Restore and enhance those watersheds, or portions thereof, that can be improved.

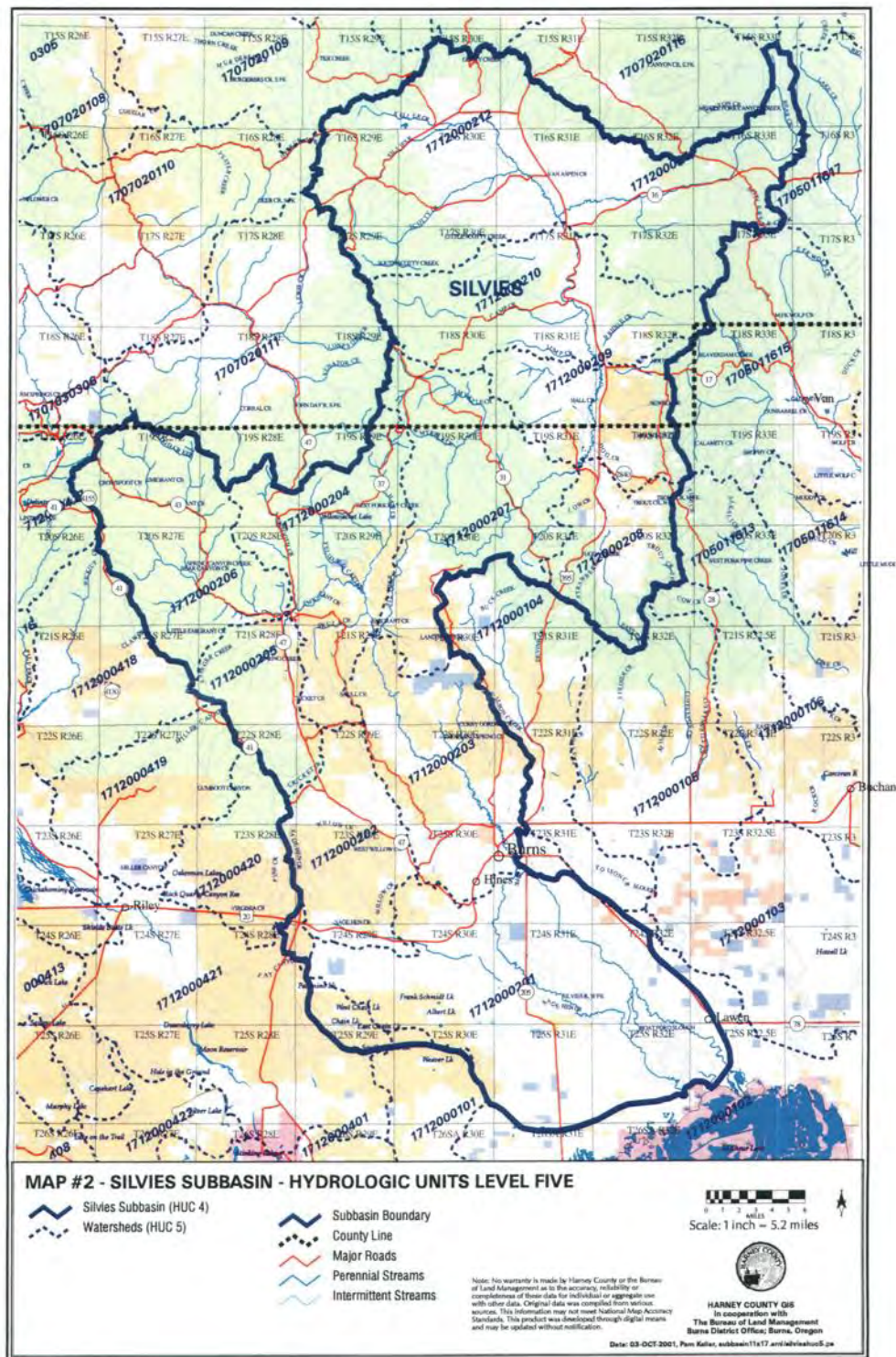
SUB-BASIN DESCRIPTION

The Silvies Sub-basin is located in northern Harney County, Oregon and in southern Grant County, Oregon (Map #1). The sub-basin is 844,976 acres in size with 555,708 acres in Harney County and 289,268 acres in Grant County. It is approximately 60 miles long and 23 miles wide. Silvies sub-basin (4th field HUC) is contained in the Malheur Lake Basin (3rd field HUC) and is designated by USGS Hydrologic Unit Code (HUC) #17120002. This sub-basin is comprised of 12 watersheds (5th field HUC), they are: #1712000212, #1712000211, #1712000210, #1712000209, #1712000208, #1712000207, #1712000206, #1712000205, #1712000204, #1712000203, #1712000202, #1712000201. (BLM Ecological Site Index) (Map #2)

OWNERSHIP (Map #3)	ACRES	% OF TOTAL ACREAGE
Public Lands Managed By:		
USDA Forest Service	371,635	44%
Bureau of Land Management	135,121	16%
State of Oregon	5,924	0.70%
Burns Paiute Tribe	768	0.09%
Private Land	330,845	39%







CHAPTER TWO

HISTORY OF THE SILVIES SUB-BASIN

Before European settlement, this area was occupied by the Northern Paiute Indian Tribe. Their original homeland encompassed portions of southeastern Oregon, northern Nevada, southwestern Idaho and northeastern California. (USDA and USDI, 1997) The Paiute people used the land for hunting and gathering. They moved through and lived in areas on a seasonal basis, which was oriented around abundant plant resources. They also hunted both small and big game. (USFS, 1997) They occupied this area from approximately 10,000 years ago until about 1872. In 1872 the Northern Paiute Indians were placed on the Malheur Indian Reservation, which was 1.8 million acres in size. By 1876, the reservation had been encroached upon by white settlers. In 1878 the Malheur Indian Reservation was terminated. The land was made public domain and the Northern Paiutes were sent to Fort Simcoe, Washington and then to a reservation in Yakima, Washington. In 1972 the United States Government transferred 762 acres approximately 2 miles northwest of Burns to the Paiute tribe, which is now the Burns Paiute Indian Reservation.

What is now known as Harney and Grant Counties were first visited by European explorers and fur traders. The Silvies Valley was once described by explorers as a vast marshland filled with beaver dams. (Armstrong, Arntz, et. al., 1989) The abundance of beaver is what attracted many fur traders to the sub-basin. Muskrat, mink, badger, coyote and bobcats were also trapped to a much lesser degree.

In the 1870's ranchers from John Day (Grant County) began trailing their cattle to Bear Valley, Silvies Valley and surrounding areas in search of more abundant feed. Because of severe winters in Silvies Valley, many ranchers wintered their cattle in Harney Valley. The expanding cattle industry in the 1870's was the catalyst for white settlement, beginning with military camps, in Harney County. With the winter of 1888, a succession of severe winters followed that decimated cattle herds. (Hatton, 1988) This resulted in the arrival of many sheep that would utilize the vacant forage supply. After the arrival and establishment of sheep ranches, the cattlemen and the sheepmen would compete for feed and space creating conflict between the two groups.

The city of Burns was established in 1883 and was voted the Harney County seat in 1889. In 1885 wagon trails ran through southeastern Oregon and in 1909 the Revised Homestead Act resulted in promotional literature that brought hundreds of settlers into the area. The influx of homesteaders lasted approximately 10 years, after which many had become poverty-stricken due to harsh conditions and moved on.

With the establishment of domestic livestock operations came the need to produce winter feed in the form of hay. Many native meadows within the flood plain of the Silvies River became hay meadows that were irrigated by diverting flows from the Silvies and surrounding streams. Dams and ditches were eventually constructed in order to more efficiently irrigate the fertile soils. Arrival of cheap electricity in the 1950's and 1960's made it possible to pump ground water and develop farmland on previously un-irrigated lands to raise alfalfa and some cereal grains for livestock feed.

Drought years accompanied by the depression of 1930 led to the U.S. government taking control of a large portion of land within the sub-basin. (Hatton, 1988) In 1934 the Taylor Grazing Act was passed. This act closed all remaining public lands to homesteading and began to limit and control the grazing of domestic livestock on public lands. The Grazing Service was established to administer this act, and has become the present day Bureau of Land Management.

In 1906 President Theodore Roosevelt established the Blue Mountain Forest Reserve that later became the Malheur National Forest in 1908. Until 1921 the Forest Service was primarily concerned with fighting fire and grazing administration. In 1919 citizens of Harney and Grant Counties petitioned the Malheur Forest for the sale of timber to be harvested and sent to a lumber mill in Harney County. (Armstrong, Arntz, et. al., 1989)

Timber was harvested on a small scale at the turn of the century. Large-scale logging began in the late 1920's and early 1930's with peaks in the late 1970's and through the 1980's. In the late 1920's the Hines Lumber Co. was constructed, and as a result the city of Hines was established. Electricity was generated by the mill and used by residents of Hines. Around the same time, Hines Lumber Co. also opened a mill in Seneca, which is no longer in operation. In 1983 Snow Mountain Pine Lumber Co. bought Hines Lumber Co. mill in Hines. Snow Mountain Pine operated through the peak timber

production years but has since been out of business. Louisiana Pacific now owns and operates a lamination plant on a portion of the property that was once Snow Mountain Pine in Hines.

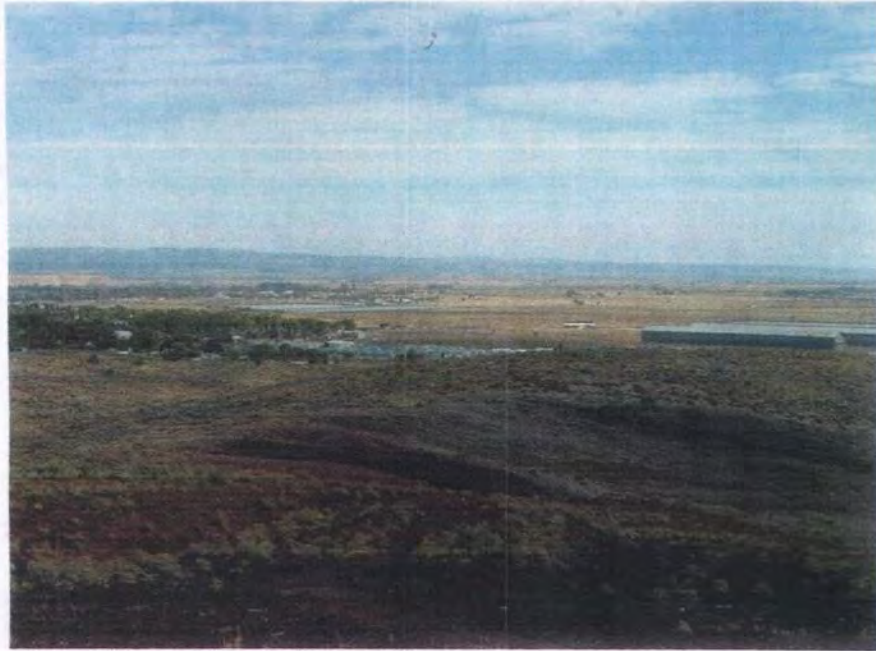


Photo of Hines and Burns in Harney Valley

Fire, an integral part of the sub-basin, has been modified throughout the history of this area. Before white settlement, natural fires and fires set by native peoples were common. Because of intensive grazing practices at the turn of the century followed by rigorous fire suppression, natural fire occurrence has significantly decreased in the past 50, or more, years.

CLIMATE

The climate in the Silvies Sub-basin is semi-arid with long, rather severe winters and short summers. This area has a high proportion of clear, sunny days and wide diurnal temperature ranges especially during the summer months. The growing season varies between 72-98 days in the lower valleys

and is shorter in the upper valleys. (State of Oregon Department of Environmental Quality, 1976)

A large percentage of the precipitation occurs in the form of snowfall, which accumulates from the month of November through the month of March. The snow pack usually remains all winter on the high timbered mountain slopes, but often melts after each snowstorm in the valleys and lower elevations. The annual precipitation ranges from less than 10 inches in the lower elevations to more than 40 inches in the headwaters. (Yockim and Smith, 1996)

There are two climatological stations located in the sub-basin. One is located near Burns at an elevation of 4,151 feet, the other is close to Seneca at an elevation of 4,666 feet. The mean temperature is 3 to 16 degrees cooler in Seneca than in Burns. The average maximum monthly temperatures range from an average of 35.3° F in January to 85.3° F in July at Burns and 34.0° F in January and 80.7° F in July at Seneca. The average minimum monthly temperatures range from an average of 15.6° F in January and 51.9° F in July at Burns and 9.8° F in January and 37.4° F in July at Seneca. (Figures #1 and #2) The average annual precipitation at Burns is 11.55 inches and it is 13.17 at Seneca (Figures #1 and #2). The average monthly precipitation for Burns ranges from a low of 0.34 inches in July and a high of 1.73 in January. The average monthly precipitation for Seneca ranges from a low of 0.52 inches in July to a high of 1.67 inches in December. (Graphs #1 and #2)

Figure #1

BURNS WSO CITY, OREGON (351176)

Period of Record Monthly Climate Summary

Period of Record : 1/ 1/1939 to 4/30/1980

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	35.3	41.8	48.4	57.6	66.6	74.5	85.3	83.2	75.0	62.8	47.3	37.9	59.7
Average Min. Temperature (F)	15.6	21.2	25.1	30.6	38.3	44.8	51.9	49.8	41.1	32.4	24.4	19.0	32.8
Average Total Precipitation (in.)	1.73	1.23	1.01	0.68	0.92	0.80	0.34	0.46	0.51	0.80	1.37	1.69	11.55
Average Total SnowFall (in.)	13.6	7.2	5.9	1.6	0.2	0.0	0.0	0.0	0.0	0.7	4.8	11.3	45.3
Average Snow Depth (in.)	4	3	0	0	0	0	0	0	0	0	0	2	1

Percent of possible observations for period of record.

Max. Temp.: 99.7% Min. Temp.: 99.7% Precipitation: 99.8% Snowfall: 99.4% Snow Depth: 99.3%

Check [Station Metadata](#) or [Metadata graphics](#) for more detail about data completeness.

Western Regional Climate Center, wrc@drf.edu

Figure #2

SENECA, OREGON (357675)

Period of Record Monthly Climate Summary

Period of Record : 6/ 1/1949 to 4/30/2000

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	34.0	39.2	44.8	53.4	61.6	70.5	80.7	80.5	71.8	59.9	44.1	35.5	56.3
Average Min. Temperature (F)	9.8	13.8	19.6	25.5	31.2	35.9	37.4	35.1	27.6	21.6	18.9	12.4	24.1
Average Total Precipitation (in.)	1.46	1.08	1.19	1.03	1.47	1.13	0.52	0.70	0.64	0.87	1.41	1.67	13.17
Average Total SnowFall (in.)	13.9	10.2	7.6	2.4	0.8	0.0	0.0	0.0	0.0	1.0	6.5	15.3	57.8
Average Snow Depth (in.)	5	5	2	0	0	0	0	0	0	0	1	3	1

Percent of possible observations for period of record

Max. Temp.: 94.2% Min. Temp.: 94.2% Precipitation: 96.3% Snowfall: 91.2% Snow Depth: 90.4%

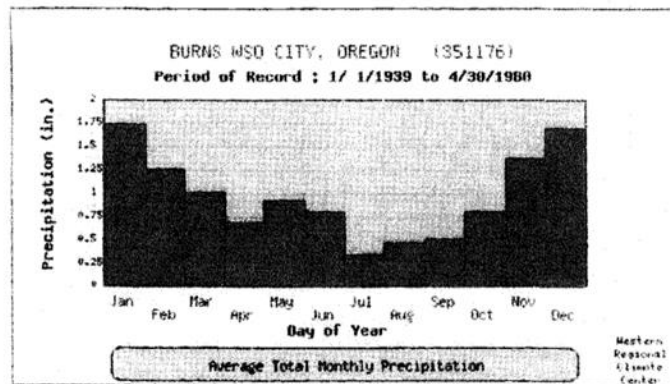
Check [Station Metadata](#) or [Metadata graphics](#) for more detail about data completeness.

Western Regional Climate Center, wrc@drf.edu

Graph #1

BURNS WSO CITY, OREGON

POR - Monthly Average Total Precipitation

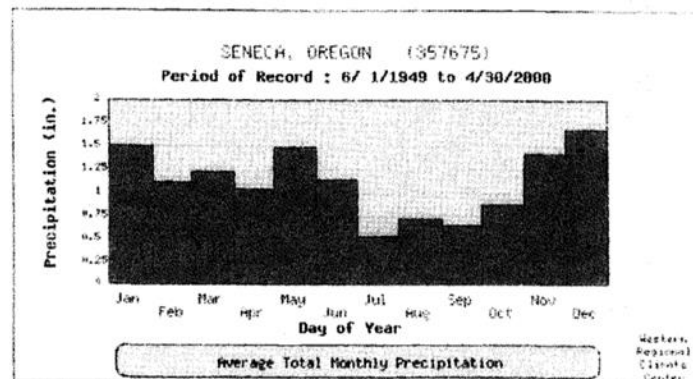


☉ - Average precipitation recorded for the month.

Graph #2

SENECA, OREGON

POR - Monthly Average Total Precipitation



☉ - Average precipitation recorded for the month.

GEOLOGY

The northern portion of the Silvies Sub-basin is located in the Blue Mountains Physiographic Province and the southern portion of the sub-basin lies within the High Lava Plains Physiographic Province. (Orr, Orr and Baldwin, 1992)

The rock units in this area are primarily three extensive Pliocene (5-10 million years old) ash flow sheets separated and overlain by sediments. The northeastern portion of the sub-basin, which lies within the Blue Mountains Physiographic Province, is composed of late Miocene (16 million years old) basalt lava flows that underlie the ash flow sheets.

The source vents that produced the ash flow tuffs are found in the High Lava Plains, specifically in the vicinity of Burns, Harney Lake and Malheur Lake. Evacuation of the ash flow magma caused the magma chamber to collapse and form low areas. As a result, the overall structure of Harney Valley is that of a bowl that dips toward the south.

Some anticlines and synclines fold the rock layers in the higher elevation north of Highway 20. Faulting primarily trends northwest over most of the sub-basin with north/south faulting on the east side of the sub-basin. (Brown, Mclean and Black, 1980) The sub-basin is capped with Mt. Mazama ash (Walker and Macleod, 1991). This ash flow event occurred approximately 7,000 years ago and has enhanced the fertility of the residual soils in the area.

HYDROLOGY

The Silvies Sub-basin drains approximately 1,350 square miles (Map #3). The Silvies River originates in the Blue Mountains and flows approximately 180 river miles to Malheur Lake. In the late Pleistocene (last 11,000 years), Malheur Lake drained through a gap just southwest of what is now Princeton, Oregon into the Malheur River, which flows into the Snake and Columbia Rivers. The outlet was blocked by Pleistocene lava flows and subsequently the Silvies Sub-basin is now a closed basin system. (Yockim and Smith, 1998)

The headwaters of the Silvies River are located in Grant County approximately 15 miles northeast of the town of Seneca. Bear Creek, a

major tributary to the Silvies River has its source approximately 15 miles northwest of Seneca and drains 85 square miles. Bear Creek winds its way through Bear Valley and joins the Silvies River just above Seneca. Little Bear Creek, Van Aspen Creek, Gerry Creek, Keller Creek, Scotty Creek and Little Scotty Creek are other tributaries located north of Seneca.



Photo of Bear Creek

The Silvies River then follows a fairly narrow corridor along Highway 20 until the topography opens up into Silvies Valley. The confluence of Camp Creek is located at the northern most end of Silvies Valley. Jump Creek, Bridge Creek, House Creek, Newell Creek, Mountain Creek, Dog Creek, Trout Creek, East Creek, Fuga Creek, Strawberry Creek, Low Creek, Jump Creek and Hall Creek are all tributaries that join the Silvies River in Silvies Valley. After exiting Silvies Valley, the river enters the largely inaccessible Silvies Canyon with high steep sidewalls. The confluences of Myrtle Creek, Emigrant Creek and Landing Creek are downstream of Silvies Canyon.



Photo of Silvies Valley

Emigrant Creek is one of the largest tributaries in the sub-basin. The runoff equals about one-quarter of the total flow of the Silvies River. (Bond, Cole, Klingemen, et.al., 1971) The channel substrate of the majority of Emigrant Creek is fine gravel and silts with some cobble and larger rock. (USFS 1997) Hay Creek, West Fork Hay Creek, Yellow Jacket Creek, Skull Creek, Sawtooth Creek, Cricket Creek, Spring Creek, Stinger Creek, Spring Canyon Creek, Bear Canyon Creek and Crowsfoot Creek are all tributaries of Emigrant Creek.

Below the mouth of Myrtle Creek there is a reduction in stream gradient and the Silvies River becomes wide with long deep pools. From about 10 miles above Burns, to the city of Burns, the river has a channel slope of 2.5 feet per mile. (Bond, Cole, Klingemen, et.al., 1971) Beginning at the confluence of Myrtle Creek, down river to the mouth of the Silvies, the channel substrate is very silty for the most part, and lacks rock armoring. This causes the river channel to be susceptible to erosion and cut banks are common.

Five Mile Dam, approximately five miles northwest of the city of Burns, is typical of many irrigation diversion dams along the river. Curry Gordon Creek and Thousand Spring Creek are tributaries of the Silvies River that are located northwest of Five Mile Dam. At Five Mile Dam, the Silvies River begins to open up into Harney Valley. There are many sloughs and other wetland areas in Harney Valley, which can be attributed to irrigation practices, spring runoff and fluctuating lake levels within the closed sub-basin. Foley Slough has its intake point approximately one-half mile

downstream of Five Mile Dam. This slough traverses southeasterly for about nine miles where it passes under Highway 78. Foley Slough joins Embree Slough through a series of irrigation canals at approximately four miles southeast of Burns. Embree Slough flows to the southeast and empties into the East Fork of the Silvies River about ten miles southeast of Burns. (Bond, Cole, Klingemen, et.al., 1971)



Photo of 5 Mile Dam

East of the fairgrounds in Burns, at the Pat Culp Ranch, the river splits into the East and West Forks of the Silvies River. The channel slope of both the East and the West Forks average approximately 2 feet per mile. (Bond, Cole, Klingemen, et.al., 1971) The East and the West Forks historically meandered across Harney Valley, but have become somewhat confined through man-made efforts to control the water. The gradient becomes extremely flat as the Silvies nears Malheur Lake. Because of this, and the low natural channel capacities, both the East Fork and the West Fork form several distributaries that flow into Malheur Lake.

Willow Creek and Sagehen Creek are tributaries of the Silvies River that flow into the south end of Harney Valley.



Photo of Harney Valley with Malheur Lake in the distance

Malheur Lake levels fluctuate depending on the total runoff available from the Silvies River, the Donner und Blitzen River that flows in from the south, and other tributaries. When Malheur Lake levels are above 4,091.5 feet in elevation overflow discharge flows into Mud Lake at the “Narrows” on Highway 205. When the elevation of Malheur Lake reaches 4,093 to 4,098 feet, water may flow from Mud Lake southwest into Harney Lake. The area of Malheur Lake varies from an average minimum of 25,000 acres to an average maximum of 45,000 acres. Malheur Lake at normal stages is no more than 7 feet deep. Harney Lake is deeper than Malheur Lake and has comparatively steeper shores. The surface area of Harney Lake varies around an average of 30,000 acres. (State Water Resources Board, 1967)

Both prehistorical features and historical record indicate that Malheur Lake levels have fluctuated greatly through time. Wave cut terraces and other geomorphic features over two hundred feet higher than the present level indicate much higher lake levels in the past. Tree rings found in tree stumps at the bottom of Malheur Lake indicate climatic variations over the years. The years of 1790-1792, 1802-1825, and 1907-1913 were exceptionally wet

years. In 1842-1849 and 1918-1934 Harney and Malheur Lakes were almost completely dry. In relatively recent years, in 1977, lake levels were very low but beginning in 1981 Burns weather station recorded 46.77 inches of precipitation which was 154% of normal. Water levels steadily rose each spring in subsequent years. Because Malheur Lake is so shallow, each 1-inch rise in lake levels equals an additional 8,500 acres that is covered by water. Finally in 1985, Malheur, Harney and Mud Lakes covered 170,000 acres, or 265 square miles, this is perhaps the largest the lakes have been in 150 years. Major flood damage occurred as a result. Approximately thirty ranchers were flooded out and Highway 78 southeast of Burns and a portion of Highway 205 between Burns and Frenchglen were under water.(Hatton, 1988) In 1986, Malheur Lake water levels were nearly sufficient for the lake to drain through the prehistoric outlet near Princeton. In years since, lake levels have slowly receded. A surface level elevation of 4,115 feet is necessary before the ancient outlet can be reached. It is estimated that the last time the outflow occurred was 3,200 to 3,800 years ago.(Yockim and Smith, 1996)

GROUND WATER

Alluvium washed into Harney Valley by several streams over time has created scattered ground water reservoirs, which can locally be economically retrieved and utilized. Additional ground water is available from bedrock sources adjacent to the basin fill alluvium. The alluvium consists of finer grained silt and clay and is considerably less permeable towards Malheur Lake. As the distance increases from Malheur Lake, the sand and gravel becomes much more coarse. Water bearing beds are discontinuous and vary in water yielding capacity.(State Water Resources Board, 1967) Various wells have tapped into groundwater resources throughout the sub-basin. (Appendix F)

WATER SUPPLY

There is one gauging station to measure stream flow within the Silvies Sub-basin. This gauge is located eleven miles northwest of Burns on the Silvies River. The gauge number is 10393500 and has collected stream flow data from 1923 to 1996. The average discharge is 177 cfs (cubic feet per second) or 128,000 acre-feet. The extremes for the period of record are a maximum discharge of 4,960 cfs on April 6, 1952 and a minimum discharge of no flow on July 19 through September 22, 1934 (Graph #3). (OWRD Gauge

Records, gauge #10393500) The annual outflow on the Silvies river may vary from under 45,000 acre-feet to over 270,000 acre-feet. The outflow of good water years is approximately six times that of poor water years.(State Water Resources Board, 1967)

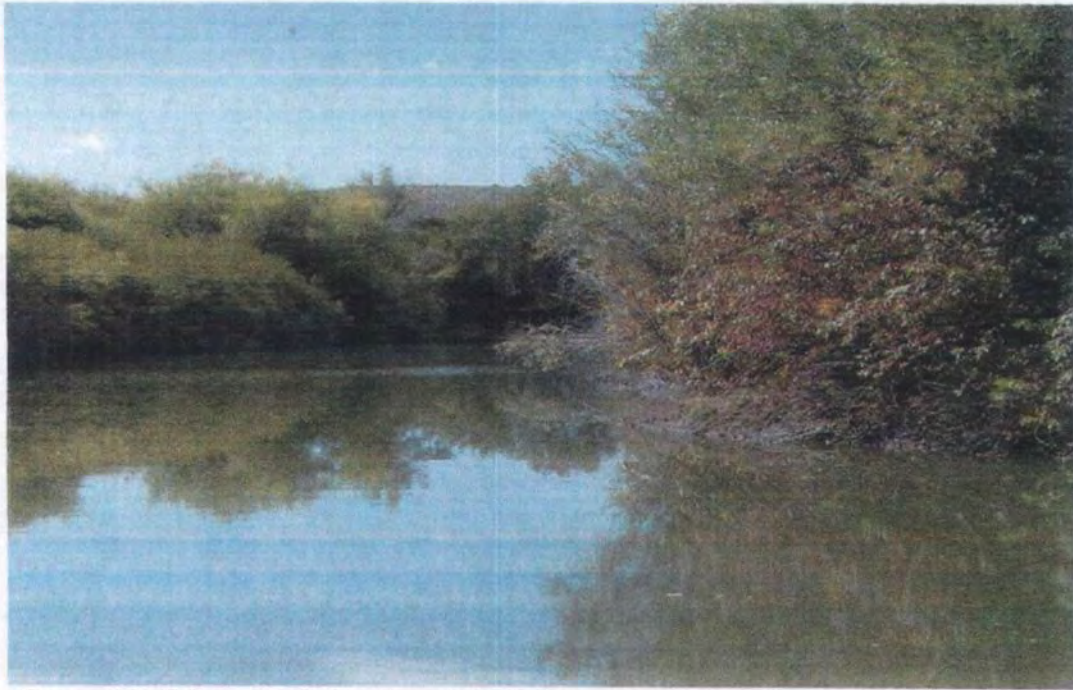
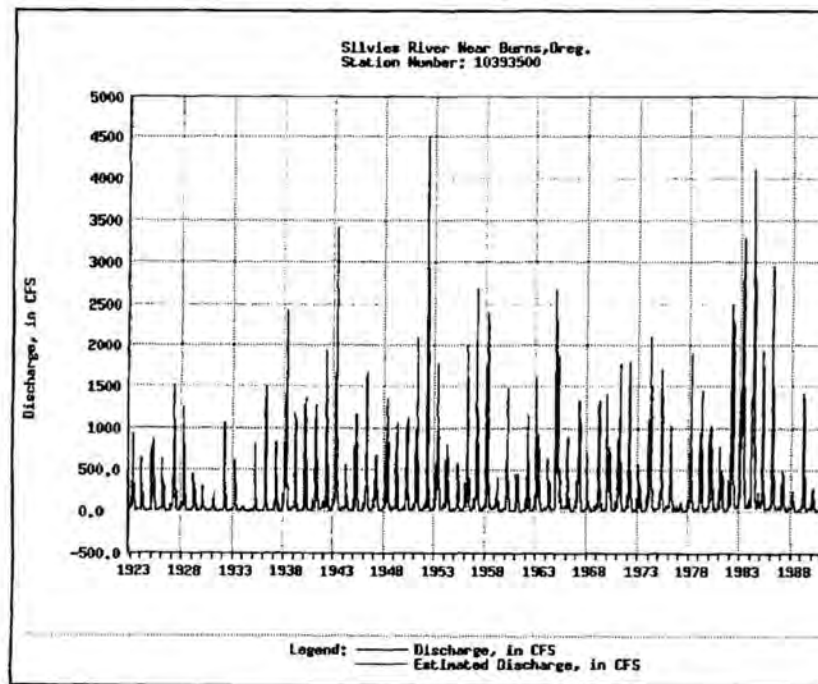


Photo of the Silvies River just above 5 Mile Dam

Graph #3



Historical Streamflow Daily Values Graph for Silvies River Near Burns, Oreg. (10393500)



Flows on the Silvies River fluctuate greatly from month to month throughout the year (Graph #4). Peak flows usually occur on the Silvies River in April. The April mean discharge for the Silvies is 767 cfs. The lowest flows usually occur during the month of September. The September mean discharge is 13.5 cfs (Table #1).

Graph #4



STREAMFLOW DATA

Oregon Water Resources Department

Station #: 10393500

Description: SHUTES RIVER NEAR BURNS, OREGON

Requested Period: 01/1996 - 12/1996

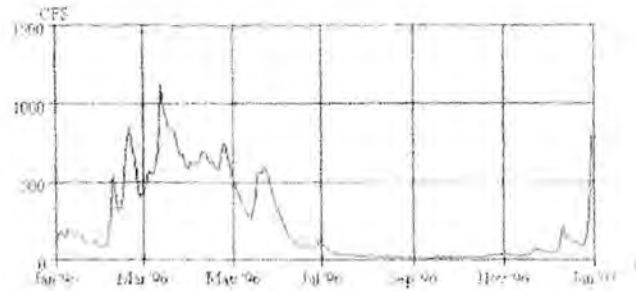


Table #1 Statistics of Monthly Mean Data For Water Years 1903-1991, Discharge in CFS (Data from USGS Gauge #10393500)

STATISTIC	MONTH											
	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
MEAN	20.6	34.0	51.5	80.5	159	380	767	464	140	33.3	14.0	13.5
MAX	74.5	142	482	715	799	1653	2716	1898	612	182	69.2	72.5
MIN	3.88	5.17	10.0	10.0	18.0	30.0	11.7	5.62	2.24	0.45	0.00	0.59

CHAPTER THREE

HUMAN USES

Timber harvesting and livestock grazing were once the economic basis for residents of the Silvies Sub-basin. Because of governmental restrictions and pressure from environmental groups, logging within this area has been greatly reduced. Livestock grazing, agriculture and recreation are the major human uses within the sub-basin today. Government agencies, Louisiana Pacific and Harney Coach Works, a recreational vehicle manufacturer, as well as local businesses and restaurants employ many residents of the cities of Burns and Hines. Mining also occurs in the area, primarily for cinder, sand and gravel production.

Agriculture in the sub-basin largely consists of feed crops for livestock. Commercial crop production is restricted by a short growing season and is predominantly limited to hearty varieties of alfalfa, pasture mix, wild hay and spring grains. Very little non-irrigated cropland exists in the area due to low annual precipitation and the short growing season. The largest agricultural product in the Silvies Sub-basin is wild hay which is flood irrigated by the Silvies River and surrounding tributaries. Flood irrigated wild hay is produced in Bear Valley, Silvies Valley and in Harney Valley.



Photo of Bear Valley

There are problems associated with flood irrigation along the Silvies River due to extreme fluctuations in flow. In the spring during high flow, which usually occurs in April, the Silvies River naturally overflows its banks and floods large portions of Harney Valley. In mid to late summer, July or August, there is not enough flow in the river to irrigate. Because of this seasonal distribution of flow, floodwaters must be diverted onto fields for early irrigation even though it may not be the optimal growth period because of low temperatures. Annual flooding also limits the production and quality of hay crops.

Water is the most limiting factor on agricultural development in this area followed by soil shallowness, drainage and alkalinity. Irrigation from the Silvies River is set by both adjudication and administrative rule. (Yokim and Smith, 1996) There are no appreciable quantities of unappropriated surface water. Any increase in agricultural land is dependant upon the availability of stored water or the development of ground water. Ground water availability is limited in some areas. Some high volume wells in Harney Valley have problems with pumping sand containing magnetite, which is abrasive and rapidly wears pumps. (Yockim and Smith, 1996)

The Northern Paiute people traditionally gathered plants for various uses and still continue this practice within the Silvies Sub-basin today. Plants found in the sub-basin that are used by the Harney Valley Paiute are listed in Appendix B. (USFS, 1997)

Recreation has become increasingly popular in this area in recent years. The solitude and openness in and of itself attracts many people. During the winter months the deep snow of the mid to upper elevations draws snowmobilers and cross-country skiers.

Hunting is an extremely popular recreational activity within the Silvies Sub-basin. Antelope season opens in late summer followed by deer season in the fall. Through the late fall and winter, many people hunt elk, cougar and bear. During waterfowl and upland game bird seasons, bird hunters actively seek a wide variety of bird species.

Bird watching in this area attracts people from long distances. Many species of migratory birds flock to hay meadows along the Silvies River (Appendix A). Thousands of birds can be observed here during the spring of the year.

Fishing and camping are popular during the summer months. Off-highway vehicle use often accompanies these activities.

Municipal water is another human use that occurs in the Silvies Sub-basin. The Cities of Burns and Hines, and the town of Seneca all have wells to meet their municipal water needs. The City of Hines has four wells that have a combined pumping rate capacity of 3,725 gallons per minute or 5,364,000 gallons per day. Hines also has two storage tanks. One tank has a 250,000 gallon storage capacity and the other has a 600,000 gallon storage capacity.(Hoffman, 2000) The City of Burns obtains its water from five wells that have the combined pumping capacity of 5,100 gallons per minute or 7,344,000 gallons per day (Corbit, 2000).

Both the City of Burns and the City of Hines treat their waste water using sewage lagoons. Burns and Hines each currently use 2 lagoons to treat waste water. The two communities are in the process of developing a combined Waste Water Treatment Plan.(Hoffman, 2000)

WILDLIFE

The Silvies Sub-basin provides habitat for a wide variety of animals (Appendix A). Elk, deer and antelope are the important big game species found in this area. Black bear and cougar are game animals that occur in the sub-basin as well.

During the summer months, elk forage in the higher elevation forested ecosystems. Deer utilize forested areas in the summer, but are also found in large numbers in juniper and sagebrush habitats. Antelope summer primarily in sagebrush habitat but are also found in meadows and grasslands.

Elk winter below 5500 ft in elevation on the fringe of the forest below the fir zone and in juniper and sagebrush habitats. Mule deer generally winter below the elevation of wintering elk and concentrate more in the open sagebrush and bitterbrush habitats. Agricultural crops are damaged during the winter season by both deer and elk. Antelope that summer in Silvies and Bear Valley are known to travel to Warm Springs Reservoir, east of the Silvies Sub-basin, to spend the winter months. Other herds of antelope in the sub-basin winter in the lowest elevation possible in order to escape any snow-pack.

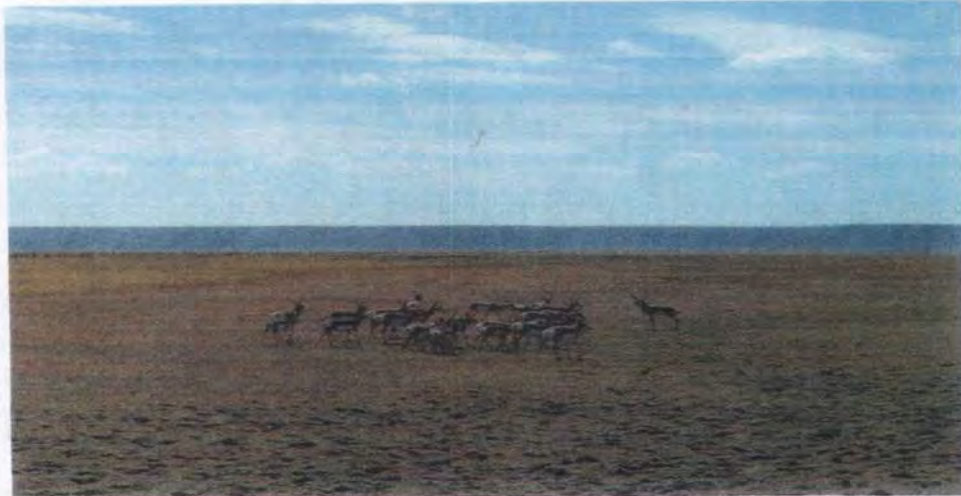


Photo of Antelope in the southern end of the sub-basin near Wright's Point

Bear are not found in high numbers in the Silvies Sub-basin. Bear prefer areas with berry producing shrubbery under a forested canopy and green grass that remains throughout the year. The Silvies sub-basin is marginal bear habitat because of the drier climate.

Cougar populations in this area are rising dramatically. Hunting cougar and bear using dogs has recently become illegal in the State of Oregon. This is the most effective means of cougar harvest, and the illegality of it is the primary cause for the increase in cougar numbers.

High populations of bobcats are found within the Silvies Sub-basin. An increase in numbers has occurred because trapping efforts have diminished due to a declining fur trade. Bobcat occupy rim-rock areas and the lower portion of the forest. They depend on various rodents and cottontail rabbits.

Coyotes are very common throughout the sub-basin. Their populations are not as large in some areas as they have been in the past. However, based upon public input, Bear and Silvies Valleys have been substantially affected by increasing coyote numbers.

There are many resident bird species found in the sub-basin. Sand hill cranes nest in both Silvies and Bear Valleys. At the south end of Silvies Valley a

bald eagle nest has been observed. Blue grouse are found in the upper elevation of the forest. Rough grouse reside along riparian areas that have a high willow and shrub component. Sage grouse occupy sagebrush fringe habitat. Sage grouse strutting grounds can be found in the Silvies Valley, Emigrant Creek and areas north of the City of Burns. (Lemos, 2000)

Wild turkeys have recently been introduced by the ODFW into the sub-basin. In the early 1990's, turkeys were planted in Emigrant Creek. During January and February of the year 2000, turkeys were placed in Little Emigrant Creek and on Burnt Mountain, located between Myrtle Creek and the Silvies River.

The hay meadows in the sub-basin provide habitat for migratory birds in the spring of the year. Flood irrigation by local ranchers provides a food base that attracts these migratory birds by the thousands. The sloughs and flooded areas contain large numbers of waterfowl at certain times of the year.

Several threatened, endangered or sensitive mammals, birds and reptiles can be found within the sub-basin (Table #2).

Table # 2 Threatened, Endangered and Sensitive Animal and Bird Species that are known to occur within the Silvies Sub-basin.

COMMON NAME	SCIENTIFIC NAME	STATUS
bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened
Columbia spotted frog	<i>Rana luteiventris</i>	Federal Candidate
ferruginous hawk	<i>Buteo regalis</i>	Sensitive
greater sandhill crane	<i>Grus Canadensis tabida</i>	Sensitive
long-billed curlew	<i>Numenius americanus</i>	Sensitive
peregrine falcon	<i>Falco peregrinus anatum</i>	Endangered
Preble's shrew	<i>Sorex preblei</i>	Sensitive
western sage grouse	<i>Centrocercus urophasianus phaios</i>	Sensitive
wolverine	<i>Gulo gulo luseus</i>	Sensitive

FISH

There are many native and non-native fish species found in the Silvies Sub-basin (Appendix C). The native fish are derived from Columbia River fauna that came from early connections with the upper Snake River and more recently from the lower Columbia River. (Klingeman, Bond, Cole, et. al., 1971) Introduced fish were brought into the streams, lakes and man made reservoirs primarily by the Oregon Department of Fish and Wildlife (ODFW) to establish populations of game fish. Small mouth bass that were stocked in 1967 can still be found in Stancliff Creek. Brook Trout were stocked in the 1940's and populations remain in Bear Creek and Scotty Creek Drainages and in the Upper Myrtle Creek Drainage. Stocking fish in streams and rivers within the sub-basin is no longer practiced by the ODFW. However, Yellow Jacket Lake, the newly constructed Poison Creek Reservoir, Willow Reservoir, State Reservoir and Greenspot Reservoir are still stocked with rainbow trout. With the exception of hatchery rainbow trout, brook trout and small mouth bass, introduced fish species are found mainly in low slow-flowing areas. The lower 40 miles of the Silvies River, including the East and West forks, contain many non-native warm water game fishes as well as large populations of native and introduced non-game fish. Carp, an introduced species, is especially abundant in the lower portion of the Silvies River. These fish create water quality problems by increasing stream turbidity, which has a negative affect on macro-invertebrate populations and trout habitat.

Native redband trout occur in all of the major tributaries of the Silvies River. Hatchery rainbow trout can be found in the Silvies River below the mouth of Myrtle Creek, in parts of Emigrant Creek, Yellow Jacket Creek and Bear Creek. There are approximately 310 stream miles that are considered trout habitat within the Silvies Sub-basin. (Hosford and Pribyl, 1991) Trout abundance, both redband and rainbow, diminish from the mouth of Silvies Canyon downstream along the Silvies River. Below Five Mile Dam, for the remaining miles of the Silvies River, trout habitat is generally poor. This poor quality habitat is a combination of both natural channel characteristics, manmade irrigation dams and diversions, and non-native fish species activity.

The ODFW, USFS, BLM and other participants are conducting a comprehensive fish and stream survey for the majority of the Silvies Sub-basin that is scheduled for completion by 2001. This survey will reveal the

current habitat conditions and current fish distribution for the streams in this area. The "Distribution, Life History and Abundance of Redband Trout in the Great Basin", written by S.P. Cramer and Associates, Inc. in November 1999 discusses the results of a stream survey conducted on many stream miles of private land on the Silvies River.

Scouring peak flows, alternating with extremely low flows in the fall (Table #1) create an instability detrimental to maintaining significant fish populations. In an effort to ensure a minimum flow in streams to maintain fish populations, the ODFW has obtained instream water rights on a few streams within the Silvies Sub-basin (Table #3).

Table #3 Instream Water Rights in the Silvies Sub-basin.
(Data from Oregon Department of Water Resources)

Stream	Priority Date	Permit Number	Water Right (cfs)
Silvies River	03/28/91	IS 71472	15.0
Emigrant Creek	04/16/90	IS 70293	12.0
Sawtooth Creek	11/19/91	IS 72023	4.0
Trout Creek	03/28/91	IS 71474	4.0
Bear Creek	03/28/91	IS 71468	12.0
Bear Creek	03/28/91	IS 71467	12.0

The redband trout and the Malheur mottled sculpin are two fish that have been designated as sensitive species within the Silvies Sub-basin (Table #4). Both species have similar habitat requirements. They both prefer cool, clear, fast flowing water with clean cobbles and gravels.

Table #4 Threatened, Endangered and Sensitive Fish Species that are known to occur within the Silvies Sub-basin.

COMMON NAME	SCIENTIFIC NAME	STATUS
Malheur mottled sculpin	<i>Cottus bairdi bairdi</i>	Sensitive
redband trout	<i>Onchorhynchus mykiss spp.</i>	Sensitive

VEGETATION

Vegetation types within the Silvies Sub-basin vary greatly due to the high variation in elevation, annual precipitation, length of growing season, soil texture and depth, and aspect. Fire suppression, herbivore grazing and timber harvest are some historic management practices that have altered vegetative communities over the years. Natural occurrences such as insect and disease outbreaks, and wild land fires have also resulted in a change in vegetative structure and type.

A large percentage of the northern Silvies Sub-basin, beginning just above the city of Burns, is forested. The forested land is comprised of pure ponderosa pine stands, pure juniper stands and mixed conifer stands that include ponderosa pine, lodge pole pine, grand fir, white fir, Douglas fir and western larch. Fire suppression and insect infestation have negatively effected many forest populations in this area.

Quaking aspen stands are widely distributed in the sub-basin. Aspen clones are maintained by disturbance regimes such as fire. The lack of disturbance, and the invasion of juniper have negatively affected aspen stands in the area.(USFS, 1997)

Below the forested uplands, sagebrush/grass communities are dominant. Mountain mahogany, bitterbrush and rabbit brush are common in these areas. Greasewood and rabbit brush along with salt grass and basin wild rye become dominant in areas within Harney Valley where the soil becomes more alkaline.

Juniper has become widespread throughout the sub-basin and particularly in the transitional zone between conifer forest and sagebrush vegetative types. Juniper is very susceptible to fire. Historically, when fire occurrence was much more frequent, juniper was found mainly on wind swept ridges. Fire

suppression has influenced the increase in juniper population and distribution in the sub-basin.



Photo of Juniper trees taken northeast of Burns

There are 4 sensitive plant species known to occur within the sub-basin (Table #5).

Table # 5 Threatened, Endangered and Sensitive Plant Species that are known to occur within the Silvies Sub-basin.

COMMON NAME	SCIENTIFIC NAME	STATUS
Deschute milkvetch	<i>Astragalus tegetariodes</i>	Sensitive
Peck's long-bearded mariposa-lilly	<i>Calochortus longebarbatus</i> var. <i>peckii</i>	Sensitive
Raven's lomatium	<i>Lomatium ravenii</i>	Sensitive
Parry's sedge	<i>Carex parryana</i>	Sensitive

There are many noxious weeds found in the Silvies Sub-basin (Appendix D). Weed infestations tend to be mostly scattered and are not severe in Silvies

Valley and Bear Valley. In these areas Canada thistle, diffuse and spotted napweed and hounds tongue are common. Beginning approximately 10 miles north of Burns, along the flood plain of the Silvies River, Russian napweed is a major problem and perennial pepperweed is becoming invasive. White top populations have drastically increased in the vicinity of Burns. In the foothills surrounding Burns, dalmation toadflax is in the invasion stage and is becoming more prevalent. In the southern part of Harney Valley, perennial pepperweed is especially problematic along riparian areas and meadows. (Sippel, 2000)

Riparian vegetation in the sub-basin varies and is determined largely by stream gradient. Where stream gradient is steep and riparian soils are generally shallow and rocky, stream banks are covered with shallow rooted species and are armored with rocks and large woody debris. In streams with a lower gradient where soil is deeper, strongly rooted vegetation exists such as sedges and willows. (USFS, 1997) The dominant overstory species found in the riparian areas in the Silvies Sub-basin are: dogwood, alder, ponderosa pine, cottonwood, chokecherry, willow, Douglas fir and aspen. The riparian area understory is most often some combination of Kentucky bluegrass, tufted hairgrass, Timothy, meadow foxtail, clover, sedges, rushes and many different forbs. Grazing, road density and location, timber harvest, and fire suppression are all human activities that affect the riparian areas within the Silvies Sub-basin.



Photo of Bear Creek

PROPER FUNCTIONING CONDITION

Proper Functioning Condition (PFC) is a methodology used by the US Forest Service (USFS), Bureau of Land Management (BLM), Natural Resource Conservation Service (NRCS) and private individuals to assess the functionality of stream systems. PFC of a stream is determined relative to the streams capability and potential given no political, social or economic constraints. PFC is identified as the minimum standard for streams. This method is beneficial because a wide variety of groups can compare like information, but it is controversial due to the lack of "hard numbers". There are 5 categories involved in this methodology, they are: PFC, functional-at risk with an upward trend, functional-at risk with a downward trend, functional-at risk, trend not apparent, and non-functional (see glossary).

PFC for all stream miles managed by the BLM within the Silvies Sub-basin has been assessed. The USFS has determined PFC on many miles, but they have a large number of streams that have not yet been assessed. PFC has not been completed along any streams on private land within the sub-basin. Proper Functioning Condition has been determined for 72.47 stream miles in the sub-basin. 50.95 miles were at PFC, 13.73 miles were functional-at risk with an upward trend, 0 miles were functional-at risk with a downward trend, 6.65 miles were functional-at risk, trend not apparent and 1.14 miles were non-functional. (Appendix E)

WATER QUALITY LIMITED STREAMS – 303(d) LIST (DEQ 1998)

Section 303(d) of the Clean Water Act requires the State Department of Environmental Quality (DEQ) to identify those waters that are "water-quality" limited based on the requirements of the most sensitive designated beneficial use. Cold-water fish are generally the beneficial use that parameters are based upon in this area.

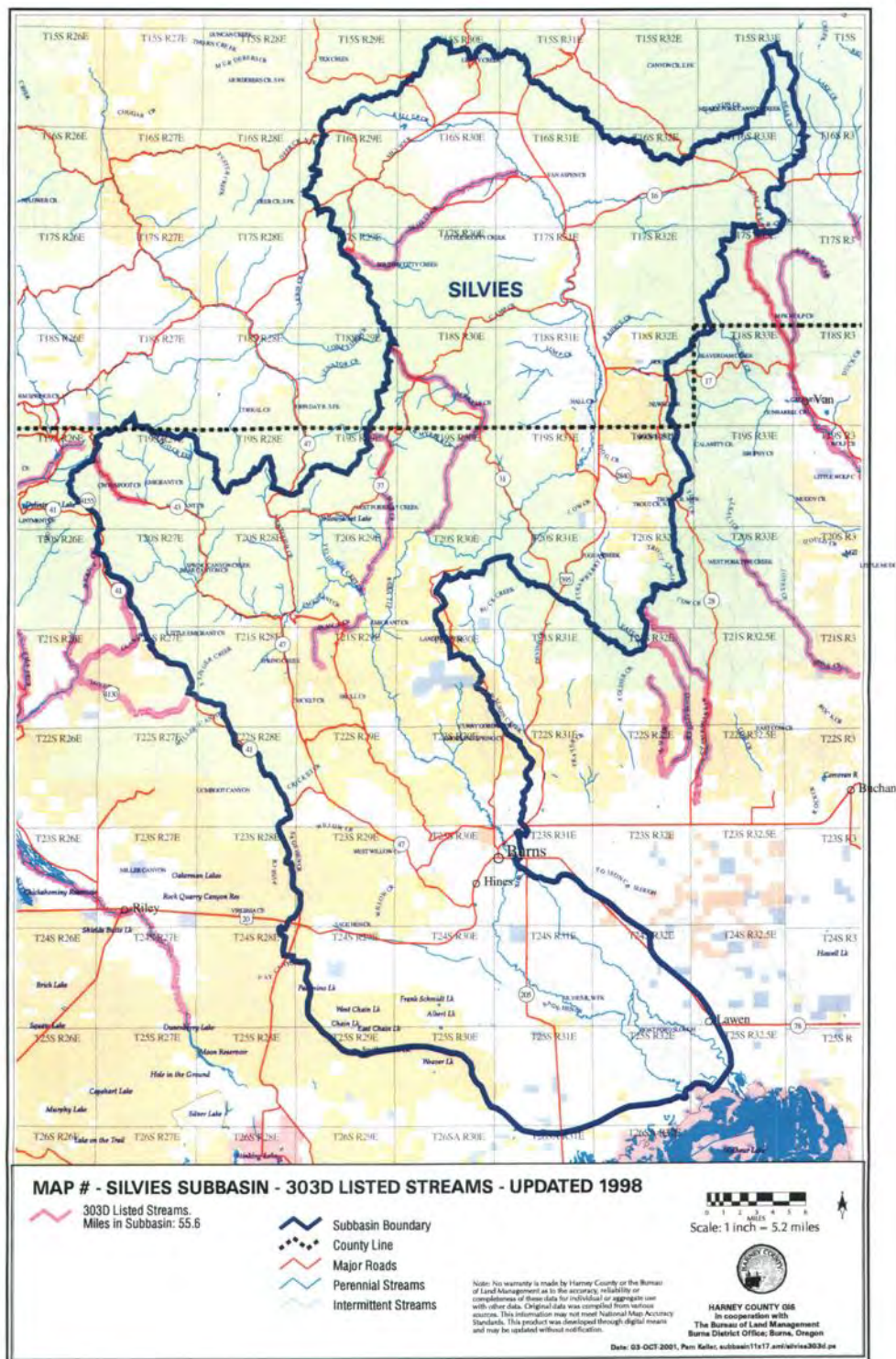
The majority of 303(d) listed streams in Eastern Oregon are placed on the list because they exceed the 7-day average of daily maximums for temperature during the summer months. Very few streams in this area meet the State Water Quality Standards during the summer months of July thru September. It is debatable as to whether or not these temperature standards are realistic or achievable in most stream systems. The Oregon State University Range Department is conducting studies to determine the effect

of stream width/depth/gradient ratio and vegetative shading on stream temperature mechanics.

There are 6 streams in the Silvies Sub-basin that have been placed on the 303(d) list. (Table #6 and Map #4) Many other streams are likely to be added in the future if the temperature standard remains the same.

Table #6 303(d) Listed Streams in the Silvies Sub-basin

STREAM NAME	BOUNDARIES	PARAMETER EXCEEDED
Crowsfoot Creek	Mouth to Headwaters	Temperature
Hay Creek	Mouth to Headwaters	Temperature
Myrtle Creek	Mouth to Headwaters	Temperature
Scotty Creek	Mouth to North/South Confluence	Temperature
Scotty Creek, South Fork	Mouth to Headwaters	Temperature
Skull Creek	Mouth to Dry Gulch	Temperature



CHAPTER FOUR

ISSUES AND RECOMMENDATIONS

Issue: Lowering of the water table due to an increase in the number of wells.

Recommendation: Educate the public as to the importance of establishing a database for the location of wells and baselines of seasonal/periodic fluctuations of ground water in those wells. This will help prevent government-mandated moratoriums on well construction due to a lack of baseline data.

Issue: Carp control.

Recommendation: Continue the development and use of selective carp management.

Issue: Weed control.

Recommendation: a) Educate the public as to the importance of their input to the existing databases of noxious weed areas. b) Recommend the continuance of government assistance for both riparian and upland weed control. c) Encourage interagency and private cooperation to increase efficiency in weed control programs.

Issue: Stream bank restoration.

Recommendation: a) Educate landowners on the typical problem conditions to be aware of on their stream systems. b) Continue to encourage assistance programs for landowners to institute repairs and riparian enhancement on their property.

Issue: Public awareness of natural resource conditions within the Silvies Sub-basin.

Recommendation: a) Ensure that the general public is aware of the development of the sub-basin assessments and improvement project summaries completed by the HCWC. Advertising their completion in the general media and making copies readily available to the public can accomplish this.

Issue: Ecological balance of native plant communities.

Recommendation: Continue to manage for ecological balance through the density control of conifers, reduction of invasive juniper populations, prescribed burning and other management practices.

Issue: Roads in the Silvies Sub-basin.

Recommendation: Create an inventory of the roads in the sub-basin and assess their affect on watershed condition.

Issue: Fish Passage and Fish Screens

Recommendation: Educate private landowners on the sources of funding available for the implementation of fish passage improvements and fish screening.

Issue: Structural integrity of existing dams along the Silvies River.

Recommendation: Educate the public on funding availability to improve the structural integrity of problem dams along the river.

APPENDIX A

Terrestrial species that occur or have the potential to occur in the
Silvies Sub-basin.

MAMMALS

COMMON NAME	SCIENTIFIC NAME
badger	<i>Taxidea taxus</i>
beaver	<i>Castor canadensis</i>
Belding's ground squirrel	<i>Spermophilus beldingi</i>
big brown bat	<i>Eptesicus fuscus</i>
big freetail bat	<i>Tadarida brasiliensis</i>
black bear	<i>Ursus americanus</i>
black-tailed jackrabbit	<i>Eutamias minimus</i>
bobcat	<i>Felis rufus</i>
bushy-tailed woodrat	<i>Neotoma cinerea</i>
California myotis	<i>Myotis californicus</i>
canyon mouse	<i>Peromyscus crinitus</i>
chickaree	<i>Tamiasciurus douglasi</i>
cougar	<i>Felis concolor</i>
coyote	<i>Canis latrans</i>
dark kangaroo mouse	<i>Microdipodops megacephalus</i>
deer mouse	<i>Peromyscus maniculatus</i>
desert woodrat	<i>Neotoma lepida</i>
fringed myotis	<i>Myotis thysanodes</i>
golden mantled ground squirrel	<i>Spermophilus lateralis</i>
Great Basin kangaroo rat	<i>Dipodomys microps</i>
Great Basin pocket mouse	<i>Perognathus parvosi</i>
hairy-winged myotis	
hoary bat	<i>Lasiurus cinereus</i>
house mouse	<i>Mus musculus</i>
least chipmunk	<i>Tamias minimus</i>
little brown myotis	<i>Myotis lucifugus</i>
long-eared myotis	<i>Myotis evotis</i>
longtail vole	<i>Microtus longicaudus</i>
long-tailed weasel	<i>Mustela frenata</i>
lump-nosed bat	
Merriam's shrew	<i>Sorex merriami</i>

COMMON NAME	SCIENTIFIC NAME
mink	<i>Mustela vison</i>
montane meadow mouse	<i>Micotus montanus</i>
mule deer	<i>Odocoileus hemionus</i>
muskrat	<i>Ondatra zibethicus</i>
northern grasshopper mouse	<i>Onychomys leucogaster</i>
northern pocket gopher	<i>Thomomys talpoides</i>
Nuttall's cottontail	<i>Sylvilagus nattalii</i>
Ord's kangaroo rat	<i>Dipodomys ordii</i>
Pale western big-eared bat	<i>Corynorhinus townsendii pallescens</i>
pallid bat	<i>Antrozous pallidus</i>
porcupine	<i>Erethizon dorsatum</i>
Preble's shrew	<i>Sorex preblei</i>
pronghorn antelope	<i>Antilocapra americana</i>
pygmy rabbit	<i>Sylvilagus idahoensis</i>
raccoon	<i>Procyon lotor</i>
red fox	<i>Vulpes vulpes</i>
Rocky Mountain elk	<i>Cervus canadensis</i>
sagebrush vole	<i>Lagurus curtatus</i>
silver-haired bat	<i>Lasionycteris noctivagans</i>
small-footed myotis	
striped skunk	<i>Mephitis mephitis</i>
Townsend's ground squirrel	<i>Spermophilus townsendii</i>
Townsend's pocket gopher	<i>Thomomys townsendii</i>
Vagrant shrew	<i>Sorex vagrans</i>
water shrew	<i>Sorex palustris</i>
western harvest mouse	<i>Reithodontomys megalotis</i>
western jumping mouse	<i>Zapus princeps</i>
western pipistrelle	<i>Pipistrellus Hesperus</i>
western spotted skunk	<i>Spilogale gracilis</i>
white-tailed antelope squirrel	<i>Ammospermophilus leucurus</i>
white-tailed jackrabbit	<i>Lepus townsendii</i>
wild horse	
wolverine	<i>Gulo gulo luseus</i>
yellow pine chipmunk	<i>Tamias townsendii</i>
yellow-bellied marmot	<i>Marmota flaviventris</i>
Yuma myotis	<i>Myotis yumanensis</i>

BIRDS

COMMON NAME	SCIENTIFIC NAME
American avocet	<i>Recurvirostra Americana</i>
American bittern	<i>Botaurus lentiginosus</i>
American coot	<i>Fulica Americana</i>
American crow	<i>Crovis brachyrhynchos</i>
American dipper	<i>Cinclus mexicanus</i>
American goldfinch	<i>Carduelis tristis</i>
American kestrel	<i>Falco sparverius</i>
American pipit	<i>Anthus rubescens</i>
American robin	<i>Turdus migratorius</i>
American white pelican	<i>Pelecanus erthrorhynchos</i>
American wigeon	<i>Anas Americana</i>
ash-throated flycatcher	<i>Myiarchus cinerascens</i>
bald eagle	<i>Haliaeetus leucocephalus</i>
bank swallow	<i>Riparia riparia</i>
barn owl	<i>Tyto alba</i>
barn swallow	<i>Hirundo rustica</i>
Barrow's goldeneye	<i>Bucephala islandica</i>
belted kingfisher	<i>Ceryle alcyon</i>
Bewick's wren	<i>Thryomanes bewickii</i>
black tern	<i>Chlidonias niger</i>
black-and-white warbler	<i>Dendroica striata</i>
black-backed woodpecker	<i>Picoides areticus</i>
black-billed magpie	<i>Pica pica</i>
black-capped chickadee	<i>Parus atricapillus</i>
black-chinned hummingbird	<i>Archilochus alexandri</i>
black-crowned night heron	<i>Nycticorax nycticorax</i>
black-headed grosbeak	<i>Pheucticus melanocephalus</i>
black-necked stilt	<i>Llimantopus mexicanus</i>
black-throated gray warbler	<i>Dendroica nigrescens</i>
blue grouse	<i>Dendragapus obscurus</i>
blue-winged teal	<i>Anas discors</i>
bobolink	<i>Dolichonyx oryzivorus</i>
bohemian waxwing	<i>Bombycilla garrulous</i>
Bonaparte's gull	<i>Larus Philadelphia</i>
Brewer's blackbird	<i>Euphagus cyanocephalus</i>
Brewer's sparrow	<i>Spizella breweri</i>

COMMON NAME	SCIENTIFIC NAME
broad-tail hummingbird	<i>Selasphorus platycercus</i>
brown-headed cowbird	<i>Molothrus ater</i>
bufflehead	<i>Bucephala albeola</i>
burrowing owl	<i>Athene cunicularia</i>
California gull	<i>Larus californicus</i>
California quail	<i>Callipepla californica</i>
calliope hummingbird	<i>Stellula calliope</i>
Canada goose	<i>Branta canadensis</i>
canvasback	<i>Aythya valisneria</i>
canyon wren	<i>Catherpes mexicanus</i>
cared grebe	<i>Podilymbus nigricollis</i>
Caspian tern	<i>Sterna caspia</i>
ceder waxwing	<i>Bombycilla cedrorum</i>
chipping sparrow	<i>Spizella passerina</i>
chukar	<i>Alectoris chukar</i>
cinnamon teal	<i>Anas cyanoptera</i>
Clark's grebe	<i>Aechmophorus clarkii</i>
Clark's nutcracker	<i>Nucifraga columbiana</i>
cliff swallow	<i>Petrochelidon pyrrhonota</i>
common goldeneye	<i>Bucephala clangula</i>
common merganser	<i>Mergus merganser</i>
common nighthawk	<i>Chordeiles acutipennis</i>
common poor-will	<i>Phalaenoptilus nuttallii</i>
common raven	<i>Corvus corax</i>
common snipe	<i>Gallinago gallinago</i>
common yellowthroat	<i>Geothlypis trichas</i>
Cooper's hawk	<i>Accipiter cooperii</i>
Cordilleran flycatcher	
dark-eyed junco	<i>Junco hyemalis</i>
double-crested cormorant	<i>Phalacrocorax auritus</i>
downy woodpecker	<i>Picoides pubescens</i>
dunlin	<i>Calidris alpina</i>
dusky flycatcher	<i>Empidonax oberholseri</i>
eastern kingbird	<i>Tyrannus tyrannus</i>
Eurasian wigeon	<i>Anas penlope</i>
European starling	<i>Sturnus vulgaris</i>
ferruginous hawk	<i>Buteo regalis</i>

COMMON NAME	SCIENTIFIC NAME
flamulated owl	<i>Otus flammeollus</i>
Forester's tern	<i>Sterna forsteri</i>
fox sparrow	<i>Passerella iliaca</i>
Franklin's gull	<i>Larus pipixcan</i>
gadwall	<i>Anas strepera</i>
golden eagle	<i>Aquila chrysaetos</i>
golden-crowned kinglet	<i>Regulus calendula</i>
golden-crowned sparrow	<i>Zonotrichia atricapilla</i>
grasshopper sparrow	<i>Ammodramus savannarum</i>
gray flycatcher	<i>Empidonax wrightii</i>
gray jay	<i>Perisoreus Canadensis</i>
great blue heron	<i>Ardea herodias</i>
great egret	<i>Ardea alba</i>
great gray owl	<i>Strix nebulosa</i>
great horned owl	<i>Bubo virginianus</i>
greater white-fronted goose	<i>Anser albifrons</i>
greater yellowlegs	<i>Tringa melanoleuca</i>
green-tailed towhee	<i>Pipilo chlorurus</i>
green-winged teal	<i>Anas crecca</i>
hairy woodpecker	<i>Picoides villosus</i>
Hammond's flycatcher	<i>Empidonax hammondi</i>
Harris sparrow	<i>Zonotrichia querula</i>
hermit thrush	<i>Catharus guttatus</i>
hooded warbler	<i>Wilsonia citrina</i>
horned lark	<i>Eremophila alpestris</i>
house sparrow	<i>Paser domesticus</i>
house wren	<i>Troglodytes aedon</i>
killdeer	<i>Charadrius vociferous</i>
Lapland longspur	<i>Calcarius lapponicus</i>
lark sparrow	<i>Chondestes grammacus</i>
least flycatcher	<i>Empidonax alnorum</i>
least sandpiper	<i>Calidris minutilla</i>
lesser scaup	<i>Aythya affinis</i>
lesser yellowlegs	<i>Tringa flavipes</i>
Lincoln's sparrow	<i>Melospiza lincolni</i>
loggerhead shrike	<i>Lanius ludovicianus</i>
long-billed curlew	<i>Neumius americanus</i>
long-billed dowitcher	<i>Limnodromus scolopaceus</i>

COMMON NAME	SCIENTIFIC NAME
long-eared owl	<i>Asio otus</i>
MacGillivray's warbler	<i>Oporornis tolmiei</i>
mallard	<i>Anas platyrhynchos</i>
marbled godwit	<i>Limosa fedoa</i>
marsh wren	<i>Cistothorus palustris</i>
merlin	<i>Falco columbarius</i>
mountain bluebird	<i>Sialia currucoides</i>
mountain chickadee	<i>Parus gambeli</i>
mourning dove	<i>Zenaida macroura</i>
n. rough-winged swallow	<i>Stelgidopterys serripennis</i>
n. saw-whet owl	<i>Aegolius acadicus</i>
Nashville warbler	<i>Vermivora ruficapilla</i>
northern flicker	<i>Colaptes auratus</i>
northern goshawk	<i>Accipiter gentiles</i>
northern harrier	<i>Circus cyaneus</i>
northern mockingbird	<i>Mimus polyglottos</i>
northern pintail	<i>Anas acuta</i>
northern shoveler	<i>Anas chlypeata</i>
northern shrike	<i>Lanius excubitor</i>
northern waterthrush	<i>Seiurus noveboracensis</i>
olive-sided flycatcher	<i>Contopus borealis</i>
orange-crowned warbler	<i>Vermivora celata</i>
osprey	<i>Pandion haliaetus</i>
peregrine falcon	<i>Falco peregrinus anatum</i>
pied-billed grebe	<i>Podilymbus podiceps</i>
pine grosbeak	<i>Pinicola enucleator</i>
prairie falcon	<i>Falco mexicanus</i>
pygmy nuthatch	<i>Sitta pygmaea</i>
red-breasted nuthatch	<i>Sitta Canadensis</i>
redhead	<i>Aythya Americana</i>
red-naped sapsucker	<i>Sphyrapicus nuchalis</i>
red-tailed hawk	<i>Buteo jamaicensis</i>
red-wingd blackbird	<i>Agelaius phoeniceus</i>
ring-billed gull	<i>Larus delawarensis</i>
ring-necked duck	<i>Aythya collaris</i>
ring-necked pheasant	<i>Phasianus colchicus</i>
rock wren	<i>Salpinctes obsoletus</i>
Ross' goose	<i>Chen rossii</i>

COMMON NAME	SCIENTIFIC NAME
rough-legged hawk	<i>Buteo lagopus</i>
ruby-crowned kinglet	<i>Regulus calendula</i>
ruddy duck	<i>Oxyura jamaicensis</i>
ruffed grouse	<i>Bonasa umbellus</i>
rufous hummingbird	<i>Selasphorus rufus</i>
rufous-sided towhee	<i>Pipilo erythrophthalmus</i>
sage sparrow	<i>Amphispiza belli</i>
sage thrasher	<i>Oreoscoptes montanus</i>
sandhill crane	<i>Grus canadensis</i>
savannah sparrow	<i>Passerculus sandwichensis</i>
Say's phoebe	<i>Sayornis saya</i>
scrub jay	<i>Aphelocoma coerulescens</i>
sharp-skinned hawk	<i>Accipiter striatus</i>
short-eared owl	<i>Asio flammeus</i>
snow bunting	<i>Plectrophenax nivalis</i>
snow goose	<i>Chen caerulescens</i>
snowy egret	<i>Egretta thula</i>
snowy plover	<i>Charadrius alexandrinus</i>
solitary vireo	<i>Vireo solitarius</i>
song sparrow	<i>Melospiza melodia</i>
sora	<i>Porzana Carolina</i>
spotted sandpiper	<i>Actitis macularia</i>
Steller's jay	<i>Cyanocitta stelleri</i>
Swainson's hawk	<i>Buteo swainsoni</i>
three-toed woodpecker	<i>Picoides tridactylus</i>
Townsend's solitaire	<i>Myadestes townsendi</i>
Townsend's warbler	<i>Dendroica townsendi</i>
tree swallow	<i>Tachycineta bicolor</i>
Turkey vulture	<i>Cathartes aura</i>
tundra swan	<i>Cygnus colubianus</i>
Vaux's swift	<i>Chaetura vauxi</i>
veery	<i>Catharus fuscescens</i>
vesper sparrow	<i>Pooecetes gramineus</i>
violet-green swallow	<i>Tachycineta thalassina</i>
Virginia rail	<i>Rallus limicola</i>
warbling vireo	<i>Vireo gilvus</i>
western bluebird	<i>Sialia mexicana</i>
western grebe	<i>Aechmophorus occidentalis</i>

COMMON NAME	SCIENTIFIC NAME
western kingbird	<i>Tyrannus verticalis</i>
western meadowlark	<i>Sturnella neglecta</i>
Western sage grouse	<i>Centrocercus urophasianus phaios</i>
western sandpiper	<i>Calidris pusilla</i>
western screech owl	<i>Otus kennicottii</i>
western tanager	<i>Piranga ludoviciana</i>
western wood pewee	<i>Contopus sordidulus</i>
white face ibis	<i>Plegadis chihi</i>
white-breasted nuthatch	<i>Sitta carolinensis</i>
white-crowned sparrow	<i>Zonotrichia leucophrys</i>
white-headed woodpecker	<i>Picoides albolarvatus</i>
white-throated sparrow	<i>Zonotrichia albicollis</i>
white-throated swift	<i>Aeronautes saxatalis</i>
wild turkey	<i>Meleagris gallopavo</i>
willet	<i>Catoptrophorus semipalmatus</i>
Williamson's sapsucker	<i>Sphyrapicus thyroideus</i>
willow flycatcher	<i>Empidonax traillii</i>
Wilson's phalarope	<i>Phalaropus tricolor</i>
Wilson's warbler	<i>Wilsonia pusilla</i>
winter wren	<i>Troglodytes troglodytes</i>
wood duck	<i>Aix sponsa</i>
yellow warbler	<i>Dendroica petechia</i>
yellow-headed blackbird	<i>Xanthocephalus xanthocephalus</i>
yellow-rumped warbler	<i>Dendroica coronata</i>
greater sandhill crane	<i>Grus Canadensis tabida</i>
long-billed curlew	<i>Numenius americanus</i>

REPTILES AND AMPHIBIANS

COMMON NAME	SCIENTIFIC NAME
boreal toad	<i>Bufo boreas</i>
Columbia spotted frog	<i>Rana luteiventris</i>
common kingsnake	<i>Lampropeltis getula</i>
desert horned lizard	<i>Phrynosoma platyrhinos</i>
desert night snake	<i>Hypsiglena torquata</i>
desert striped whipsnake	<i>Masticophis taeniatus</i>
E. long-toes salamander	<i>Ambystoma macrodactylum</i>

COMMON NAME	SCIENTIFIC NAME
Great Basin fence lizard	<i>Sceloporus occidentalis</i>
Great Basin gopher snake	<i>Pituophis catenifer</i>
Great Basin spadefoot toad	<i>Spea intermontana</i>
Great Basin whiptail	<i>Cnemidophorus tigris</i>
n. side-blotch lizard	<i>Utastans buriana</i>
northern sagebrush lizard	<i>Sceloporus graciosis</i>
Pacific treefrog	<i>Hyla regilla</i>
rubber boa	<i>Charina bottae</i>
sagebrush lizard	<i>Sceloporus graciosus</i>
short-horned lizard	<i>Phrynosoma douglassii</i>
spotted frog	<i>Rana pretiosa</i>
valley garter snake	
w. yellow-bellied racer	
wandering garter snake	
western fence lizard	<i>Sceloporus occidentalis</i>
western rattlesnake	<i>Crotalus viridis</i>
western skink	<i>Eumeces skiltonianus</i>

APPENDIX B Plants used by the Burns Paiute Indian Tribe (USFS, 1997)

Scientific Name	Northern Paiute Name	English Common Name
<i>Achillea millefolium</i>	waa da qusi	yarrow
<i>Allium acuminatum</i>	kyyga	tapertip onion
<i>Allium madicum</i>	sii	swamp onion
<i>Artemesia frigida</i>	na te zoowa	wormwood/praire sagewort
<i>Artemesia tridentata</i>	sah wabi	big sagebrush
<i>Calochortus macrocarus</i>	koogi	sagebrush mariposa lily
<i>Camassia quamash</i>	paazigo	camas
<i>Fritillaria pudica</i>	winida	yellow bell
<i>Juniperus occidentalis</i>	waa pi	juniper
<i>Lewisia rediviva</i>	kanicy	bitterroot
<i>Lomatium canbyi</i>	canacuka	Canby's biscuit-root
<i>Lomatium cous</i>	cuka	cous biscuit-root
<i>Lomatium gormanii</i>	kwidapoo	German's biscuit-root
<i>Lomatium macrocarpum</i>	haapi	large-fruit biscuit-root
<i>Lomatium nudicaule</i>	unknown	bare stem biscuit-root
<i>Mentha arvensis</i>	pakwana	fieldmint
<i>Penstemon spp.</i>	namogot	beardtongue
<i>Perideridia bolanderi</i>	yapa, yampa, payapa	Gairdner's yampah
<i>Perideridia oregana</i>	pamahayapa	Oregon yampah
<i>Pinus ponderosa</i>	ti bi	ponderosa pine
<i>Prunus virginiana</i>	toosia bui	chokecherry
<i>Ribes aureum</i>	poko pisa	golden currant
<i>Trifolium macrocephalum</i>	poziidapy	big-head clover

APPENDIX C

FISH SPECIES OF THE SILVIES SUB-BASIN

NATIVE FISH

COMMON NAME	SCIENTIFIC NAME
bridgelip sucker	<i>Catostomus columbianus</i>
chiselmouth	<i>Acrocheilus alutaceus</i>
largescale sucker	<i>Catostomus macrocheilus</i>
longnose dace	<i>Rhinichthys cataractae</i>
Malheur mottled sculpin	<i>Cottus bairdi bairdi</i>
mottled sculpin	<i>Cottus bairdi</i>
northern squawfish	<i>Ptychocheilus oregonensis</i>
redband trout	<i>Oncorhynchus mykiss newberii</i>
redside shiner	<i>Richardsonius balteatus</i>
speckled dace	<i>Rhinichthys asculus</i>

NON-NATIVE FISH

COMMON NAME	SCIENTIFIC NAME
bluegill	<i>Lepomis macrochirus</i>
brook trout	<i>Salvelinus fontinalis</i>
brown bullhead	<i>Ictalurus nebulosus</i>
common carp	<i>Cyprinus carpio</i>
largemouth bass	<i>Micropterus salmoides</i>
pumpkinseed	<i>Lepomis gibbosus</i>
rainbow trout	<i>Oncorhynchus mykiss</i>
smallmouth bass	<i>Micropterus dolomieu</i>
white crappie	<i>Pomoxis annularis</i>
yellow perch	<i>Perca flavescens</i>

**APPENDIX D
HARNEY COUNTY NOXIOUS WEEDS**

A Rated Weeds (infestations are subject to eradication where found)

Common Name	Scientific Name
tansy ragwort	<i>Senecio jacobaea</i>
diffuse knapweed	<i>Centaurea diffusa</i>
spotted knapweed	<i>Centaurea maculosa</i>
squarrose knapweed	<i>Centaurea virgata</i>
yellow star thistle	<i>Centaurea solstitialis</i>
purple loosestrife	<i>Lythrum salicaria</i>
leafy spurge	<i>Euphorbia esula</i>
rush skeletonweed	<i>Chondrilla juncea</i>
scotch broom	<i>Cytisus scoparius</i>
salt cedar	<i>Tamarix ramosissima</i>
musk thistle	<i>Cardus nutans</i>
yellow toadflax	<i>Linaria vulgaris</i>

B Rated Weeds (infestations are handled at county discretion)

Common Name	Scientific Name
perennial pepperweed	<i>Lepidium latifolium</i>
scotch thistle	<i>Onopordum acanthium</i>
puncture vine	<i>Tribulus terrestris</i>
dalmatian toadflax	<i>Linaria dalmatica</i>
russian knapweed	<i>Centaurea repens</i>
medusahead rye	<i>Taeniatherum caput-medusa</i>
mediterranean sage	<i>Salvia aethiopsis</i>

C Rated Weeds (infestations are handled at landowners discretion)

Common Name	Scientific Name
klamath weed	<i>Hypericum perforatum</i>
morning glory	<i>Convolvulus arvensis</i>
canada thistle	<i>Cirsium arvense</i>
white top	<i>Cardaria draba</i>
halogeton	<i>Halogeton spp.</i>

APPENDIX E

PROPER FUNCTIONING CONDITION

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Stream	Approx. Legal Location	Ownership	PFC (miles)	Functional		Functional		Non Functional (miles)
				At Risk Upward Trend (miles)	At Risk Downward Trend (miles)	At Risk Trend (miles)	At Risk Not Apparent (miles)	
Crane Creek #1	T19S R30E sec. 3	Forest Service						
Crane Creek #2	T19S R30E sec. 3&10	Forest Service	1					0.5
Crane Creek Totals			1					
Emigrant Creek	T20S R29E sec. 21&31	B.L.M.	1.7					
Hay Cr. & West Fork Hay Cr.	T20S R29E sec. 1,11,12	B.L.M.		2.85				
Heifer Creek #1	T18S R30E sec. 21,22,29	Forest Service	1.75					
Heifer Creek #2	T18S R30E sec. 29	Forest Service						0.75
Heifer Creek Totals			1.75					0.75
Landing Creek	T21S R29E/30E sec. 1,4,5,6	B.L.M.	3.6					
Little Sagehen Creek #1	T19S R30E sec. 31	Forest Service	0.5					
Little Sagehen Creek #2	T19S R30E sec. 25,30,31	Forest Service						1.75
Little Sagehen Creek #3	T19S R30E sec. 24&25	Forest Service		0.5				
Little Sagehen Creek #4	T19S R30E sec. 14,23,24,25	Forest Service	1.75					
Little Sagehen Creek Totals			11.05	3.35				1.75
Mountain Creek	T18S/19S R32E sec. 32,33,4	B.L.M.	2.48					
Myrtle Creek #1	T19S R30E sec. 27,28,33	Forest Service	1.75					
Myrtle Creek #2	T19SR30Esec.2,10,15,16,22,27	Forest Service	5.5					
Myrtle Creek #3	T19S R30E sec. 182	Forest Service		0.25				
Myrtle Creek #4	T18S R30E sec. 36	Forest Service	0.75					
Myrtle Creek #5	T18S R30E sec. 25&26	Forest Service		1.25				
Myrtle Creek #6	T18S R30E sec. 27	Forest Service	0.25					
Myrtle Creek #7	T18SR30Esec.16,21,22,27	Forest Service		2.5				
Myrtle Creek #8	T18SR30Esec.17,18,20,21	Forest Service	2					
Myrtle Creek Totals			10.25	4				
Newell Creek	T18S R32E sec. 32,33,28,27	B.L.M.	2.67					
Sagehen Creek #1	T19S R31E sec. 29	Forest Service	0.19					
Sagehen Creek #2	T19S R31E sec. 19,29,30	Forest Service						1.25
Sagehen Creek #3	T19S R31E sec. 18&19	Forest Service	0.75					
Sagehen Creek #4	T19S R31E sec. 18	Forest Service						0.5
Sagehen Creek #5	T19S R30S/31S sec. 7,13,18	Forest Service	1.25					
Sagehen Creek Totals			2.19					1.75

Stream	Approx. Legal Location	Ownership	PFC (miles)	Functional At Risk		Functional At Risk		Functional At Risk		Non Functional (miles)
				Upward Trend (miles)	Downward Trend (miles)	Upward Trend (miles)	Downward Trend (miles)	Upward Trend (miles)	Downward Trend (miles)	
Silvies River #1	T20S R30E sec. 32,6,7	B.L.M.						1.9		1.14
Silvies River #2	T20S R29E sec. 13&24	B.L.M.				3.24				
Silvies River #3	T21S R29E sec. 13,25,24,14	B.L.M.				0.75				
Silvies River #4	T20S R30E sec. 3&4	Forest Service								
Silvies River #5	T20S R30E sec. 1,12,11,10,4	Forest Service								
Silvies River #5	T20S R31E sec. 6	Forest Service								
Silvies River #5	T19S R31E sec. 31,29,28,21	Forest Service								
Silvies River #5	T19S R31E sec. 22,15	Forest Service	12.5							
Silvies River Totals			12.5			3.99				1.9
East Creek	T20S R32E sec. 7&8	B.L.M.	1							
Skull Creek #1	T21S R29E sec. 5&6	B.L.M.	0.6							
Skull Creek #2	T20S/21S R29E sec.4,5,6	B.L.M.	1.14							
Skull Creek #3	T21S R29E sec. 5&6	B.L.M.				0.38				
Skull Creek #4	T20S R29E sec. 34&35	B.L.M.	0.57							
Skull Creek Totals			2.31			0.38				
Stanciliff Creek #1	T19S R31E sec. 29&32	Forest Service	0.75							
Stanciliff Creek #2	T19S/20S R31E sec.33&4	Forest Service				1.25				
Stanciliff Creek #3	T20S R31E sec. 4,8,9	Forest Service	0.75							
Stanciliff Creek #4	T20S R31E sec. 8	Forest Service				0.25				
Stanciliff Creek #5	T20S R31E sec. 8	Forest Service	0.25							
Stanciliff Creek Totals			1.75			1.5				
Tributary of Myrtle Cr. #1	T18SR30Esec.19,20,27	Forest Service	2							
Tributary of Myrtle Cr. #2	T18S R30E sec. 19&27	Forest Service				1				
Tributary of Myrtle Cr. #3	T18S R29E sec. 24	Forest Service				0.5				
Tributary of Myrtle Cr. Totals			2			1.5				
West Fork of Myrtle Creek			4.25							
Silvies Sub-basin Totals			50.95			13.73	0			6.65
Total Stream Miles Assessed	72.47									1.14

LIST OF RECORDED WELLS WITHIN THE SILVIES RIVER SUBBASIN			
TWN'SHP	RANGE	GEOGRAPHIC AREA	NUMBER OF WATER WELLS REPORTED
15S	30	LOGDELL	9
15S	31	WINDFALL SPRING	8
16S	30	JACK CREEK-SCOTTY CREEK	5
16S	31	BEAR VALLEY	11
16S	32	BEAR CREEK	1
16S	33	UPPER BEAR CREEK	0
17 S	29	UPPER SCOTTY CREEK	3
17 S	30	CAMP CREEK	0
17 S	31	SENECA-LOWER CAMP CREEK	4
17S	32	UPPER ANTELOPE CREEK	0
18S	30	CROOKED CREEK	0
18S	31	JUMP CREEK	2
18S	32	HOUSE CREEK	1
19S	26	CROWSFOOT CREEK	3
19S	27	UPPER EMIGRANT CREEK	0
19S	28	UPPER SAWTOOTH CREEK	0
19S	29	SUGARLOAF MTN.	2
19S	30	MYRTLE CREEK	0
19S	31	SAGE HEN-TROUT CREEK	2
19S	32	MOUNTAIN CREEK	1
20S	27	BEAR CANYON	5

LIST OF RECORDED WELLS WITHIN THE SILVIES RIVER			
TWN'SHP	RANGE	GEOGRAPHIC AREA	NUMBER OF WATER WELLS REPORTED
20S	30	MYRTLE CREEK- UPPER DRY CREEK	1
20S	31	CROW FLAT	2
21S	28	SPRING CREEK	0
21S	29	SKULL CREEK	0
21S	30	GORDON CREEK	2
21S	31	POISON CREEK	1
22S	28	WEST WILLOW CREEK	0
22S	29	UPPER CRICKET CREEK	1
22S	30	MIDDLE-LOWER SILVIES	30
22S	31	DEVINE CANYON WEST-NORTH BURNS	63
23S	29	LITTLE SAGE HEN CREEK	1
23S	30	CITY OF HINES	52
23S	31	CITY OF BURNS	208
24S	29	SOUTH SAGE HEN	31
24S	30	WEST HINES	60
24S	31	BURNS EAST	42
24S	32	BURNS SOUTH	72
25S	30	SOUTH WRIGHTS POINT	16
25S	31	HYW 205 WEST	95
25S	32	ISLAND RANCH	14
TOTAL			748
NOTE; LIST DOES NOT INCLUDE ANY WELLS NOT FILED WITH THE OREGON DEPARTMENT OF WATER RESOURCES NOR FILED AFTER MAY 1999. SOURCE FOR DATA IS THE OREGON DEPARTMENT OF WATER RESOURCES. NO MONITOR OR GEOLOGIC WELLS LISTED. NO DIFFERENTIATION BETWEEN DOMESTIC AND IRRIGATION WELLS MADE			

APPENDIX G

ISSUES DISCUSSED AT PUBLIC MEETINGS

Two public meetings were held to discuss this assessment. One meeting was located in Burns on August 28, 2000, the other was held in Seneca on August 31, 2000. The following are issues that were discussed at these meetings.

1. Urban sprawl issues in Burns and Hines.
2. Lowering of the water table due to an increase in wells.
3. Carp control.
4. Weed control.
5. Desire to maintain wild flow along the Silvies as opposed to storing water.
6. Stream bank restoration.
7. Need for an education program on stream bank stability and stream potential.
8. More realistic reporting of elk numbers and control of the elk population.
9. Need to raise public awareness as to the good condition of natural resources within the sub-basin.

GLOSSARY

Proper Functioning Condition (PFC) – Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize stream banks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding and other uses; and support greater biodiversity. The functioning condition of riparian-wetland areas is a result of interaction among geology, soil, water and vegetation. (USDI Bureau of Land Management, 1995)

Functional at Risk – Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation. (USDI Bureau of Land Management, 1995) An upward trend signifies that conditions are improving and moving towards PFC. A downward trend implies that conditions are worsening.

Nonfunctional – Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc., as listed above. The absence of certain physical attributes such as a floodplain where one should be are indicators of nonfunctioning conditions. (USDI Bureau of Land Management, 1995)

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MEINZ Kelly A * WRD

From: Chico Baravelli <cbaravelli@mail.com>
Sent: Tuesday, July 22, 2025 4:13 PM
To: MEINZ Kelly A * WRD; Rob Frank; harmony@saltandfresh.solutions; Chico Baravelli
Subject: RULE 512 Econ_Anal v1.2
Attachments: According to the USDA.pdf

This is public comment. Please replace the previous AN INDEPENDENT IN COUNTY STATISTICAL ANALYSIS OF RULE 512 ECONOMIC IMPACTS ON HARNEY COUNTY with this.

An immediate 49% reduction in irrigated hay and alfalfa production. Crop gross income by -32.24%. 18 jobs. \$1,053,300 in annual income. 2.68-2.84% RGDP decline with lingering but short lived offsets to any economic gains perhaps for a total -3.5%. Monetary velocity slows down more. Gonna hav'ta keep that Dodge Ram 3500 with the Cummings three years longer.

TANX

**AN INDEPENDENT IN COUNTY STATISTICAL ANALYSIS OF RULE 512
ECONOMIC IMPACTS ON HARNEY COUNTY
1997 to 2022 SURVEY PERIOD**

KEY POINTS

RULE 512 does not impact livestock production if numbers are limited to 112,000 to 118,000 at the end of implementation. 2022 NASS estimate total grazing livestock number is 88,000. Historic numbers have been 122,000 to 133,000 head.

County alfalfa self sufficiency will continue but with much less export. When livestock counts exceed 118,000, variable livestock - groundwater production margins are also.

RULE 512 volume and acre reductions for well irrigated crops are large and immediate. Crop gross income may be -32.24% lower in 2022 dollars. Hay and alfalfa irrigators by -49.46%. Agriculture real GDP may decline -9.63% after implementation. Non-government Industrial RGDP declines -2.68%. However, weak cattle replacement rates and the lack of future sales may make a -2.84% RGDP decline immediately after the first PTW, Then, reduce or offset any economic gains for the next few years perhaps for a total -3.5%.

RULE 512 will have minimal impacts on county employments and incomes. 18 full-time jobs and a total \$1,053,002 of income in 2022 dollars is at risk of loss. Direct income losses are -1.044% of total county income. Perhaps another five to seven due to secondary job losses. Harney County has low monetary velocity rates.

Perhaps the industrial category which future income and employment is most impacted is electric power and distribution.

RULE 512 may impact county population by -5.62% or to 7,008 residents by PTW Year 24 from the 2023 USCB ACS estimated 7,402 if livestock numbers remain at 2022 levels.

There has been a rather rapid population expansion and now contraction.

RULE 512 will have some impact on county government revenues. \$144,144.03 to \$145,167.95 in property taxes will be at risk three years after implementation from the Weaver Springs sub-area which is proposed to be "regulated off" in PTW Year 12. Beyond then is difficult to estimate with accuracy. County property taxes will continue to lag behind inflation but at higher rates. Property tax rates are high and tax assessments are low.

An estimated annual 10% to 20% by volume reduction of available surface water flows into the SWMPA is due to 50% over consumption and 75% over retention in the Bear and Silvies sub-Basins above the 1924-26 Silvies River Water Decree. The River is now tributary to Emigrant Creek by a near 40/60 ratio. If those sub-basins had been regulated, then in 2022 this may have induced a minimum 5% to 10% livestock number increase in a drought year.

This is an independent in county statistical analysis of RULE 512 economic impacts on Harney County. Source numbers are from the USDA including the Commerce Department, United States Census Bureau, Treasury, Federal Reserve, Oregon Department of Agriculture and other collaborative sources including the Harney County Assessors' Office.

Survey period is between the USDA 1997 and the NASS 2022 agri censuses. A 25 year look back to predict where and how much RULE 512 may impact agri production 25 years forward.

I am Mario Petrilli. A "townie" and a "newbie". I attended the April Division 512 RAC meeting and read the PowerPoint OWRD presented on future economic costs to the local economy. EconW prepared the analysis from a distance and with an ecological lens. Their estimates were ridiculous:

OWRD economic forecasts use alfalfa at \$273 a dry ton worth \$58,000,000 in 2023 dollars.

Forecast assumes a 1 to 1 relationship in alfalfa and livestock production declines.

80% of alfalfa production is exported and 20% is consumed in county.

County has a \$200 million dollar a year recreational industry.

Department economic estimates are available at https://www.oregon.gov/owrd/Documents/ECO_Harney_County_Report_Final.pdf and <https://www.oregon.gov/owrd/Documents/CGWA%20Fiscal%20Impact.pdf>.

An in-county for the county analysis is needed.

Numbers and statistics presented in this report are for Harney County, not the SWMPA alone.

Methodology measures the economic and demographic deltas or rates of change and apply them to well irrigated crop production with 50% less after RULE 512 implementation.

Statistics are reported in percentages, not in dollars. Dollars inflate.

Dollars and Real Gross Domestic Product percentages are "chained" to 2017 dollars except when noted.

All dollar amounts are corrected with CPI and PPI inflation rates except USDA and ODA published numbers from each census.

Census survey numbers may be corrected by the next census. Numbers are verified using the census numbers published five years later.

Averages or *means* are the sum of numbers divided by the number of sums. Medians are the same but with extreme high and low "outlier" numbers omitted. Report uses means whenever possible.

This report is a difficult read. There are many numbers. There are many ifs. There IS statistical analysis IN ENGLISH for each category and comparisons to regional counties and state means. There are three agriculture sections; crops, irrigation and livestock.

In Harney County, cattle, sheep and horses eat the most hay / alfalfa and drink the most water. Future groundwater restrictions will restrict future livestock farm numbers, head counts and incomes. This Report will present an estimate of by how much in near identical formats for crops and livestock. Report also estimates RULE 512 impacts on population, gross domestic product and county property taxes.

The Oregon Water Resources Department RULE 512 intends to reduce current groundwater by half or when non-regulated domestic wells recover, no longer report going sour or dry. Implementation uses three simultaneous methods.

An immediate acre-feet [AF] volume reduction from 3.0 to 2.5 AF, a -16.666% decrease.

An immediate historical beneficial reduction reducing total land acres to irrigated acres, a -21.666% decrease for pivot farms. However, 30% of the 703 grantees have some form of beneficial use restriction. Corrected SWMPA reduction is a -15.080% decrease.

The 35% PTW Schedule with the largest percentage decreases front loaded in the first six year PTW period have a general -17.7% decrease.

The average, or mean, immediate reductions could be -49.446% of current volumes. The year when accumulated AF is half of 2018 is 1990. Without PTW implementation, the year is 2004.

Comparisons and contrasts can be made with the 1990 U.S. Census and the 1992 U.S.D.A. Census to forecast future RULE 512 economic impacts under the current scenario.

Unfortunately, the USDA Census does not begin reporting by county until 2002. Only state totals and top 100 counties are in 1987 census for each less diversified category. Harney County is in two. Cows and Heifers that have Calved (1992 60,502, 1987 66,974) and Beef Cattle (1992 60,442, 1987 66,854). There are no crop numbers available.

Oregon Department of Agriculture *Record Highs and Lows for Field Crops through 2020 Crop Year* reports 1992 is the record low year for All Hay in the state with records from 1909. All Hay, Alfalfa and Other commodity prices per ton between 2012 and 2020 decline -7.14%, -8.07% and -7.94% respective in non-inflation dollars. 2011-2020 Value Per Harvested Acre decline -15.16%, -10.87% and -18.86% respective. Federal Reserve Consumer Price Index inclines +11.28% during the period.

https://agcensus.library.cornell.edu/census_parts/1992-oregon/

1982 is the record high year for All Cattle and Calves with records from 1867. Oregon All Cattle and Calves total head counts between 2012 and 2021 decline -5.30%. Cattle and Calves Production Gross Income inclines +5.38%. Cattle and Calves Inventory, Supply, and Disposition Deaths for cattle improves +2.5% and for calves +11.11%.

2017-2021 All Cattle and Calves Harney County inventories decline -7.62% to end at 97,000 head. Beef Cows decline -2.90% to 67,000.

<https://www.oregon.gov/oda/Documents/Publications/Administration/AgStatsDirectory.pdf>

U.S.D.A. National Agriculture Statistical Service [NASS] begins a new more diversified format in 2002. Census includes 1997 statistics. 1997 granted groundwater allocations are 43.01% less than 2018. RULE 512 immediate intent is a -49.45% reduction.

According to the USDA and NASS from 1997 to 2022, Harney County, not the SWMPA alone, **farm and or ranch** numbers decline -11.17% through consolidation and abandonment. **Farm acres** incline +8.89%. **Farm average or mean size** increases +15.06% yet estimated median size decreases -42.34% indicating farms are growing larger. **Land in farms** by +12.11% with a -58.61% decrease in **Land in house lots, ponds, roads, wasteland, etc.** Harney County farms have become larger and more efficient with the best improvements occurring between 2012 and 2022.

ESTIMATED MARKET VALUE OF LAND AND BUILDINGS increase +379.49%. Consumer Price Index [CPI] core inflation also increases by +82.32%. Corrected MAV is an impressive +65.68%. Corrected or real **Average per farm** value is a more impressive +76.11%. **Average per acre** value increases by +57.80%.

Increases are due in large part to irrigated pivot alfalfa farms. Within the five county southeast Oregon area, Lake County has the highest valuation numbers from 2007 forward. Total 25 year property valuations there in 1997 dollars increase a most impressive real +229.03%, surpassing Harney County in the 2012 USDA census.

ESTIMATED MARKET VALUE OF ALL MACHINERY AND EQUIPMENT, corrected for the Producers Price Index [PPI] 88.04% inflation rate, increases +45.32%. **Average per farm** real increase is +46.32%. Again, increases are due in large part to irrigated pivot alfalfa farm equipment.

County +75.48% **Average per acre** is second highest in southeast Oregon and higher than state mean by +15.61%. Only Lake County exceeds the Harney County average per farm machinery and equipment valuation increase by +22.35%.

NASS 2022 Census estimates the 2017 total asset value at \$81,222,000 and the 2022 total at \$106,160,000 for a +30.70% gain. Lake County has \$97,159,000 and \$146,545,000 for +50.83%. Malheur County declines from \$232,904,000 to \$208,737,000 or by -10.38%.

Farm numbers receiving **GOVERNMENT PAYMENTS** double by +104.03% in the 25 year period. **Average per farm** inclines a real +151.52% and **payments** by 428.04% in then dollars.

Farms reporting **TOTAL INCOME FROM FARM-RELATED SOURCES, GROSS BEFORE TAXES AND EXPENSES** increase a real +167.37%. They report a +96.82% increase in total income for a +50.76% **Average per farm** increase. Larger producers and operators have larger increases. Only Grant County has a lower mean total income percentage and ratio.

TOTAL FARM PRODUCTION EXPENSES increase a real PPI corrected +22.40% and **Average per farm, dollars** increase a real +26.50% in 1997 dollars. State mean per farm expenses are up +25.09%.

In 2022, mean core expenses per farm are **Feed purchased** (14.26%) followed by **Livestock and poultry purchased or leased** (11.45%) then by **Hired farm labor** (9.88%), **Repairs, supplies, and maintenance costs** (9.49%) and **Gasoline, fuels, and oils purchased** (8.99%).

In 1997, mean core expenses per farm are **Livestock and poultry purchased or leased** (13.94%) followed by **Feed purchased** (13.40%) then by **Hired farm labor** (11.79%), total **Interest expense** (9.68%) and **Repairs, supplies, and maintenance costs** (8.43%). **Gasoline, fuels, and oils purchased** was 6.37% of core farm expenses.

NET CASH FARM INCOME OF OPERATION incline a real +51.00% and **Average per farm, dollars** incline a real +57.65%. State mean net income per farm is +21.66% and average per farm is +3.98%. Harney County net gains are due in large part to irrigated pivot alfalfa farms. Only Lake County has substantially higher numbers and percentages in the 2007 USDA census and thereafter. Another factor is while county livestock counts decrease, beef cattle market prices increase more at higher All Urban CPI (housing, food and fuel) inflation rates.

MARKET VALUE OF AGRICULTURAL PRODUCTS SOLD INCLUDING DIRECT AND ORGANIC gain by a real +29.29%. State gains +21.74%. **Average per farm dollars** gain by +35.19%. State gains +26.65%. County mean gains are higher than state due to county mean farm acreage size ratio is larger, 3,102 to 430 acres. Harney County may have the largest mean farm sizes in the state due to large scale livestock operations.

FARMS WITH SALES OF \$500,000 OR MORE farm numbers increase +422.22% during the 25 year period. Sales amounts for these farms more than double with a real +105.05% increase. Both are far above state means. Only Lake County, with a +78.71% higher farm number increase with +85.97% higher sales for those farms with sales \$500,000 or more, is far above Harney County.

CROPS, INCLUDING NURSERY AND GREENHOUSE (vegetable) reporting farms decrease -30.26%. Crop farm % of total farms decreases from 36.31% in 1997 to 28.51% in 2022. However, vegetable crop sales increase a real +69.15% and crop sales % of total agri sales increases from 19.86% to 36.71%.

LIVESTOCK, POULTRY, AND THEIR PRODUCTS (animal) reporting farms decrease -30.73%. The same as vegetable crop farms. Livestock farms % of total farms decreases from 81.19% in 1997 to 63.31% in 2022. However, animal sales increase a real +21.68% while sales % of total sales decreases from 69.10% to 63.29-.31%.

Vegetable and animal sales will not sum to total agricultural sales estimates due to various factors such as government subsidies.

County total vegetable crop sales increase more than three times more than livestock sales from 1997 to 2022.

2022 total vegetable sales estimate is \$36,470,000. 2022 total animal sales estimate is \$62,867,000. Ratios are 1.72 to 1 or 0.58 to 1.

Farms reporting **TOTAL CROPLAND acres** decline by -40.25% and reported **acres** decline by -9.74%. **Farms** with **Harvested cropland** decline by -30.97% and **acres** incline to what

appears to be at a stable +4.44%. Recall 2022 is the last year of the third most severe drought recorded since 1923. 2017, a wet year, reports a -13.86% decrease in farms since 1997 with +35.41% more harvested acres.

Drought and the national pandemic impact farm ratios. 2022 NASS has 477 reporting farms, 302 animal and 136 vegetable. Together, they are 91.82% of total farms. Others may have no production to report or are abandoned. 2017 NASS has 532 reporting, 360 animal and 174 vegetable. Together, they are 100.38% of total farms. Two farms report both animal and vegetable sales.

Between 2017 and 2022, farms with harvested cropland report 173,533 and 133,857 acres respective. However, harvested crop sales are between \$29,601,000 and \$36,470,000 in 2017 and 2022 dollars. -22.86% less net farms and +23.21% more gross incomes in five years.

CROPLAND ON WHICH ALL CROPS FAILED OR WERE ABANDONED or **CROPLAND ON WHICH ALL CROPS FAILED** number of farms increase +463.49% and acres by +1,153.50% between 1997 and 2022. Small number changes in small number pools make for large percentage changes.

LAND ENROLLED IN CONSERVATION RESERVE OR WETLANDS RESERVE PROGRAMS participating farms decline -68.63% while acres incline +54.96%. OO Ranch is an example. Ratios change after the Steens Mountain Cooperative Management and Protection Act of 2000.

IRRIGATION:

There are two droughts recorded in USDA and NASS censuses from 1997 to 2022. The 2002 USDA Census occurs during the final year of the second most severe drought recorded in a century. 1997 is a not so wet year. The 2022 NASS Census occurs in the final year of a 2 1/2 year drought, third most severe in a century. 2023 forward are wet years.

Comparing consecutive wet and dry census numbers, 1997 and 2002 to 2017 and 2022, failed farms between the first wet to dry census pair triple and acres more than double. Between the second census pair, failed farms begin at triple more than at the beginning of the first pair Both are near identical percentages. But failed acres increase by only +41.67%. The 2000-2002 drought period was more severe.

However, 34 of total 524 farms reporting in 2002 have failed crops for 6.49% of total. In 2022, 51 of total 477 farms reporting have failed crops for 10.69% of total. Major factor is surface water dependent grass, hay and alfalfa producers have significantly less access to flows during dry years. More so since the 2017 census.

USDA-NASS data does not allow for parsing irrigated cropland water sources between surface and groundwater or what crops are grown. Hay and alfalfa production and income from wells cannot be estimated.

FARMS WITH IRRIGATION Table 6 (1987-2012) and **IRRIGATED FARMS** Table 10 (2017-2022). **Irrigated farm** numbers decline -25.55% and **irrigated acres** incline by +29.40%.

Harney County acre gains are due in large part to irrigated pivot hay and alfalfa farms.

Harvested cropland farms decline -22.84% and **harvested acres** incline +13.48%. 2017 has peak production with 169,587 total acres. 2017 to 2022 change is -22.16% due to drought.

OTHER CROPLAND, EXCLUDING CROPLAND pastured farms incline +23.40% and **acres** by +252.94% with the largest increases between 1992 and 2002. In Harney County, other cropland excluding cropland pastured are irrigated pivot hay and alfalfa farms. In Lake County, such cropland has the largest increases between 2017 and 2022 of +70.98%.

PASTURELAND, EXCLUDING WOODLAND farm numbers decline -28.08% and **acres** incline +23.82%. Pastureland is developed with limited opportunities to expand. Yields are more sensitive to precipitation changes year to year.

PASTURELAND AND OTHER LAND, a small sub-set of the total, farms decline -57.73% and acres by -40.90%. Both numbers collapse in the 2022 NASS Census from 2017 by -53.93% and -15.12% respective. Yields are most sensitive to precipitation changes. Within southeast Oregon, Harney County has the largest farm decline due to consolidation and abandonment yet the smallest acre decline. Between 2017 and 2022, Grant County acres incline a more stable +0.83% as it again expands production.

Irrigated Land total acres decline -15.29% between 1997 and 2022 with the largest decline between 2017 and 2022 of -26.47%. 2017 has peak production with 166,501 total acres. NASS reports 2017 **harvested irrigated croplands** having peak production with 169,587 total acres. 2022 production is second smallest to 2002 with 133,001 and 122,421 acres respective due to drought.

HAY - ALL HAY INCLUDING ALFALFA, OTHER TAME, SMALL GRAIN, AND WILD (TONS, DRY) 1997 census numbers were in different categories than used in the 2002 census and thereafter. Those numbers are not presented but can be extracted.

Between 2002 and 2022, **farm numbers** decrease -29.25% and **acres** decline -3.86%. Recall both censuses occur during drought years. **Quantity** in dry tons improve +4.42% and tons per acre by +8.41%.

Between 1997 and 2022, **tons per acre** range from 1.91 to 3.06, Lake County ranges from 2.89 to 4.08 tons, Malheur County from 3.65 to 4.23 and the State mean ranges from 2.84 to 3.00 tons.

Between 2002 and 2022, **Irrigated ALL HAY** farm numbers decrease -22.27% and **acres** by -21.85%. In wet 2017, irrigated farms are 84.44% of total all hay farms and 81.72% of total acres. In very dry 2022, irrigated farms are 95.67% of total with much fewer all hay farms and 71.50% of total acres.

Reported acres per farm in 2017 is the record 601.67 acres, 375.64 and 377.65 acres in 2002 and 2022. Irrigated all hay acres decline a mean -34.40% and dry tons a mean -28.35% during severe drought years.

From 1982 to 2012, USDA tracts OTHER DRY, WILD HAY, SMALL GRAIN AND OTHER TAME HAY (other than alfalfa, wild hay and small grain) separate from ALFALFA. From 2017 forward, NASS reports HAY, HAY and HAYLAGE, HAY and ALFALFA, HAY excluding ALFALFA and ALFALFA.

OTHER DRY HAY (TONS, DRY), between a somewhat wet 1997 and a very dry 2002, **harvested farms** decline -30.06% and **acres** by -34.52%. **Dry tons** decline -26.36%. Reporting **irrigated harvesting farms** decline -27.01% and **irrigated acres** by -50.53%. USDA does not report irrigated dry tons.

In 1997, irrigated harvesting farms are 73.68% of total other dry hay farms and irrigated harvested acres are 93.48% of total. In 2002, irrigated harvesting farms are 85.07% and irrigated harvested acres 79.96% of total.

WILD HAY (TONS, DRY) **farm numbers** decline -37.04% and **acres** by -20.65%. **Dry tons** decline -34.66%. 1997 and 2002 reporting **irrigated harvesting farms** decline -28.68% and **irrigated acres** by -14.74%. Reporting **irrigated harvesting farms** decline -27.01% and **irrigated acres** by -50.53%.

In 1997, irrigated harvesting farms are 79.63% of total wild hay farms and irrigated harvested acres are 83.44% of total. In 2002, irrigated harvesting farms are 90.20% and 89.67% respective of total. In 2002, wild hay is less affected by drought than other dry hay.

SMALL GRAIN HAY (TONS, DRY) small **farm numbers** between 1997 and 2002 decline -15.25% and **acres** by -25.80%. **Dry tons** decline -9.31%. Reporting **irrigated harvesting farms** decline -52.94% and **acres** incline +10.14%.

In 2002, the most reliable census between the two, irrigated harvested acres are 80.18% of total small grain hay (and alfalfa) farms.

OTHER TAME HAY (TONS, DRY) small **farm numbers** incline +17.54% and **acres** decline -27.02%. **Dry tons** decline -16.08%. Reported **irrigated harvesting farms** incline +35.71% and **acres** decline -37.58%. The mean irrigated harvested acres are 43.89% of total other tame hay acres.

ALL OTHER HAYLAGE, GRASS SILAGE, AND GREENCHOP (TONS, GREEN) **farm numbers** decline -47.83% within a much smaller farm sub-total. 1997 acres and dry tons are reported as (D), not disclosed due to low quantity and quality producer reports.

In 2002, irrigated harvesting farms are 100.00% of total other haylage (alfalfa) farms and irrigated harvest acres are +41.39% more than total. Often, haylage, grass silage and greenchop is cut from the same land as dry haylage. Acreage and production for both is reported in their appropriate categories. A double production count from the same acreage.

FORAGE - LAND USED FOR ALL HAY AND HAYLAGE, GRASS SILAGE, AND GREENCHOP **farm numbers** between 2002 and 2022 (1997 numbers are (NA), not available) decline -26.69% and **acres** incline +20.72%. Equivalent dry tons incline +20.66%. 2017 to 2022

tons per farm incline +5.80% and tons per acre by +6.28%. In 2022, 77.17% of forage land is irrigated and the 2.03 equivalent tons per is half Lake County with 4.07 tons per.

The 2017 NASS Census redefines hay, silage and forage into different sub-categories going forward in time. In the NASS **ALL HAYLAGE, GRASS SILAGE, AND GREENCHOP (TONS, GREEN)**, between 1997 and 2022, **farm numbers** incline +66.67% and **acres** incline by +9,139.24%. Dry tons incline +4,006.84%.

Irrigated haylage farm numbers incline +87.50% and acres by +4,230.68%. Dry ton 2002, 2012 and 2017 numbers are reported as (D). 2022 all reported haylage acres as irrigated. Recall 1997 granted groundwater allocations are 43.01% less than 2018.

Harney County ground and surface water distribution systems are developed but inefficient with few opportunities to expand. However, it has the largest irrigated acre number and percentage increases by far in the region. Only Lake County produces more haylage than Harney after the 2017 census.

ALFALFA ONLY: EXCLUDING HAY or ALFALFA HAY (TONS, DRY) reporting **farms** decline -18.29% and **acres** incline +7.69%. **Dry tons** incline +8.12%. **Irrigated alfalfa farm numbers** decline -12.80% and **acres** incline +17.94%. As near all alfalfa acres are irrigated, farms by acreage increase near 18% in 20 years.

Between 1997 and 2022, tons per acre range between 3.16 to 3.65. Lake County, with the highest percentage of pivot irrigation farms among all hay farms in the region, tons per acre range between 3.83 in 2002 to 5.03 in 2022.

HAYLAGE OR GREENCHOP FROM ALFALFA OR ALFALFA MIXTURES (TONS, GREEN) 1997 to 2022 farm numbers are very small, from one to five, and near all quantities are (D) or (NA). All reporting farms are irrigated.

In 2022, four farms report producing 1,932 bushels of winter / spring wheat for grain.

NASS 2022 Census numbers skew nominal annual hay and alfalfa production numbers. For example, between 1997 and 2017, Harney County alfalfa farms decline by -9.71% and acres incline by +56.84%. Dry tons by +53.77%. Irrigated alfalfa farm numbers decline -10.92% and irrigated acres incline +91.73%. Irrigated dry tons by +42.40%.

2017 has peak acres and production of 54,277 acres with 60,514 acres irrigated producing 193,255 dry tons. Between 2017 and 2022, acreage and production collapse. 37,230 acres with 37,224 irrigated producing 135,885 dry tons. According to this measure, drought and market instabilities impact alfalfa only acreage by -31.34% and production by -29.69%.

Another measure is the former USDA alfalfa only excluding hay from All Hay farms. Between 2017 and 2022, farms decline -17.34% and acres by -64.06%. Dry tons incline by +6.25%. Irrigated alfalfa farm numbers decline -2.05% and irrigated acres decline -38.49%. Between 2017 and 2022, 37,230 acres with 37,224 irrigated producing 135,885 dry tons. By this measure, 2022 impacts alfalfa only acreage by -29.01% and production by -30.41%.

2017 total haylage 321,141 dry tons.	2022 total haylage 230,090 dry tons (-28.35%)
2017 total all hay only 127,866 dry tons	2022 total all hay only 94,205 dry tons (-26.33%)
2017 alfalfa only 193,255 dry tons	2022 alfalfa only 135,885 dry tons (-29.87%)
2017 60.17% alfalfa	2022 59.06% alfalfa
2017-2022 total haylage mean is 275,615.50 dry tons	
2017-2022 all hay only mean is 111,035.50 dry tons	
2017-2022 alfalfa only mean is 164,570.00 dry tons	

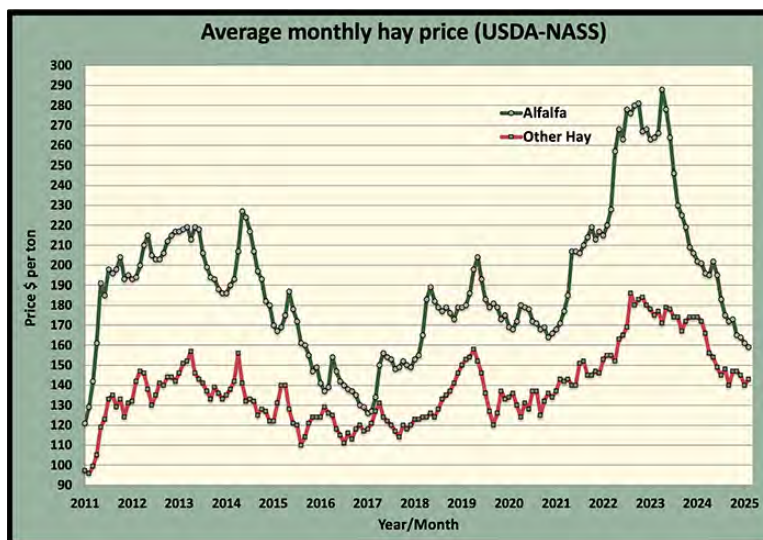
If RULE 512 restricts ground water usage to estimated 1990 levels or by 49.03%,
if as in 2022, 92.31% of haylage produced using ground water is alfalfa from 1997 to 2022,
if as in 2017 and 2022, alfalfa is an estimated 60% of all haylage produced,
and if RULE 512 -34.55% volume and acre-feet reductions are immediate and the -17.7% first
six year PTW is implemented for -52.25%.

then RULE 512 will immediately reduce total alfalfa production by 50% to 82,285 dry tons. All
hay only irrigation 7.69% of total haylage is also reduced by 50% to 106,760.63 dry tons and is
more dependent on less dependable surface water flows. Total haylage may decline -28.85% to
196,100.43 dry tons.

The real world example would be a 2022 all hay production decline of -16.15% and alfalfa
production by -39.44%.

Median of 2017 and 2022 crop sales, adjusting 2017 to match 2022 inflated amounts by the
core CPI 20.51% rate, is a mean annual \$36,069,602.50 in 2022 dollars during this five year
period.

If the anecdotal 40% of hay and 60% of alfalfa is exported during the period,



Source: hayandforage.com/article/5288

if volatile market prices for other
hay start 2017 at the USDA-NASS
national mean estimate of \$118 per
dry ton in 2017 dollars and end
2022 at \$178 in 2022 dollars (other
hay sale prices peak mid-Summer
2022 at \$188) and alfalfa starts at
\$127 to end at \$268 (alfalfa sale
prices peak Spring 2023 at \$289),
if Oregon sale prices were, at
times, the highest in the nation for
supreme and premium quality
alfalfa (Lake County, DEC 2022,
supreme \$350 per dry ton, premium
\$330 (Klamath Basin organic

premium \$375), good quality \$275-280 (eastern Oregon \$245 and good quality pasture hay
single small bale \$235) and fair quality \$250 (eastern Oregon), and

if the median national sales price between censuses for hay is \$141.25 per dry ton and alfalfa is
\$202.12 per,

if the 2017 and 2022 five year mean of total producing forage pasture land is 151,929.5 acres,

if all hay including alfalfa mean is 136,467 producing acres,
 if total irrigated all hay farm mean is 121,553.5 producing acres,
 if harvested hay only mean is 90,713.5 acres with 22,657.5 (24.98%) irrigated pasture acres,
 if all harvested alfalfa cropland is 45,753.5 acres with 48,869 irrigated acres (mix crop double count) producing,
 if total haylage dry tons are a mean 275,615.50,
 if all hay only dry tons are a mean 111,035.50 or 40.29% of total haylage,
 if alfalfa only dry tons are a mean 164,570.00 for 59.71% of total,
 and if alfalfa production is reduced 50%,
 and if the mean 48,869 irrigated alfalfa acre yields are reduced by 50% with RULE 512 and if good quality alfalfa production, selling for the NASS mean \$202.12 a dry ton, is also reduced by 50%,
 then 50% of the mean 164,570 alfalfa tons selling at \$202.12 is \$16,631,444.20, 30% of the 7.69% mean of 111,035.50 hay only tons selling at \$141.25 or more is \$1,082,179.74. RULE 512 immediate implementation would reduce Harney County crop production \$17,713,623.94.
 If 60% of alfalfa mean 164,570 dry tons is not consumed by county livestock and exported, then \$19,957,733.04 is included in the county 2022 real gross domestic product [RGDP] of \$320,290,000 as estimated by the St. Louis Federal Reserve [FRED] in “chained or real” 2017 dollars or \$424,958,000 in “unchained” 2022 dollars (+22.68% inflation).
 If the mean between 2017 chained and 2022 real GDP is \$372,624,000, then the 50% alfalfa production reduction may reduce county RGDP -6.23% or more in one year, not including the local low monetary velocity or multiplier effect. Impact will be felt later than sooner.
 Exports will continue. Numbers and percentages cannot be extrapolated from the available data. Recall the anecdotal 60% of alfalfa and 40% of hay is. The estimated -50% alfalfa and -7.7% hay only production declines allow for export income. However, alfalfa production is at the margins of annual local alfalfa consumption which is variable. RULE 512 does not impact local alfalfa consumption with 2022 livestock inventory numbers.
 In 2022, the largest mean core expense among all farms, vegetable and animal, is feed (14.26%) if the anecdotal 60% of harvested hay and 40% of irrigated alfalfa is consumed by livestock within the county,
 if 60% of hay only or 66,621.3 dry tons at \$141.25 per ton or \$9,410,258.63 is consumed or stored and if 40% of alfalfa only or 65,828.0 dry tons at \$202.12 per ton or \$13,305,155.36 is, then local haylage production and consumption by all livestock may be 7.092% of county RGDP. Value added dollars per dollar spent or saved (profit) increases county GDPs.

LIVESTOCK:

CATTLE, INCL CALVES – INVENTORY, between 1997 to 2022, **farm numbers** decline -26.95% and **head count** by -38.97%. 2022 cattle and calves per farm is 281.71 head. Harney County has the lowest farm number decline in the region and is among the lowest in the state. Grant County has the largest head count decline of -44.13% in the region.

COWS AND HEIFERS THAT CALVED farm numbers decline -25.89% and **head count** by -24.45%. 2022 head per farm is 221.42. Cows and heifers that calved numbers are 73.72% of total. Highest percentage in the region and among the highest in the state.

CATTLE, COWS, BEEF – INVENTORY farm numbers and head counts are near identical to cows and heifers that have calved. **Farm numbers** decline -25.96% and **head count** by -21.45%. 2022 head per farm is 223.77. Beef cow numbers are 73.68% of total. Farm number changes are the most stable in the region if not the state. However, the highest reduction rate occurs between 2017 and 2022 (-24.65%) due to consolidation, abandonment and drought.

CATTLE, COWS, MILK – INVENTORY very small farm numbers decline from 26 to 12 **dairy farms** or by -53.85% and **counts** by -61.23%. 2022 head per farm is 2.92. Milk cow numbers are 0.04% of total. The highest reduction rate occurs between 2017 and 2022 (-51.39%) due to, for the most part, suspension of the Silver Sage dairy in Weaver Springs. Milk from cows sales are never reported except in the 2022 census by Silver Sage (\$0).

CATTLE, (EXCL COWS) or OTHER CATTLE - INVENTORY farms decline -28.32% and **head count** by -14.65% as county beef producers continue to reduce bull and steer counts. 2022 boy cow per farm is 88.36. Male cattle numbers are 26.28% of total. Since 2002, Harney County has the largest bull and steer number and percentage reductions in the state.

In 2022, Malheur County farms have the largest decrease in the region (-34.28%) yet numbers decline only -4.14% since 1997. Other cattle are 41.17% of its total head count.

CATTLE ON FEED - INVENTORY farms decline from 13 in 2002 to one feed lot in 2022 processing undisclosed (D) **head**. Lake and Grant counties farms and counts also decline but by less.

Malheur County is the regional meat market. Farms decline -42.11% due to consolidation, processing +17.47% more cattle than in 2002. 2022 feed cattle per farm is 4,788.82, state average is 1,580.65. Between 2017 and 2022, counts incline +92.76% due to high supply volumes. Between the previous 2012 and 2017 censuses, counts decline -19.84%.

SHEEP AND LAMBS - INVENTORY farms decline from 58 to 18 (-68.96) in 25 years and **counts** by -55.73%. 2022 head count is 3,968. 2022 sheep and lambs per farm is 220.44, still the highest in the region and above state mean. However, this is a long term systemic decline. State counts also decline a mean -46.08%.

2017 share of sheep sold to total inventory is 26.47%. 2022 share is 52.70% due to market prices and drought. Sheep, like cattle, are ruminants which graze on pastureland which acres were reduced by -30% and remaining acre yields were also reduced due to drought.

For comparisons, Grant County counts decline -83.41% with a rapid -53.34% decline between 2017 and 2022. Lake County counts incline +326.30% with a 1997 start base one tenth the count of Harney County (924 to 9,019) while farms decline -40.00%.

GOATS – INVENTORY 1997 to 2022 low numbers are often reported as (D). In 2022, 31 **farms** have a total 459 head **count** for 14.81 goats per farm.

For comparison, Grant County farm numbers incline from three milk goat farms to 34 total and inventories incline from 57 to 2,655 with rapid expansion between 2012 and 2017 (an estimated 1,346 head increase). In 2022, there are 76.91 goats per farm.

HORSES AND PONIES - INVENTORY AND SALES (excludes mules, donkeys and burros) **farm numbers** decline -16.61% and **counts** by -4.29%. 2022 horses and ponies count is 2,676 for 11.1 per farm, the highest in southeast Oregon and higher than state mean. Farms in the horse trading business decline -32.69% from 52 to 35 but sales numbers near double and numbers sold per farm incline to 15.14 head. Total sales more than double +113.81% or by +20.12% in inflation adjusted dollars. Recall core CPI inflation during the period inclines +82.32%. A \$1,000 horse in 1997 sells for a mean \$1,111.32 in 2022 adjusted dollars. Malheur County and state mean sale prices per are \$4,097.40 and \$4,218.40 respective.

2022 is COVID year three. The 2020 national pandemic brought a brief recession followed by high inflation and uncertain markets. 2022 is also year two of the third most severe drought in a century.

COVID impacts on county agriculture produces record haylage and near record beef market prices with lower acres and numbers. COVID impacts livestock production more than alfalfa. Hay and alfalfa production impacts livestock more than COVID. Drought impacts haylage production more than livestock. Between 2017 and 2022, haylage production declines -30% while market prices for hay incline by near two-thirds and alfalfa more than doubles. Historically extreme market prices for both products.

CATTLE AND CALVES SOLD farms selling decline -32.99% and **counts** sold by -13.97% due to increasing cattle sales between 2017 and 2022 with a +4.09% incline in farms selling. 2022 sales amount is \$61,523,000 and mean sale price per is 8.76, the lowest unit price in the region and -24.40% below the state mean unit price. Malheur County high \$1,534.54 price per is due to value added processing such as feed and slaughter.

Between 1997 and 2022, Harney County cattle sale amounts doubles by 102.99% in then current dollars with 2022 sale amounts +18.48 above 2017. Recall FRED estimates 2017 to 2022 chained and unchained dollar difference is an +32.68% inflationary decrease to real dollar values. Cattle are sold at losses.

Lake County sale numbers decline -1.12% and amounts incline +153.62% with 2022 sale amounts +20.20% above 2017. The integration between robust cattle and alfalfa industries through ground water irrigation is undeniable.

SHEEP AND LAMBS SOLD farms numbers decline from 52 to 8 and counts decline from 8,915 to 2,091 head in 25 years. 2022 sheep and lamb numbers sold per farm is 261.375, the largest in the region and larger than state mean by near five times. Sales amounts incline

+118.39%. 2022 total sales amount is \$487,000 and mean sale price per is \$232.90, again the highest in the region and higher than state.

EQUINE SOLD farm numbers decline from 52 to 39 and counts near double to 530 by 2022. Horse and pony numbers sold per farm is 15.14, the highest in the region and five times the state mean. Sales amounts double by 113.81%. 2022 total sales amount is \$589,000 and mean price per is \$1,111.32, near four times less than Malheur County and mean state prices of \$4,097.40 and \$4,214.40 respective. BLM wild horse sales.

2022 total livestock sales excluding pigs and goats, chickens and quail is \$62,599,000. 2022 total vegetable sales estimate is \$36,470,000.

County livestock production and sales numbers intermix with Malheur County numbers. It is the region's market place. Sales numbers and amounts are often recorded in the county of transaction. Especially during the 2020-2022 high market prices and drought. Some Harney ranches sell direct to feed lots while others maintain livestock contract during "finishing" in Malheur then sell on delivery. By how much is undisclosed.

2017 to 2022 Harney and Lake county sale numbers incline +18.48% and +20.20% respective. Malheur County inclines +71.44%. If county also has +20% more sales numbers from its own cattle, then 50% comes in from Southeast Oregon and Southwest Idaho.

Harney 2022 cattle sales is \$61,523,000, Malheur is \$290,492,000. Malheur County 1997 to 2022 cattle sale numbers are the same but incline +11.01% between 2017 and 2022.

If in 2022, a 30% pastureland reduction due to drought and if 30% of remaining 70% has less yield due to the drought (-49% total loss of edible vegetation) induces a 15% decrease in cattle numbers,

if the annual 10% to 20% by volume reduction of available surface water flows into the SWMPA due to over consumption and retention in the Bear and Silvies sub-Basins is regulated, then this may have induced a 5% to 10% cattle number increase in 2022. However, the -38% beef cattle count and -23% of bulls and steers in the total -13% to -16% inventory loss may be due more to high market and very high feed prices than lack of productive pastureland.

If the historically suppressed 2022 total livestock 88,341 head count rebounds to a more historic 120,000, then alfalfa may have to be imported.

Ground water reduction limits on future livestock inventories may be reduced by near half if unlawful Silvies River surface water use upstream is regulated. 50% over consumption and 75% over retention above the 1924-26 Silvies River Water Decree impacts natural pasture irrigation and availability for natural haylage and grasses in the Malheur Lake Administrative Basin. In particular, the West and East Forks from Wright's Point to Saddle Butte south to the Lake. The Refuge wants its 20% back.

POPULATION:



Harney County population from 1990 to 2024 derived from Census Bureau decennial censuses and the American Community Survey [ACS] one year surveys with five year estimates beginning in 2000. 1997 population is 7,202 and 2022 population is 7,537, a +4.65% incline. 1980 has the highest number of residents (8,315) and 2008 has the lowest (6,691).

However, annual estimates from the ACS and Portland State University Population Research Center estimates are known to under estimate rural and frontier populations. Actuary tables do not match the older age demographic for not dying when and where other people do. ACS estimates are corrected or “reset” every 10 years by the decennial census counts.

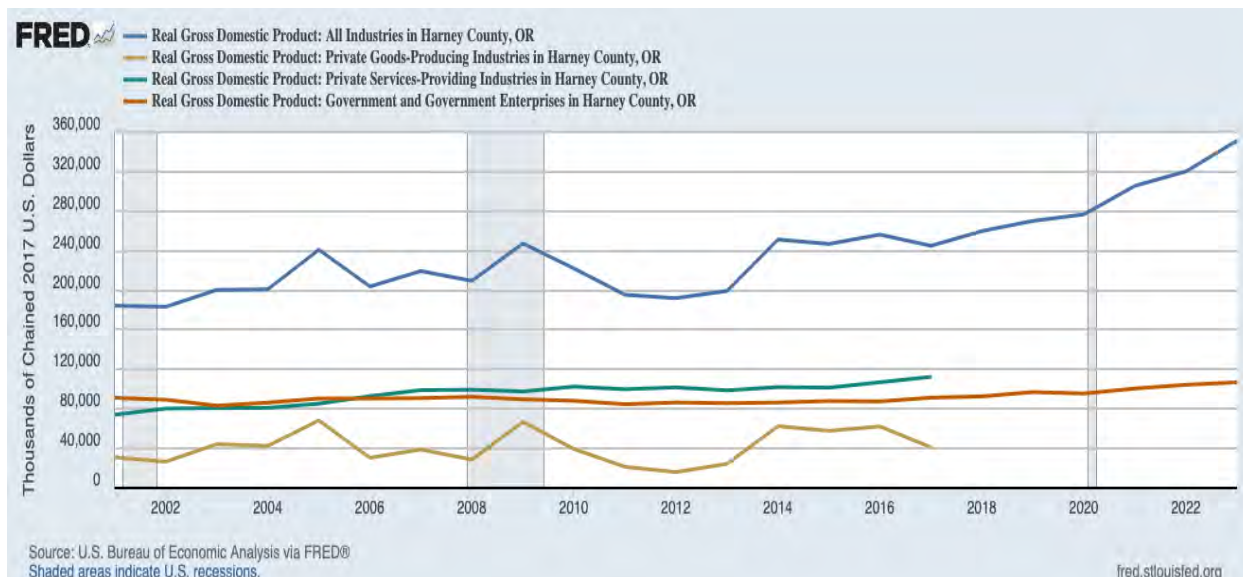
The estimated 2023 7,402 residents is an under count. “Vintage” PEP tables estimate 7,440 people with 2020 being the modern high of 7,602. Then, the COVID era 162 total person loss. 2023 ACS five year estimate is 7,515 which may have been without the 72 or so COVID related deaths.

Since 2000, ACS estimates Harney County population declines from 7,601 (or 02) to 7,402 by 2023, a -2.62% decline and a mean annual -0.65% decrease during these four COVID and post-COVID years. Rather rapid population expansion and now contraction.

RULE 512 may accelerate estimated resident declines not through the natural attrition of a somewhat aging demographic but to lower immigration into the county due to the rapid economic decline and lack of new opportunities.

GROSS DOMESRIC PRODUCT:

Harney County real gross domestic product [RGDP] in thousands of “chained” 2017 dollars from 2000 to 2022. Private Goods and Public Services annual RGDP after 1 January 2017 are not shown but data is available in other formats. FRED does not publish RGDP estimates prior to 1 January 2000 in this format. 2000 sub-category sums exceed all industries RGDP by \$11,928,000. All other years sum. 2020 Goods and Services amounts in parenthesis are not published and are estimates. The major private goods producing industries are beef and haylage.



	Real Gross Domestic Product: Chained 2017 dollars				Percentage of All Industries RGDP		
	All Industries	Private Goods	Private Services	Government	Private Goods	Private Services	Government
\$1,000							
2000	184,380	30,977	74,161	91,210	16.79%	40.22%	49.49%
2016	245,012	41,169	112,450	91,323	16.80%	45.90%	37.30%
2020	276,842	(88,894)	(92,382)	95,575	(32.11%)	(33.37%)	34.52%
2022	351,439	117,732	121,994	106,910	33.49%	34.71%	30.42%
2000-2020 change	150.15%	286.97%	124.57%	104.78%	191.24%	82.97%	69.75%
2016-2022 change	143.44%	285.97%	108.49%	117.07%	199.35%	75.62%	81.55%
2020-2022 change	126.95%	132.44%	132.05%	111.86%	104.30%	104.02%	88.12%

From 2000 to 2020, non-government All Industries RGDP inclines +50.15%, Private Goods +86.97% and Private Service +24.57%. Government and Government Enterprises share of county RGDP declines from 49.49% to 34.52%

From 2020 to 2022, county RGDP inclines +26.95%, Goods and Services an identical +32.44% and +32.05% respective. Equal local economic investment and growth in goods and services during the Goods (beef and haylage) increase +85.97% from 2016 to 2022.

The phenomenal 2016-2022 +43.44% county all industries growth rate, near six percent per year is due to the high demand and record market prices for haylage and high volume at lower than then record market prices for beef and cattle. The main catalysts are the long term drought in the West, the national pandemic and alfalfa.

Also, the last OWRD ground water allocation grant is made in 2015 and some RGDP growth is from previous alfalfa irrigation expansion and increasing local monetary velocity..

EMPLOYMENT

Direct haylage production employment losses should be measured in man days, not in full time employees [FTEs]. Livestock production is more labor intensive than irrigated crops. In 2022, there were three to four *braceros* working in the Weaver Springs sub-area, in part, “winding down” the research dairy. There is one at the end of 2024. This area may be “regulated off” by PTW Year 12.

For the most part, pivot farms are automated and do not require constant attention. Some cattle farm employees punch cows and adjust pivot drop lines. Many irrigated farm owner / employees also are FTEs in other industries.

OWRD published estimates include both crop and livestock job losses and are high. Recall, RULE 512 does not reduce livestock employment numbers while county head counts rebound but does limit new jobs available above 112-115,000 head.

Man days may be reduced by near the same percentage as irrigation water use and yields decline or about 50%. With 142 irrigating farms reporting in 2022 and an estimated 48 man days to operate each irrigation system, four to six full time jobs will end at implementation (Silver Sage Farms and pellet mill) and perhaps 3,408 man days will be lost. A 40 hour 52 week FTE works 260 days. This calculates to an annual 24.0 man days per 142 irrigated farm loss or an equivalent 13.11 FTE jobs. These and the four to six FTEs lost would be 17 to 19 equivalent jobs eliminated after implementation.

INCOME

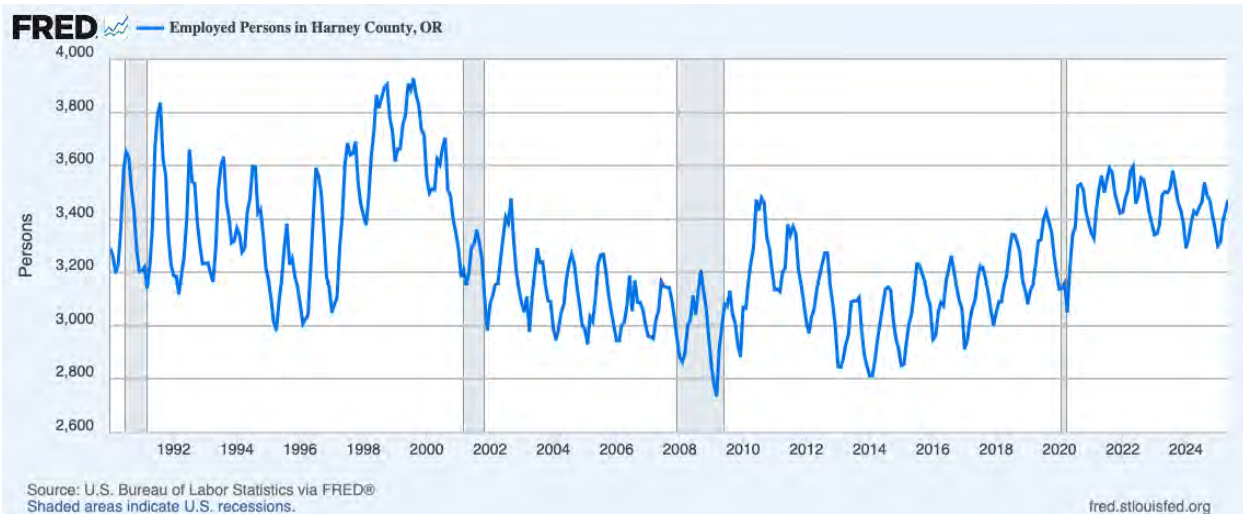
According the 2022 USCB American Community Survey, Harney County farming occupations account for 14.72% of total employment. 31.38% of county workers earn between \$25,000 to \$49,999. Income percentage bracket is the largest in the region and is more than twice the state mean. Median income for farm workers is \$38,400. Low wages.



From 1997 to 2022, estimated median household income inclines from \$29,809 to \$56,001 or +187.87% in non-inflation dollars. Consumer Price Index [CPI] inclines +182.87%. Real incomes have not changed despite having -43.01% less appropriated ground water.

Mean family household size is 3.17 persons and non-family size is 1.27. One worker household mean annual income is \$59,092 and households with two workers, both spouses working, is \$109,029. Employment parity between males and females is near equal (53% to 47%). FRED estimates median household incomes incline a phenomenal +30.62% between 2018 and 2022 or above six percent per year in non-inflation adjusted dollars.

If half of those 18 lost jobs are single householders or are in unmarried multiple worker households and the other half are married two worker households, then the first household group income risk is \$531,828 and the second, whom may not change occupations or relocate elsewhere, is \$521,174. A total \$1,053,002 of income in 2022 dollars is at risk of loss. ACS estimates 2022 total county incomes at \$100,836,241. Direct income losses are -1.044% of total.



Secondary indirect and induced losses are difficult to estimate immediately after RULE 512 implementation.. Too many external variables. However, there may be an All Industries RGDP decline of -45.48% for all industrial sales and services. Primarily, in electric power distribution, heavy machinery and irrigation equipment sectors. If 17 to 19 equivalent agri workers are estimated to be lost, then secondary workers may decline by eight to nine FTEs or more.

The industrial category most impacted, income and employment, is electric power and distribution. Perhaps four to five high pay jobs may be lost to attrition unless offset by higher delivery prices. This estimate is made without inclusion to total job loss numbers.

County agriculture monetary velocity or dollar “multiplier effect” on total economic activity is an estimated low 30 day .41-.45 to 1 depending on sector and category. RULE 512 will have minimal impacts on county employments and incomes. Economic affects on already declining commercial and retail activity will not be immediate.

TAXES

\$144,144.03 to \$145,167.95 in county property taxes will be at risk three years after RULE 512 is implemented from the Weaver Springs sub-area which is proposed to be “regulated off” by PTW Year 12. County 2023-24 Approved Budget requires \$3,300,000 in property taxes to balance. Harney County Health District 2023-24 Approved Budget requires \$1,399,127 in property taxes to balance. Total budget expenditures are \$4,580,285.

According to the 2023 Harney County Tax and Assessor’s Office, sub-area Real Market Value is \$40,250,300 to \$40,647,310, Market Assessed Value is \$19,677,979 to \$19,770,739 and Assessed Value is \$11,866,858 to \$11,963,573. Property tax rates are high and tax assessments are low.

Beyond RULE 512’s initial start is difficult to estimate. Largest ground water volume and acreage declines occur in the front end. Retail asking prices for agricultural real estate have declined and low numbers of annual property sales or transfers under a rather antiquated state property tax system make annual adjustments cumbersome and slow. Harney County property tax revenues will continue to lose pace with inflation at a somewhat increasing rate.

Harney County services are now stressed dealing with the 2020-2023 high inflation rates for operational costs while county tax revenue increases lag for years. There is a 66.12% percent differential between 1987 and 2022 CPI national inflation rates (Oregon is higher) and total Harney County property tax increases. Gap is widening.

Perhaps there will be an immediate number of negative property sale prices resulting in lower RMVs and MAVs. Continuing price changes may tend to be less than inflation resulting in limiting or reducing real property tax revenues in the future. The question is not how much property tax revenues are lost, but how much taxable gains will be. An accurate, more clean and clear answer is not possible.

ENVIRONMENT

Irrigation ground water evapotranspiration [ET] rates may decline by near half. Tons per acre yields may decline by more than half as surface soils retain less moisture during the water year. Comprehensive research on Harney Basin and then Ground Water Area of Concern ET rates conclude near one third or more of the granted irrigation 271,315.59 acre-feet is lost or wasted. One half or near 45,000 acre-feet less will be after Rule 512 implementation.

EcoNW economic analysis models for “less impact to groundwater dependent ecosystems.” Had OWRD provided for a local analysis, both would have known the often cited Warm Springs complex of permanent springs and ephemeral lakes as well as Weaver Spring and the spring at ephemeral Weaver Lake have never been close to being dry and for different reasons.

RAC recommends measuring spring flows to adapt management strategies. Another tool set are aerial photographs and space imagery beginning in 1986. From these observations, spring flows vary with long term precipitation variations. Weaver Spring more than most Warm Springs Valley springs. In fact, the Singhose place on Weaver Spring has been threatened by over flows a few times. RULE 512 does not impact SWMPA springs immediately after implementation.

FINAL ANALYSIS

According to the NASS 2022 Census, all Harney County agriculture sales is \$99,336,000. \$62,866,000 in livestock, \$36,470,000 in crops. There is \$5,751,000 from farm related income sources. An additional \$13,297,000 in government payments with \$10,001,000 subsidizing livestock operations. 2022 county total agri income is \$118,384,000.

\$22,871,000 of agri sales will have immediate RULE 512 acre-feet general declines of -49.46%, from when haylage sale prices were near record highs, for a \$11,311,996.60 decrease of the \$36,470,000 in crop sales or by -32.24%, agri sales by -11.39% and total agri income by -9.63%. FRED estimates Harney County 2022 GDP to be \$424,958,000. RULE 512 will reduce by 2.68%. No impacts on livestock income can be found in the numbers.

RULE 512 limits future livestock counts to an estimated 112,000 – 118,000 head or to NASS 2017 census numbers. The RULE also limits future economic and demographic expansion and risks continual stagflation and natural population attrition with the current cattle production mix. Crop income losses must be offset by livestock production numbers and sales gains.

There is not enough water. There is less and less. In particular, from declining snows and inclining surface water use in the Bear and Silvies valleys. An annual mean of near 20% of available upper Silvies River flows are no longer available to lower River farms and the Lake.

Everyone needs to take at least a ten percent “haircut”. ALL ground and surface water permittees. The 100 year old Silvies River Water Decree no longer fits. One foot is too tight while the other’s shoe laces have been very loose. New Silvies River, Silver and Sage Hen creek water decrees are necessary to increase ground water recharge volumes and decrease or reverse RULE 512 long-term impacts..

The opportunity for a relative low cost dam storing near 6,000 acre feet on private land is available at the location identified as “Silvies Canyon Dam” by the USACoE in 1956, the confluence of the Silvies River and Emigrant Creek. But the State has an “open flow” policy for a long time now which effectively eliminates public-private partnerships for surface water storage facilities.

Harney Basin has attempted five times over a century organizing three water districts to final conclusions. Efforts begin after severe flood and drought periods. Three times they fail. Most think others benefit more than they. The state is the water master AND de facto water district. A local water or water management district for a small irrigation dam and distribution maintenance is necessary for the SWMPA moving forward.

RULE 512 impacts will be bad for some. But, not as bad as some folks fear. The numbers are the numbers and they suggest reverting to pre-COVID crop / livestock ratios may be the best and only strategy. County RGDP will become more reliant again on lower profit margin livestock sales with volatile but increasing market prices. Industrial diversification is necessary for the SWMPA moving forward but is unlikely.

Allowing for RULE 512 employment and population attrition losses, businesses and employment will still exist at near current numbers. However, profits and incomes will grow less than inflation. Stag-flation.

In essence, RULE 512 turns back the hands of time to 1992 then the hands stop moving forward again.

While the analysis uses 1997 USDA-NASS data and not 1992, this economic and demographic statistical analysis of RULE 512 is as valid as any other. But the numbers used and calculations made are more in context to actual local events and therefore perhaps more accurate.

Mario Petrilli
15 July 2025
Burns -Oregon
425.205.3300
cbaravelli@mail.com

P.S.

The Department over appropriates ground water use in the Harney Basin. It creates this problem by issuing ground water permits when there are department records indicating serious ground water level concerns in 2006-08. The Department does not enforce surface water regulations in other sub-basins. The Department is, for the most part, negligent and at fault.

As an engineer, wouldn't it be faster, easier and perhaps cheaper in 2022 to come here with a "bid" of \$12,000,000 or whatever the assigned price of ground water would be per acre foot and buy back the assigned water rights? Those to be regulated off would have three years to take their stuff and go away. Department has done this before in Malheur County. Imminent domain. This would require legislative action and approval. One can dream ...

MEINZ Kelly A * WRD

From: Chico Baravelli <cbaravelli@mail.com>
Sent: Saturday, July 26, 2025 6:02 PM
To: MEINZ Kelly A * WRD; Chico Baravelli
Subject: Public Comment on RULE 512
Attachments: GWRO.pdf

See enclosed. TANX

Concerning RULE 512:

Since 1909, Harney Basin has been studied to death. An enormous amount of environmental data has been accumulated by me. I wrote the book 100 Year Statistical Analysis of Malheur/Harney Basin Meteorology. I also wrote a statistical analysis of the 2022 USDA Census for private circulation.

Rule 512 Economic Impact Statement uses ridiculous numbers. I have submitted as public comment A Statistical Analysis of RULE 512 Economic Impacts on Harney Basin to correct the misinformation. RULE 512 reduction percentages did not match known numbers.

Upon request, I received from Division 512 the 2022 Subarea_GW_Rights by Owner in a quality Microsoft Excel spreadsheet. Following are a statistical analysis of the OWRD 2022 Groundwater Rights by Owner table and the SWMPA 15 sub-area totals in Table 1.

Key takeaways are;

There is 272,780.23 irrigated acre-feet in volume, 81,509.35 total “paper” acres and 87,205.03 irrigated acres..

Overall, there are 695 active users with 745 allocations on 663 active wells. There are 684 regulated wells without exempt wells in total.

Between 2012 and 2015, 39 grants are issued (5.603% of 695 user count). 26,369.72 acre-feet is granted (9.667% of 272,780.23 AF irrigation total).

Seven municipal and quasi-municipal users permitted a total 17,899.45 acre-feet subject to future adjustments. Including the 6.562% of municipal use volume to the irrigation total, 290,679.68 AF is the maximum total allocated per annum for irrigation, commercial, industrial, municipal, expanded residential and livestock/wildlife uses.

According to the best available science, there is a current -49.539% discharge deficit. From 3.0 acre-feet to 2.5 is a -16.666% reduction.

For pivot farms, there is a -21.666% reduction from total “paper” to irrigated acres. “Historical beneficial use” is an estimated -15.080% acre-feet mean SWMPA reduction.

There is an initial mean reduction of -34.55% before the first six year PTW is implemented. -38.332% for pivot farms. -24.563% for the SWMPA mean.

The third and final permit expansion starts in 1991 and ends in 2014, 49.88% of total. Numbers suggest no junior rights will be remanded or revoked.

Omitting Weaver Springs 100% PTW reduction, the seven sub-area RULE 512 mean total reduction from 2018 consumption estimates are -20.833% at the end of 24 years and, with the initial and immediate general mean -24.563% reduction, would total -45.396%. Including Weaver Springs, the total SWMPA reduction would be -51.531%.

Numbers indicate all if not most of the seven sub-areas may record some stable if not recovering static well levels when the first six year PTW period ends.

RULE 512 could turn back Harney Basin crop production 30 to 35 years with an immediate -48% to 49% loss of alfalfa production.

A STATISTICAL ANALYSIS OF THE OWRD 2022 GROUNDWATER RIGHTS BY OWNER TABLE

From the 2022 Subarea_GW_Rights by Owner table:

There are 812 well certificate and permit rows. 114 multiple certificates and permits, some inchoate, are attached to an individual well ID number. Ground water is allocated by the acre and not by the Point of Source [POS] well.

Most multiple permits are as the same user expands beneficial use acreage over time. Some are two or three users for the same well. A few can be defined as a small community well for a few users. Six are identified as multiple users. One is a 1993 USFW livestock/wildlife well. Two use the same well for different purposes (livestock/wildlife and irrigation) and are in adjacent sub-areas. Two are for the same well with a third sharing the second permit in 1993.

One 2008 permit is allocated no ground water for 226 acres and must be considered a void or a loss of one to the active well total. Upper Blitzen sub-area has four wells outside the RAC 14 seven with 521.59 acre-feet [AF] which are also void.

Malheur Lake sub-area contains one certificate for 1.00 AF which is now included in the Silvies sub-area numbers.

Silvies sub-area also contains a non-exempt 709.32 AF 2010 permit for Geo-thermal (heating and cooling) and "may not really be a consumptive use" but is considered in the irrigation numbers as this permit will be regulated.

If the Department table is correct, subtracting the 114 multiple users from the adjusted 809 row total leaves the remainder of 695 active users.

For those wells with expanding allocated volumes and acres, the last certificate or permit supersedes all previous ones. Subtracting those previous sums from the table is 272,780.23 irrigated AF (391.926 AF/user) for 81,509.35 total "paper" acres and 87,205.03 irrigated acres (125.656 irrigated acres per user).

There are 664 wells, 663 with granted water rights with 411.43 AF/well and 131.531 irrigated acres per well. Overall, there are 695 active users with 745 allocations on 663 active wells.

Department estimates 748 non-domestic and non-exempt well users will require to report with 1,410 POAs total. Division estimates 953 exempt domestic, livestock and wildlife wells.

14 sub-area sum mean is 3.1035 AF per irrigated acre. Sub-area means vary from 2.887 (Crane) to 3.827 (Silvies) AF/acre. Silvies sub-area high totals and means are due, in part, to a large 2,337.86 AF 1997 Irrigation, Supplemental Irrigation, Industrial/Manufacturing permit and relative large community wells serving no total acres. 12 of 14 sub-areas are between 3.000 and 3.057 AF/acre.

Per user means confirm sub-area means within three and one-third percent, 2.998 AF/acre. However, sub-area means vary from 2.598 (Harney Lake) to 3.624 (Silvies) AF/acre due, in part, to 28 of 106 are non-irrigation permits with different allocation rates for livestock, wildlife, pond maintenance, forest uses, expanded domestic and industrial permittees.

14 sub-area primary permit mean grant day and time is Friday 6 January 1988 at 07:33.22 hours. Permit time means vary from year 1975.955 (Silvies) to 1999.857 (Lawen).

There are 470 irrigation allocations and 165 more supplementals, 80 industrial, eight wildlife, seven livestock, seven municipal and five expanded domestic. There are 517 certificates, 72 transfers and 75 final permits issued, 684 irrigation grants in total. First issued certificate is in 1929 (Silvies). First inchoate transfer is in 1931 (Poison-Rattlesnake). First permit is in 1974 (Upper Silvies). Last certificate is issued in 2015 (Lower Blitzen-Voltage) and the last three permits are in 2014 (two Crane-Buchanan, one Dog Mountain).

Between 2012 and 2015, 39 are issued (5.603 % of 695 user count). 26,369.72 AF is granted (9.667 % of 272,780.23 AF irrigation total). Rock Creek has the largest increase (7,687.00 AF) and the largest single grant of all, 7,089 AF for 2,363 AF/acre issued in 2012. Lower Blitzen-Voltage has the most granted, 11 of 39.

Not included in the allocated irrigation totals are seven municipal and quasi-municipal users permitted a total 17,899.45 AF subject to future adjustments. A 1978 certificate for 3,474.22 AF is issued for the current Hines Dairy Queen user perhaps for the municipal swimming pool. Crane residents are discussing expanding the Crane School ground water distribution system to include a water and sewer district.

Including the 6.562% of municipal use volume to the irrigation total, 290,679.68 AF is the maximum total allocated per annum for irrigation, commercial, industrial, municipal, expanded residential and livestock/wildlife uses.

Nine livestock/wildlife wells have 8.91 AF total and 1.88 AF/acre or less each should not be regulated.

From the many estimates of Harney Valley aquifer recharge rates beginning in 1916 of between 155,000 and 224,000 AF. Most estimates are made from data available three to ten years prior to report publication. 2022 USGS Garcia et al publishes 144,000 AF recharge rate from a previous ten year period analysis which includes a three year severe drought. -49.539 % is the discharge deficit.

There are 745 active allocations for 663 active wells. Appears the Department uses the 2022 Subarea_GW_Rights by Owner original numbers to determine the RULE 512 reduction levels and not the corrected numbers. Department table over counts multiple allocations and under counts actual wells.

Author counts 741 active irrigation wells using space observations since 2002, a 6.208% reduction from the current 695 well user count. Most of these are more distant from and at higher mean elevations than Harney Valley. Unknown at this time if these POS's, POA's and POU's are abandoned or revoked. Corrected numbers may reduce total well counts, volumes and flows further.

The 2020-2024 "historical beneficial use" concept is not a universal -21.46% AF reduction for all pivot irrigation users. A few are already so allocated beginning in 1961. 494 permittees have $\geq 90\%$ allocations for ≥ 10 total or "paper" acres. 70.270% of total certificates / permits and near identical AF/acre percentages are at risk. Accordingly, (21.46% of 70.27% is) a -15.080 % AF mean of all sub-areas may be a more accurate, if somewhat high estimate due to unknown factors at this time, universal historic beneficial use reduction.

The current universal 2.5 AF limit proposal is an additional 16.666% reduction. If a pivot farm, whether the reduction to 2.5 AF is further reduced by beneficial use [$100 - 16.666\% = 83.333 - 21.46\% = 65.45$] or if beneficial use is further reduced by the 2.5 AF reduction [$100 - 21.46\% = 78.54 - 16.666\% = 65.45$], the initial -34.55 %

before the first six year PTW may be difficult to manage. The SWMPA mean [$100 - 70.28\% = 70.28 - 16.666\% = 58.567 - 15.08\% = 49.735$ | $70.28 / 49.735 = 34.954\%$ | $70.28\% (34.954\%) = 24.563\%$] of a -24.563 % initial reduction may also be difficult.

The Department lowers the first proposed 2.7 AF reduction to 2.5 AF to include more junior users from being “regulated off”. Department is unable to identify what year permits are affected because each sub-areas has different time of issue characteristics. If the Department intention was to reduce AF allocations 10% by revoking the most junior users in each sub-area, nine include years beginning in 2011. 1999 and later most junior rights would be regulated off in the Silvies and Harney Lake sub-basins.

To reach the 10% AF reduction in each sub-basin, the previous rights by application date may also have partial reductions and a first right may have only a portion reduced. This is not feasible. Numbers suggest the 16.666% immediate reduction from 3.0 to 2.5AF would ensure no junior rights will be remanded or revoked. Numbers suggest with a large +16.66% AF insurance margin of the total initial reduction percentage. An actuarial minimum 2.583 AF per acre per annum, if somewhat low due to unknown factors at this time, is indicated. More work needs to be done if required.

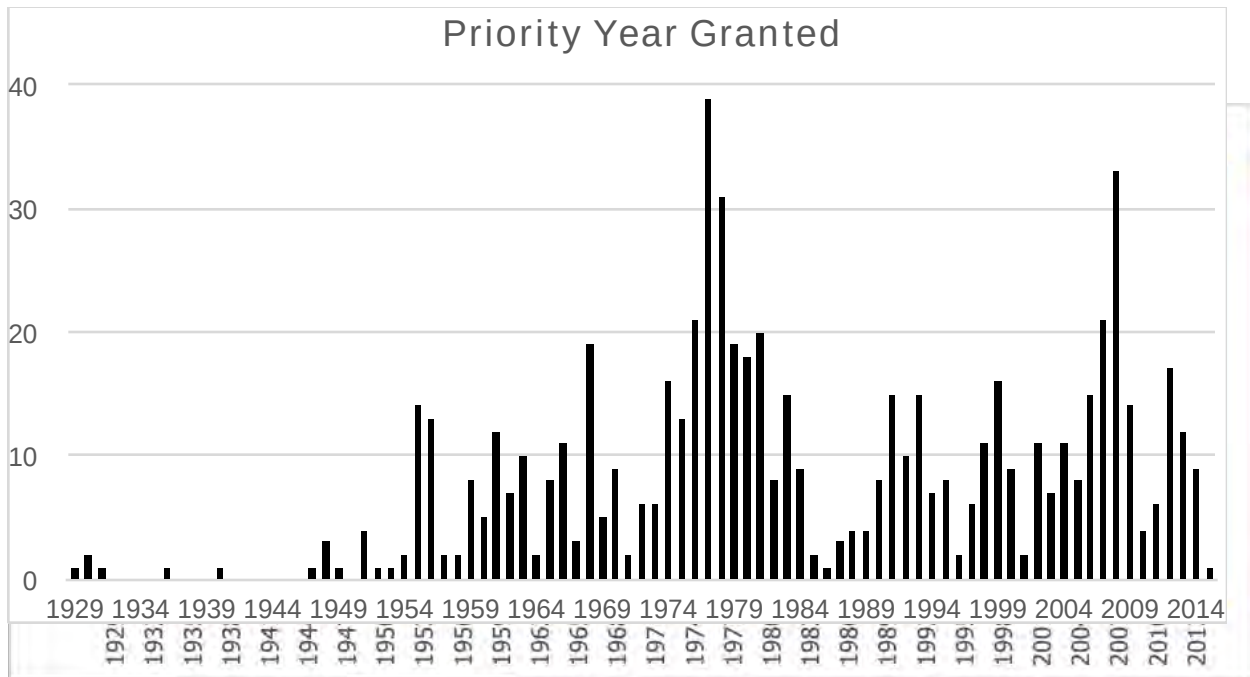
Recall, 9.667% of the irrigation 272,780.23 AF total are granted between 2012 and 2015.

Omitting Weaver Springs 100% PTW reduction, the seven sub-area RULE 512 mean total reduction from 2018 consumption estimates are -20.833 % at the end of 24 years and, with the initial and immediate general mean -24.563 % reduction, would total -45.396 % . Including Weaver Springs, the total SWMPA reduction would be -51.531%.

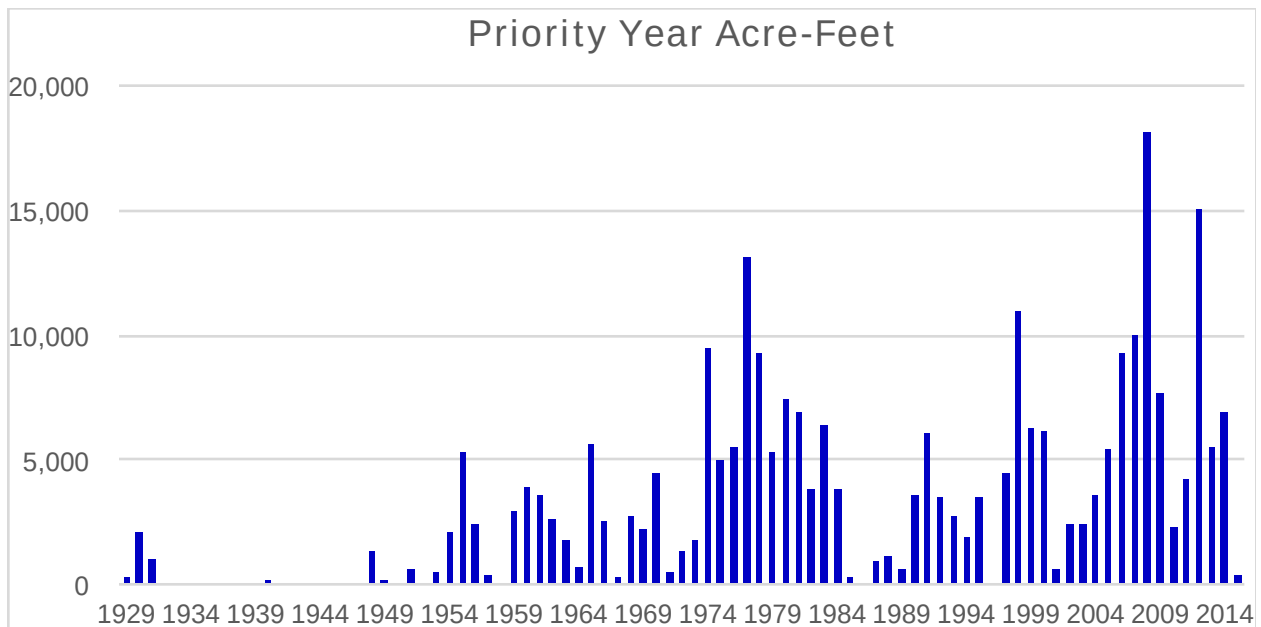
From the many ground water papers and reports, a one half reduction from present levels may return charge/recharge balance of the 1987 - 1998 period when more residential users begin to indicate to the Department relative shallow wells were going sour or dry. As currently understood, RULE 512 could turn back Harney Basin crop production 30 to 35 years with an immediate -48-49 % loss of alfalfa production.

However, RULE 512 estimates over count wells, acre-feet, acres and acre-feet per acre. All by +11 to +19% margins from the corrected table numbers and under estimates aquifer[s] capacities and mobility. Sub-area actual pumping and aquifer recharge amounts and rates are guesstimates. Department basis is to present the worst case scenario using the best available science.

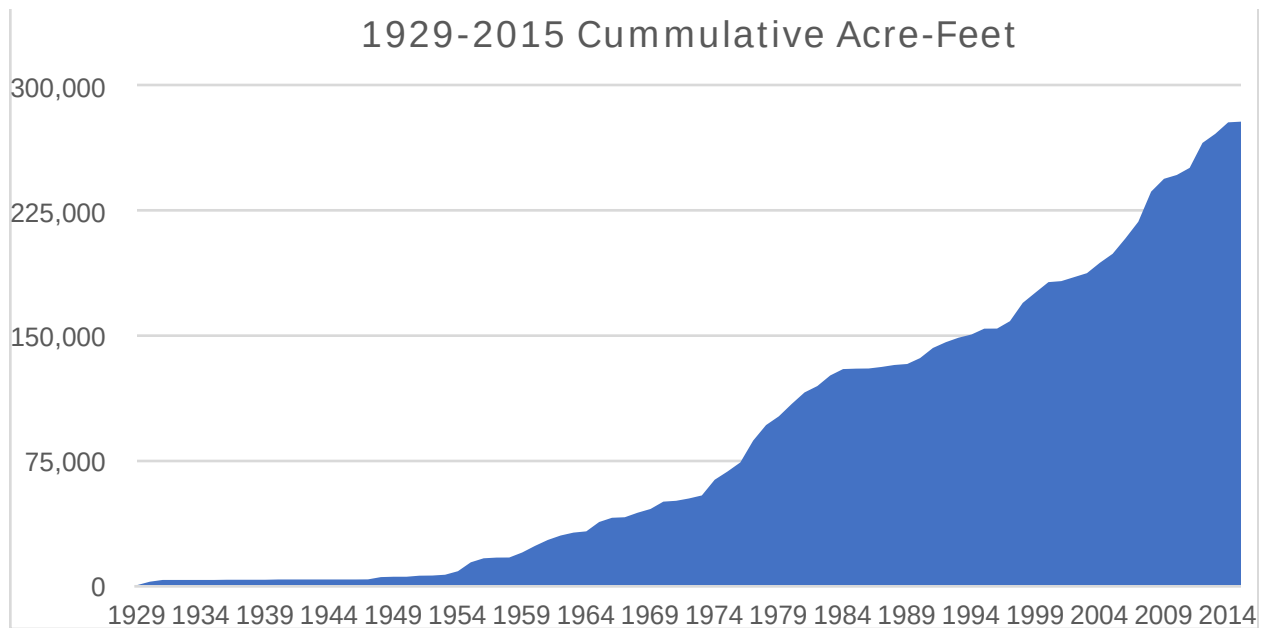
If the Division and RAC intent is stabilization rather than recovery, the numbers indicate all if not most of the seven sub-areas may record some stable if not recovering static well levels when the first six year PTW period ends.



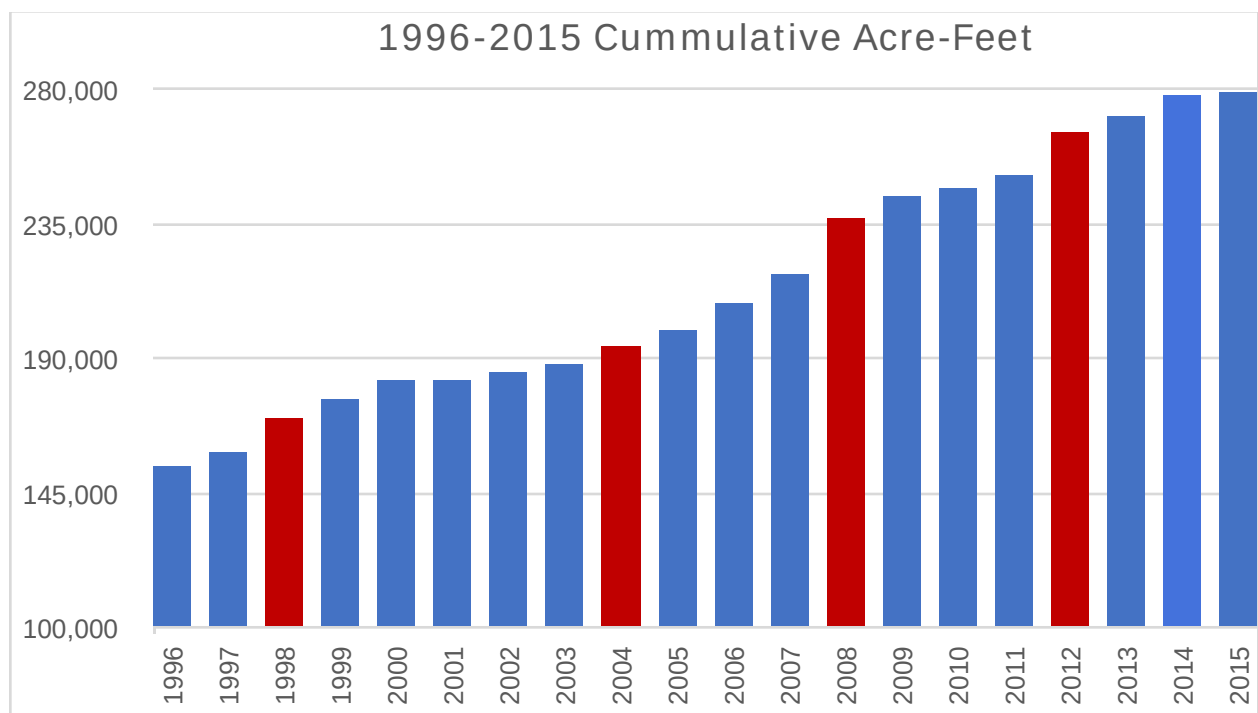
1929-2015 number of approved applications by file year. Omitted from the 2022 Groundwater Rights by Owner table are preceding and duplicate applications, certificates, transfers and permits. 87 year total is 664 well approvals. 73 years with new approvals mean is 7.721 allocations per year.



Accumulative granted annual volume in acre-feet since 1929. Omitted from the 2022 Groundwater Rights by Owner table are preceding and duplicate applications, certificates, transfers and permits. 87 year total is 272,780.23 irrigated AF. 73 years with annual increase mean is 3,782.96 acre-feet per year.



Accumulative granted annual volume in acre-feet since 1929. The third and final expansion begins in 1991 and ends in 2014, 49.88 % of total.



1996-2015 accumulative granted annual volume in acre-feet. Red columns indicate 10% incremental reductions in years from the final 2015 volume allocation. A -10% reduction is at 2012 allocation volumes, -20% by 2008, -30% by 2004 and -40% by 1998.

Division 512 proposed initial -32% reduction of lowering maximum use rates and beneficial use acres will be at 2002 allocated volumes. The -35% PTW reductions alone will be at 2000 volumes. Together, if the full RULE 512 implementation is required, the available -67% reduction is the same as 1978. A -50 % reduction from the 2018 AF total will be at 1991-92 volumes.

The summary math is bass-ackwards. A factor is a resultant.

PTW % change times well level change equals % of total PTW.

I understand the approach. But,

AF % change times well level change equals % of total PTW.

Allocated acre-feet reductions, a known quantity, not estimated reduction percentages using the best science available.

A less systematic approach is, as volume and rates are known, and general well level stability requires a best available science guesstimate -50% reduction, to adjust annual AF usage to those reduction levels within a time frame. Perhaps a general six percent reduction every three years with the last adjustment in 24 years, a total -48%, as the basis for a voluntary agreement. Of course, targeted sub-areas may have higher requirements within shorter periods. Perhaps eight percent every three years for 24 years, a total of -64%. Of course, the current Department and RAC seven sub-areas will need reconfiguration to match more with local ground water resources.

Still, tweaking the numbers for percentages is easier than tweaking the percentages for numbers. Go ask a statistician.

Next step is to transfer the OWRD 2022 15 sub-areas to the current seven. Accumulating the numbers will be difficult as the Department ground water portals are, as one person said, "It's so 80's."

Thank you for your time and consideration on this matter.

Respectfully:
Mario Petrolli
Burns - OR
26 July 2025

Table 1A

OWRD 2022 Harney SWMPA Ground Water Rights by Owner	Crane	Crane-Buchanon	Dog Mountain	Harney Lake	Lawen	Lower Blitzen - Voltage	North Harney	Poison Creek Rattlesnake Creek
Total Permits	53	113	34	17	17	87	17	167
Active permits	45	98	31	12	14	74	16	129
Wells	44	99	31	12	14	74	16	129
Allocation Types								
Irrigation	43	82	28	3	14	67	7	74
Supplemental Irrigation	2	11	3	6	0	5	9	53 *
Commercial	0	1	0	0	0	0	0	0
Industrial	0	12	3	6	0	5	9	0
Municipal	0	0	0	0	0	0	0	0
Domestic Expanded	0	0	0	0	0	0	0	1
Livestock	0	2	0	1	0	0	0	0
Wildlife	0	2	0	2	0	1	0	1 **
Grant Types								
Certificates	31	81	22	11	6	45	15	98
Inchoate Transfers	6	7	4	0	3	20	0	20
Permits	8	10	5	1	5	9	1	11
Mean Priority Year	1984.022	1986.616	1991.419	1987.167	1999.857	1989.837	1983.938	1981.729
First Permit Year	1952	1949	1960	1966	1979	1955	1967	1931
Last Permit Year	2008	2014	2014	2013	2011	2015	2013	2014
Volume (AF)	19195.82	36286.83	14684.25	3381.77	8920.75	24422.07	8430.76	36861.58
Total Acres	6624.32	10185.76	6556.18	562.50	2707.40	7502.20	2809.40	10908.95
Percent Area Irrigated	78.65	80.70	77.33	47.33	81.60	75.13	88.41	67.57
Irrigated Acres	6648.61	11695.83	4894.75	1071.92	2973.58	8123.76	2810.25	12063.55
AF / Irrigated Acre	2.887	3.103	3.000	3.155	3.000	3.006	3.000	3.056
Permits above 250 AF	25	55	18	6	13	44	4	57
Permits above 500 AF	9	17	7	3	7	15	2	16
Permits above 1000 AF	4	5	3	0	2	3	1	4

* Majority are Supplemental Primary ** Irrigation, Fish Culture, Wildlife ^ Agricultural Uses
 Silvies sub-basin includes Malheur Lake.

Table 1B

OWRD 2022 Harney SWMPA Ground Water Rights by Owner	Rock Creek	Silvies	Silvies Municipal	Upper Silver Creek	Weaver Springs	Windy Point	Total and Mean
Total Permits	7	153	7	52	46	39	304
Active permits	7	106	7	47	45	33	245
Wells	7	109	7	45	43	33	244
Allocation Types							
Irrigation	2	57	0	23	42	28	152
Supplimental Irrigation	5 *	41	0	24 *	1	5*	165
Commercial	0	1	0	0	0	0	2
Industrial	0	42	0	0	1	0	43
Municipal	0	0	7	0	0	0	7
Domestic Expanded	0	3	0	0	1	0	5
Livestock	0	2	0	0	1 ^	0	7
Wildlife	0	2	0	0	0	0	8
Grant Types							
Certificates	7	88	6	41	39	27	517
Inchoate Transfers	0	7	1	0	2	2	12
Permits	0	11	0	6	4	4	25
Mean Priority Year	1995	1975.955	1964.286	1987.511	1989.822	1981.182	1986.1116
First Permit Year	1964	1929	1933	1956	1951	1955	1956.2
Last Permit Year	1995	2010	1998	2014	2012	2012	2009.1333
Volume (AF)	9882.60	35368.53	17899.45	34055.44	28769.22	11849.13	290529.78
Total Acres	3294.20	8123.15		10415.37	8733.42	3416.30	82012.35
Percent Area Irrigated	100.00	56.18		83.25	96.80	75.26	79.16
Irrigated Acres	3294.20	8860.56		11140.32	9525.85	3949.71	87226.10
AF / Irrigated Acre	3.030	3.991		3.057	3.020	3.000	3.094
Permits above 250 AF	6	29	7	36	28	21	350
Permits above 500 AF	3	17	7	26	19	7	156
Permits above 1000 AF	1	12	6	9	11	2	63

* Majority are Supplemental Primary ** Irrigation, Fish Culture, Wildlife ^ Agricultural Uses
 Permits at and above 1,000 AF [63] are 8.456% of permits, 9.065% of active users
 and 9.502% of active wells.

Oregon Water Resources Department
725 Summer St. NE
Salem - OR, 97301

Concerning RULE 512:

There comes a point when flow meters and regulation compliance is beyond small users. After running the numbers, the economic and demographic "sweet spot" is to exempt users allocated 20 AF and less.

206.6 AF irrigating 65.74 acres on 137.25 total acres. 3.14 AF/acre. 17 users.

Most are small family farm operations with older owners. Many of these allocated irrigation rights are used for exempt domestic and livestock uses. Some use "wagon wheel and pipe" irrigation. Y'know, the kind of folks with 20 foot wells who write letters to the Department when their wells go sour or dry.

Arguments can be made to exempt users allocated 30 AF and less.

657.81 AF irrigating 219.41 acres on 328.0 acres. 2.998 AF / acre. 35 users.

I recall RAC exemptions for small users but don't find any in the Division Rules. I am missing something? Should be. There is enough room in the budget to consider 50 AF as well for approx. 1,500 irrigated acres.

The current Division Rules do not exempt native-American groundwater rights, both within the Colony and on land they own and lease in the north-central Basin.

There are nine 1993 BLM livestock/wildlife and two USFS wildlife and pond maintenance wells that are already exempt. I argue two recreational users, Crane Crystal Hot Springs and Valley Golf Club with 778.08 AF total or 0.285% of the total appropriation, should be.

The Hot Spring is well developed and attracts thousands of visitors each year. The Fourth of July weekend was standing room only. It is vital to the the lower Basin's economy and must remain as it is. With half of the water gone, the only Golf Course will simply no longer exist. The Division makes no such special distinction for recreational uses however Department RULE 10 does.

What about the Crane School? Its ancient irrigation right also serve domestic and livestock needs. Exemptions must be made for frontier school districts.

Oregon has a progressive history of economic and social justice. These exemptions will continue the legacy.

Thank you for your time and consideration on this matter.

Respectfully:
Mario Petrilli
Burns - OR

5 August 2025

Oregon Water Resources Department
725 Summer St. NE
Salem - OR, 97301

Concerning RULE 512:

To the paralegal reading this letter in the future. As now proposed, RULE 512 has two fundamental flaws. Estimated groundwater discharge rates are too high and recharge rates are historically too low. We know where we want to go and we have a way to get there. But we don't know for sure when to stop or what will happen to the people and economies here when we do. This may prove fatal to the RULE in its present form.

The second fundamental flaw is RULE 512 proposes to measure "aquifer" recharge rates using long term and test wells not well placed in all sub-areas. The better way is to measure recharge using actual static levels other than the water master making irregular inspections of private wells. Good luck with that.

Piezometers. They are relatively inexpensive, work great and, being passive having no moving parts, last a long time. I used one on my well in Washington 20 years ago. Just seal one end of the tape and unroll it into the bore hole. I did not purchase the display module. I used an ohmmeter instead. That well was not regulated.

My understanding is many "corporate" growers use this simple technology to monitor their wells. If the Division's noble attempt is to monitor all wells, then recording monthly flows AND static levels makes more sense than measuring total discharges alone while guessing at recharge rates.

I am a communications systems engineer so this was simple for me to identify the fundamental problem of knowing function outputs without knowing domain inputs. Calculations using these derivatives can be made. But if I am missing crucial input data and make a wrong guess, error margins can be excessive and costly. Simple calculus.

Mandating continuous well discharge AND static level records by using flow meters AND piezometers solves this problem.

Dear paralegal, if the Division does not incorporate an in-situ full kit measurement solution to determine groundwater discharge and recharge rates, especially when sub-surface flows and percolation rates are not consistent in and among the proposed seven sub-areas, then consider this as another arrow in your legal quiver.

Thank you for your time and consideration on this matter.

Respectfully:
Mario Petrilli
Burns - OR
5 August 2025

Oregon Water Resources Department
725 Summer St. NE
Salem - OR, 97301

Concerning RULE 512:

Doesn't seem fair groundwater users are reduced to 2.5 acre-feet while surface water users are not. Everyone needs to take a haircut.

You do know NOAA says snow falls have declined 20% the past 40 years. SNOTEL says snows have declined 33% on Snow Mountain the past 42. But, the snow pad gets stuck.

You do know in 1967, the comprehensive OWRD flood control report estimates the ratio between Silvies River and Emigrant Creek was 65/35. The past ten year USGS/OWRD mean or average ratio is now 45/55 and approaching 40/60. The Silvies is now a tributary to Emigrant. This is historic and impacts lower Basin ground water recharge rates.

Did you know Bear and Silvies sub-Basins ranches and farm consume 50% and retain 75% of stream flow far above the 1924-26 Silvies River Water Decree? There are times most years when no flow from there reaches the lower Basin for weeks. The anecdotal "half the water entering the Silvies Valley never leaves" is not far from the truth. The Department has no water cop up there.

Did you know this mean of 20 to 25% decrease in Silvies River flow reaching Harney Valley makes cattle ranching very difficult towards the end of flows north of the Lake? Most properties with acreage are on the market.

The Water Decree is an old pair of shoes. One with the laces too tight and the other with the laces too loose. The County has sustained injury and has standing in a court of law for the Department's breach in not enforcing the 1926 contract.

Harney Basin's critical ground water problem is comprehensive. So must be the solutions. They must include the entire Basin SWMPA. The best solution is new court decrees. Everyone there must take at least a 20% reduction from current water use practices. Adherence and enforcement of the current Silvies River Water Decree will go a long way in accomplishing the same. However, District 10 Watermasters have been reticent to enforce the Decree's allocations due to the lack of proper tools and Department support.

The Silvies Water Decree is no longer efficient and equitable for today's Harney Basin. Everyone needs to reduce surface water irrigation use but not reservoir storage.

On its own initiative, OWRD along with local stakeholders would recommend POD and POU day flow rates, where, when, why and how based on various agreed upon matrices. A new Surface Water Planning Board would submit its findings to both Harney and Grant county district courts for judicial review and adjudication. The Division 512 team can't do this and most local folks don't trust the Department to do it.

I hate to say this. Another long delay while ground water levels continue to decline. But, this must be done for state mandates to preserve the Harney Basin aquifer system to be fair.

Everything down here starts with Strawberry Mountain and Carson Spring up there.

The Refuge wants its 20% back.

Thank you for your time and consideration on this matter.

Respectfully:
Mario Petrilli
Burns - OR
25 July 2025

March 20, 2024

Oregon Water Resources Commission
Attn: Chair Eric Quaempts
725 Summer St NE Ste A
Salem, OR 97301

RE: Section 512 Rules and Rules Advisory Committee Process

In August of last year representatives of the community requested the Department secure independent third-party facilitation to support the Division 512 rulemaking process. We greatly appreciate the Department acting on that request but remain concerned about the approach the Department is taking with the rules advisory committee (RAC). The RAC meetings are perceived by some participants and observers as a forum for the Department to tell the community what is going to happen. There remains a failure to fully engage the RAC members and broader community in any meaningful dialogue to build understanding of the assumptions and logic of the regulatory approach proposed by the Department let alone any consideration of constructive dialog to examine the consequences of the proposed approach as well as explore alternative approaches.

The Harney Basin will be the first basin in the state to have a critical groundwater area designation using the updated critical groundwater area statutes and Division 10 rules. This will be a defining moment for the state and for our basin. This process presents an opportunity for the Commission to set the course for the future of water management in the state. We are invested in the Department's success and offer the following observations and recommendations based on our individual and collective experiences and expertise working through complex natural resources issues in the Harney Basin.

When the Commission last approved updated Division 512 rules in April 2016, the Department's message to the community throughout the rulemaking process was more hopeful. The Department indicated that, depending on the outcome of the groundwater study, the Department might reopen portions of the Basin for additional groundwater development. This is the primary reason that community members advocated for a rulemaking process to begin within a year of the groundwater study being completed "to explore whether there is a need for updates or changes to these rules." At that time there was no indication that we would be facing basin-wide reductions in groundwater use. In the five years that it took to publish the groundwater study, the Department delivered contradictory messages to individuals and organizations within the community about what might occur. At the same time, Department staff and leadership consistently made commitments to engage the community in a collaborative process.

As a result of our participation on the Groundwater Study Advisory Committee, community leaders now know and accept that most of the basin cannot sustain additional groundwater development and that, in order to achieve sustainability, reductions in groundwater use are necessary. We were led to believe through many conversations with Department leadership and staff over the years that the process to determine the amount and timing of reductions as well as how to achieve the reductions, would be a collective effort. Based on the last year of the Division 512 rulemaking process, we now feel that the Department is making these decisions for the basin rather than *with* the basin. We are concerned that the Department views this rulemaking as a project to be completed rather than a collective effort to identify what success looks like and chart out how we will all work together to achieve that success.

Since place-based planning was initiated in 2016 through funding and support from the Department, community members and stakeholders have devoted thousands of hours towards devising and coming to consensus on holistic solutions that can help to achieve sustainable groundwater management in a way that balances the social, ecological, and economic needs of our basin. While we did not have the benefit of the groundwater study results or significant technical support from the Department, we have done the difficult work of developing a shared understanding of groundwater issues and identifying areas of agreement, including actions that can and should be implemented in the near-term. We understand that a mix of regulatory and voluntary approaches are needed to achieve sustainability and that the Department has a responsibility to use its authority to ensure outcomes are achieved. The Department has, on numerous occasions, committed that they would seek to actively support voluntary efforts and other creative approaches that have not been tried in other basins before.

Now with the groundwater study published and the imminent release of the groundwater model, we finally have the information and tools we need to get serious about what the future of our basin looks like. We also have the attention of many groundwater users who will be affected by any decisions made through the rulemaking process. Unfortunately, the Department is putting us in a position where we are forced to react to its proposed regulatory approach on a tight timeline rather than engaging us as partners in solving a problem created by over-appropriation. Furthermore, many RAC members and the public at large are not yet informed enough to be effective participants in the process.

As water leaders in the Harney Basin, we have worked tirelessly over the past eight years to build a strong working relationship with the Department and establish trust between the Department and the community. Department staff, including the former Director as well as the current staff overseeing the rulemaking process, have given us reassurances and made commitments that are not currently being upheld. We understand that the Department has undergone significant changes over the past several years with many new faces at the table, but the Department must be accountable to past commitments. We continue to believe that a better outcome is possible if we work together as partners.

In light of these concerns, we urge the Commission to consider the following requests:

- Continue to track Division 512 rulemaking as it progresses in the Harney Basin by including it as an agenda topic at each upcoming Commission meeting and inviting comments from RAC members at those meetings.
- Identify a Commissioner to participate in the Division 512 RAC meetings going forward.
- Direct the Department to follow its own process as outlined in the adopted Division 10 rules by providing a draft report for public comment (see OAR 690-010-0130(4)(c)), as was indicated in presentations to the community, prior to holding additional RAC meetings.
- Focus on enacting rules in the near-term that address the most acute issues or areas of agreement while simultaneously allowing for more time in areas where issues are less acute and/or more complex to determine the appropriate path forward for establishing and achieving necessary reductions.
- Direct the Department to use the forthcoming Harney Basin groundwater study model with the RAC and community to examine the anticipated response of various management actions devised by the RAC and allow for time for this to occur.
- Direct the Department to develop a road map for how they will engage the broader community and water users throughout the basin in conversations to understand the groundwater system and define desired outcomes and management objectives.

- Consider how policy decisions made in the Harney Basin may set precedent and affect groundwater management in other basins and how that may affect the Department's legal budget and capacity to effectively manage water resources across the state.

It is important to note that we, like the Department, have a sense of urgency and believe that there are some issues and areas that warrant more immediate attention and action. We also share a desire to devise an efficient and effective regulatory framework that will not overburden the Department and will hold water users accountable to a desired outcome. We believe that this can be achieved while also fostering cooperation and working with groundwater users to achieve voluntary reductions in groundwater use.

Success of this rulemaking process should not be measured by whether the rules are adopted "on time" as determined by the Department's ambitious schedule, but whether the rules set us up for long-term success, which has yet to be discussed and defined.

We appreciate you taking our concerns and recommendations into consideration and look forward to continued conversations.

Sincerely,

Mark Owens

Commissioner Kristen Shelman

Chad Karges

Brenda Smith

Holly Stanitsas

Ken Bierly

Cc:

Geoff Huntington

Doug Woodcock

Ivan Gall

Jason Spriet

Dally Swindlehurst

Racquel Rancier

Kim Fritz-Ogren

Alexandria Scott

Danielle Gonzalez

Kelly Mainz

Annette Liebe

Justin Iverson

Darrick Boschmann

Tim Seymour

Courtney Crowell

HARTT Laura A * WRD

From: Rep Owens <Rep.MarkOwens@oregonlegislature.gov>
Sent: Tuesday, August 12, 2025 4:00 PM
To: WRD_DL_rule-coordinator
Cc: HUNTINGTON Geoff * GOV; FERRARI Chandra Alene * GOV; Rep Owens; Sen McLane; Bill Hart; Rob Frank; Patty Dorroh; ericquaemptswrc@gmail.com; Woody Wolfe; joemollwrc@gmail.com; janleewrc@gmail.com; juliesmithermanwrc@gmail.com; kathykiharawrc@gmail.com; GALL Ivan K * WRD; WOODCOCK Douglas E * WRD; RANCIER Racquel R * WRD
Subject: Division 512 Rulemaking Public Comment
Attachments: 512 Rules letter of concern 3 20 24.pdf

Good afternoon,

Please see the attached as an additional public comment for Division 512 rulemaking from Representative Mark Owens.



Stacy Clark | Chief of Staff

Office of Representative Mark Owens
Oregon State Legislature, House District 60
900 Court Street, NE H-475, Salem, OR 97301
(503) 986-1460 (Salem office)
oregonlegislature.gov/owens

Cc: Governor's Office

Geoff Huntington - Senior Natural Resources Policy Advisor - geoff.HUNTINGTON@oregon.gov

Chandra Ferrari - Natural Resources Policy Advisory - Chandra.Alene.Ferrari@oregon.gov

State Legislators

Representative Mark Owens - rep.markowens@oregonlegislature.gov

Senator Mike McLane - sen.mikemclane@oregonlegislature.gov

Harney County Court

County Judge Bill Hart - bill.hart@harneycountyor.gov

Commissioner Rob Frank - rob.frank@harneycountyor.gov

Commissioner Patty Dorroh - patty.dorroh@harneycountyor.gov

Water Resources Commissioners

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Deputy Director Doug Woodcock - douglas.e.WOODCOCK@water.oregon.gov

Deputy Director Racquel Rancier - racquel.r.RANCIER@water.oregon.gov

May 27, 2024

Oregon Water Resources Department
Attn: Acting Director Doug Woodcock
725 Summer St NE Ste A
Salem, OR 97301

RE: Section 512 Rules and Rules Advisory Committee Process

Numerous Rulemaking Advisory Committee (RAC) members have raised concerns regarding policy and procedural issues with the RAC process. They strongly believe that a clear understanding of roles and decision processes is necessary to proceed. There is a group of around 12 RAC members that have been meeting regularly that remain committed to working through this in a constructive manner with the Department, but also remain concerned given the lack of engagement in resolving these issues in an open, transparent, and cooperative manner. At the next RAC meeting we request that the Department grant 30-45 minutes for the RAC to clarify expectations regarding roles and process. Specifically, we request the facilitator take the following actions:

1. Invite the Department to answer the following questions (without conversation from the RAC):
 - a. What has the Department meant in the past meetings when it has stated that its role is to “seek consensus” and “work collaboratively” with the RAC?
 - b. What is the process the Department is currently using to seek feedback from RAC members on decisions?
 - c. What criteria has the Department used to determine “general concurrence” from the RAC at past RAC meetings as described in the **RAC Influence in Division 512 Rulemaking** document transmitted on 5/23?
 - d. Does the Department view this as a collaborative process?
2. Perform a consensus check amongst RAC members (using a [fist to five method](#)) to determine if there is alignment with the following recommendations to the Department and document the level of consensus in the meeting summary:
 - a. **Consensus Statement #1:** The decision-making process for the RAC as well as the role of the RAC members, Department, and facilitator should be clarified and documented in the form of a charter or other governing document.
 - b. **Consensus Statement #2:** RAC members should be invited to indicate concurrence with the charter or governing document prior to adoption, even if concurrence is not necessary for adoption by the Department.
 - c. **Consensus Statement #3:** The Department should adhere to a structured decision-making process specified in a charter or governing document.
 - d. **Consensus Statement #4:** The Department should identify the decision points to be made in each step of the rulemaking process (i.e., the scope of the rulemaking), identifying them in each agenda, and provide an opportunity for each RAC member to provide written or verbal feedback on the list of decision points, which will be added as an addendum to the list.
 - e. **Consensus Statement #5:** For each decision point, we request that the Department clarify, in writing, the decision space for each decision point (clarify what is negotiable/non-negotiable) and describe the rationale.

- f. **Consensus Statement #6:** We request that the Department develop a discussion guide for each decision point to show what information is being used to inform/guide the decision including but not limited to the following: policy framework, data/science, public input received to date, impact/consequence of the decision, interdependencies with other decisions.
 - g. **Consensus Statement #7:** Every RAC member should have the opportunity to provide their verbal or written feedback on each decision point prior to a decision being made.
 - h. **Consensus Statement #8:** A summary of the RAC discussion, including verbal and written feedback received, should be developed for each decision with areas of agreement and disagreement noted and level of agreement.
 - i. **Consensus Statement #9:** The Department should provide an ability to consult with subject matter experts, including the assistance of a neutral fact finder, and a clear process to request that subject matter expertise at meetings.
- 3. Go through the **RAC Influence in Division 512 Rulemaking** document transmitted on 5/23 and use a method of your choice (e.g., fist to five, thumb voting, etc) to determine existing concurrence on the first five decision points amongst RAC members and document the level of concurrence in the meeting summary.
- 4. Invite each RAC member to provide 1-2 statements regarding their perspective on the current RAC process and document each statement in the meeting summary.

Mark Owens

House District 60 State Representative.

August 13, 2025

**Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271**

Subject: Comments on Division 10 Groundwater Report and Proposed Petition for Rulemaking

Dear Mr. Mainz,

Attached to this letter you will find comments on the Division 10 groundwater report and proposed Division 512 rules with questions about the Department's legal and technical basis for proposed regulatory reductions in portions of the basin. You will also find an outline of a proposal that will be coming before the Commission at a future meeting that describes a framework that will better adhere to the groundwater policies of the state by addressing areas with excessive declines, maintaining reasonably stable groundwater levels throughout the basin, protecting existing water rights, minimizing economic impacts, promoting voluntary joint action, increasing cooperation, minimizing conflict and litigation and achieving an integrated and coordinated approach to groundwater management. This proposed approach will target known problems while providing opportunities for partnership to sustainably manage groundwater in the Harney Basin. This approach is more consistent with the commitments made to the community over the past decade by the Department and is a more reasonable and responsible approach.

After much discussion within our community we know that we can better balance the interests and concerns than the current set of proposed rules. There are portions of the basin that require more immediate regulatory action and there are portions of the basin that can be sustainably managed without regulatory intervention. We will be successful, and we will continue more through collaboration and partnership than through conflict, regulation, and legal action.

The Department and state must take accountability for over appropriation of our basin. Fortunately, due in large part to complex local conditions, the Harney basin is not overdrawn. The State should not allocate groundwater to the point of being over appropriated or overdrawn and should consider proper apportionment of available recharge to various beneficial uses when allocating groundwater resources, including for natural systems. The Department should be communicating the current status of groundwater conditions to communities across the state and should engage in basin-scale conversations about current allocation policies and how current decisions of the Department may create or exacerbate existing water conflicts or shortages. We encourage the Department and the State to learn with and from the Harney Basin and modify existing practices to prevent critical conditions and limit the need for regulatory actions in other basins.

We continue to encourage the Department to work proactively with our community as partners to improve management of groundwater rather than focusing solely on maximizing its regulatory authority.

Respectfully submitted,

(Signatures on the next page)

Aug 12 2025

Rep MARK OWENS

AWSY J ROOT

Sabrina Maki

Lorissa Singhose

Will Bentz

Dan Otley

Jake Davis

Rob Frank

Fred Flippence

Mr. 
Mark Owens

Lorissa D. Singhose

Will Bentz

Dan Otley

Jake Davis

Rob Frank

Fred Flippence

Comments on Division 10 Groundwater Report and Division 512 Proposed Rules

A Critical Groundwater Area can be designated where certain criteria have been met. The Division 10 groundwater report states that the following criteria have been met: 1) 537.730(1)(a): Groundwater levels are declining or have declined excessively; and 2) 537.730(1)(e): The available groundwater supply is being or is about to be overdrawn. The Northern and Western regions from the USGS groundwater study budget report meet the criteria, the Southern region does not. The entire Harney Basin is overappropriated by 160% but is not overdrawn by the Department's current definition. One groundwater study budget region, the Western region, is not currently overdrawn, but could be overdrawn if all groundwater rights are fully developed. A portion of the Western region, Weaver Springs, has substantial evidence of excessive declines, while the other portion of this region meets the Department's current definition of reasonably stable. The Northern region is overdrawn by ~2,700 acre feet and has the potential to be significantly overdrawn if all groundwater rights were fully developed. A portion of the Northern region, the current Northeast-Crane area, exhibits evidence of excessive declines in clusters of wells, while the other portion of this region meets the Department's current definition of reasonably stable.

The Department does not have statutory authority to impose a Critical Groundwater Area and reduce groundwater use by regulation for parts of the Harney Basin that do not meet the statutory criteria. Based on existing state policies, while the basin is over-appropriated, for parts of the basin that meet the current definition of reasonably stable and do not have evidence of excessive declines and are not overdrawn, it could be argued that the Department does not have the statutory basis for regulatory action.

Recharge/Discharge Estimates

Estimated Recharge in 1968
Robison Recharge Report =
260,000 afy

[Estimated Recharge in 2022 USGS Report](#) = 173,000 afy

[Estimated Pumpage in 2022 USGS Report](#) = 152,000 afy

[Estimated Non-Exempt Pumpage in Division 10 Groundwater Report](#) = 144,800 afy

[Modeled Pumpage in RAC Materials \(RAC #14\)](#) = 136,500 afy

[Estimated Discharge \(pumpage and natural systems\) in 2022 USGS Report](#) = 262,000 afy

The USGS 2022 study estimates that 88% of the total recharge for the basin is being pumped (with 4% returning to groundwater).

The USGS 2022 study and Division 10 report estimates that 84% of the total recharge for the basin is being pumped and consumed (not recharging).

The modeled results estimate that 79% of the total recharge for the basin is being pumped.

Estimated pumpage is less than recharge. Total discharge (pumpage + natural discharge) is greater than recharge.

The groundwater budget study indicated that there is cumulative uncertainty of +/- 23% in the estimated groundwater budgets.

Neither the USGS groundwater study report nor the Department's Division 10 groundwater report make the statement that the Harney Basin is one groundwater reservoir. Rather, both state that the "groundwater in the Harney Basin occurs within a single groundwater-flow system that 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." Groundwater reservoir is a policy term, not a technical term and should consider multiple criteria, including local knowledge and input. The boundaries of groundwater reservoirs should be ascertained or reasonably inferred based on the distinctions between these areas, as has been repeatedly requested by the community, rather than the exterior boundaries of the groundwater study area, which the Department has insisted on. Hydraulic connection (defined verbally by the Department as no evidence of physical barriers to groundwater flow) is used as the sole criteria for demarcating groundwater reservoirs in the Harney Basin despite significant information gathered through the groundwater study. The Department continues to insist on declaring the entire Harney Basin one groundwater reservoir so that it can also designate the entire Harney Basin as a Critical Groundwater Area without sufficient evidence in parts of the basin to do so.

Water rights were granted based on an assessment by the Department that water is available, the rights are within the capacity of the resource, and that it is in the public interest to issue the water rights. Were these areas not hydraulically connected to an area with excessive declines, the Department may still make a determination that water is available for appropriation. Were this in a surface water context, the Department would allocate all available flow to instream and out-of-stream water rights in accordance with their priority date. The Department cannot retroactively make a determination that water is not available and reduce allocations by regulation if available data show that water is still available for existing water rights (recharge exceeds pumpage) and other criteria for a critical groundwater area designation are not evident.

Under current allocation policies, the Water Resources Department can fully allocate all available recharge without consideration of impacts to natural systems (springs, streams, native vegetation). It is the current practice of the Department to allocate the entirety of groundwater recharge throughout the state, unless the Department has evidence that groundwater levels are not reasonably stable or there is a potential for substantial interference with protected surface water rights. The Department cannot, in a management context, adopt a more restrictive standard than it uses for its allocation decisions.

The Department cannot retroactively decide to reapportion available groundwater recharge to different uses without a clear legal basis to do so. As it stands, the Department's own

rules continue to allow the Department to fully appropriate available recharge without consideration of environmental impacts or impacts to permit exempt uses beyond an assessment of a “potential for substantial interference” with legally protected water rights. The allocation policies and practices should be revised to ensure that the Department protects senior users, accounts or permit exempt uses, and accounts for environmental impacts in a balanced manner during allocation prior to issuing water rights.

The Department has a statutory obligation to protect water rights unless there is a threat to public welfare, health, and safety. There is not a documented threat to public welfare, health, and safety, except in areas where excessive declines have impacted drinking water quality and quantity for rural residents on permit exempt wells. Proposed regulations present a greater threat to public welfare, health, and safety for much of the basin than the current levels of groundwater pumping, with the exception of the areas where excessive declines are occurring or likely to occur.

The statutory standard for the Department is “reasonably stable” groundwater levels, not “durably stable” groundwater levels. Where excessive declines have already occurred and groundwater declines are not reasonable, for example in Weaver Springs where some wells have declined >100 feet, there is a sufficient basis to require stabilization. In other areas where conditions are currently reasonably stable, it is questionable whether the Department has the authority to require durable stability since the statutory standard is reasonably stable. If recharge is currently sufficient to meet the legal obligations of the state, then it has a responsibility to meet those legal obligations. The Department has the authority to proceed with cancellation of unused rights consistent with forfeiture laws and withdraw available recharge for non-consumptive beneficial uses. The basis for regulatory action to curtail water rights is in question without substantial evidence of excessive declines.

Where groundwater levels show modest declines but are otherwise reasonably stable and do not show evidence of excessive declines, it is the policy of the state to pursue voluntary joint action, not regulatory action. Hydraulic connection with an area showing excessive declines is not sufficient to regulate an area that is currently reasonably stable and expected to remain reasonably stable, especially where the Department has evidence that pumpage does not exceed recharge for that area. Voluntary joint action should be pursued in areas that do not clearly warrant regulatory reductions.

The current permissible total withdrawals are not based off of current estimates of recharge, authorized use, or estimated use. The permissible total withdrawals are based off of “optimized” model runs with parameters that were not agreed to by the RAC and not peer reviewed. The model may not accurately represent current conditions and should be used

as a planning tool, not as the sole tool to determine permissible total withdrawals. The pumpage estimates from the model differ from the numbers included in the 2022 USGS groundwater study reports. These discrepancies have not been accounted for in the Department's materials and may actually represent larger reductions in each area. See Tables 1 and 2 below. For instance, if you use the numbers from the USGS groundwater study rather than the modeled results it could be the difference between a 61% curtailment and a 39% curtailment from estimated use for the Southern region which is neither over-appropriated nor overdrawn and does not have evidence of excessive declines. For the Western region it could be a difference between 47% and 50% of curtailment from estimated use. This region is overappropriated but not overdrawn and a portion of the region has evidence of excessive declines. For the Northern region it could be a difference between 22% and 27% of curtailment from estimated use. This region is overappropriated and overdrawn and a portion of the region has evidence of excessive declines. These numbers do not account for the +/- 23% uncertainty in the groundwater budget and any additional uncertainty in the modeled results.

Furthermore, each region of the basin would be apportioned a very different percentage of available recharge. The Southern region, which is neither overappropriated nor overdrawn and shows no evidence of excessive declines would only be allowed to use 18% of available recharge. The Western region, which is overappropriated but not overdrawn and shows evidence of excessive declines in a portion of the region, but is otherwise reasonably stable, would be allowed to use 43% of available recharge. The Northern region, which is overappropriated and overdrawn and shows evidence of excessive declines in a portion of the region, but is otherwise reasonably stable, would be allowed to use 77% of available recharge. What percent of available recharge is allowed under law to be permitted and used? What is the statutory basis for this determination? Where pumpage does not exceed recharge, it is questionable whether the Department has the authority to set a permissible total withdrawal that is significantly less than estimated use, except in areas where there is evidence of excessive declines. Where authorized use does not exceed recharge, it is questionable whether the Department has the authority to set a permissible total withdrawal that is significantly less than the authorized use.

The Department should establish a more defensible legal and technical framework for delineating groundwater reservoirs, designating Critical Groundwater Areas, and imposing regulatory reductions, including the process by which permissible total withdrawals are determined. The current proposal is not consistent with current policies and results in an unsubstantiated and inequitable distribution of regulatory reductions across the basin, including in areas that have not met the criteria for regulatory reductions.

Table 1. Recharge, authorized use, estimated use, and estimated reductions by water budget region using the 2022 USGS Study Report

Water Budget Region	Mean annual lowland recharge (acre-feet) – 2022 USGS Estimates (Source: Groundwater Report)	Over-appropriated (Authorized Use>Recharge in acre feet per year) See definition in OAR 690-300-0010 (Source: Groundwater Report)	Overdrawn (Actual Pumping>Recharge in acre feet per year) See definition in OAR 690-008-0010 (Source: Groundwater Report)	Wells Declining Excessively or Excessively Declined? See definitions in OAR 690-008-0010 (Source: Groundwater Report)	OWRD Proposed Permissible Total Withdrawal (% of Recharge) Proposed Percent of Authorized Use and Estimated Use Allowed
Northern region (Silvies Subarea, Northeast-Crane Subarea, Parts of Dog Mountain Subarea)	78,000 acre feet	YES 174,454 > 78,000 -96,454	YES 80,700 > 78,000 -2,700	YES, in Northeast-Crane Subarea	PTW: 60,400 (77% of recharge) 34% of authorized use allowed 75% of estimated use allowed
Southern region (Lower Blitzen-Voltage Subarea, Upper Blitzen Subarea)	48,000 acre feet	NO 37,443 < 48,000 +10,557	NO 21,600 < 48,000 +26,400	NO	PTW: 8,376 (18% of recharge) 22% of authorized use allowed 39% of estimated use allowed
Western region (Silver Creek Subarea, Weaver Springs Subarea, Parts of Dog Mountain Subarea)	47,000 acre feet	YES 65,204 > 47,000 -18,204	NO 42,500 < 47,000 +4,500	YES, in Weaver Springs Subarea and Part of Dog Mountain Subarea (see groundwater study maps)	PTW: 20,000 (43% of recharge) 31% of authorized use allowed 47% of estimated use allowed
Total	173,000 acre feet	YES 277,101 > 173,000 -104,101	NO 144,800 < 173,000 +28,200 84% of recharge	YES, in Weaver Springs, Northeast-Crane, and Dog Mountain Subareas	PTW: 88,776 (51% of recharge) 32% of authorized use allowed 61% of estimated use allowed

Table 2. Recharge, authorized use, estimated use, and estimated reductions by water budget region using modeled results

Water Budget Region	Mean annual lowland recharge (acre-feet) – 2022 USGS Estimates (Source: Groundwater Report)	Over-appropriated (Authorized Use>Recharge in acre feet per year) See definition in OAR 690-300-0010 (Source: Groundwater Report)	Overdrawn (Actual Pumping>Recharge in acre feet per year) See definition in OAR 690-008-0010 (Source: Groundwater Report and RAC 14 PowerPoint)	Wells Declining Excessively or Excessively Declined? See definitions in OAR 690-008-0010 (Source: Groundwater Report)	OWRD Proposed Permissible Total Withdrawal (% of Recharge) Proposed Percent of Authorized Use and Estimated Use Allowed
Northern region (Silvies Subarea, Northeast-Crane Subarea, Parts of Dog Mountain Subarea)	78,000 acre feet	YES 174,454 > 78,000 -96,454	YES 82,500 > 78,000 -4,500	YES, in Northeast-Crane Subarea	PTW: 60,400 (77% of recharge) 35% of authorized use allowed 73% of estimated use allowed
Southern region (Lower Blitzen-Voltage Subarea, Upper Blitzen Subarea)	48,000 acre feet	NO 37,443 < 48,000 +10,557	NO 13,800 < 48,000 +34,200	NO	PTW: 8,376 (18% of recharge) 22% of authorized use allowed 61% of estimated use allowed
Western region (Silver Creek Subarea, Weaver Springs Subarea, Parts of Dog Mountain Subarea)	47,000 acre feet	YES 65,204 > 47,000 -18,204	NO 40,200 < 47,000 +6,800	YES, in Weaver Springs Subarea and Part of Dog Mountain Subarea (see groundwater study maps)	PTW: 20,000 (43% of recharge) 31% of authorized use allowed 50% of estimated use allowed
Total	173,000 acre feet	YES 277,101 > 173,000 -104,101	NO 136,500 < 173,000 +36,500 79% of recharge	YES, in Weaver Springs, Northeast-Crane, and Dog Mountain Subareas	PTW: 88,776 51% of recharge 32% of authorized use allowed 65% of estimated use allowed

Overview of Preferred Alternative for Division 512

Groundwater Reservoir	Critical Groundwater Area and Criteria	Threshold for Regulatory Action	Proposed Corrective Controls	Timing for Implementation
Weaver Springs	Yes (Overdrawn, Excessive Declines)	Already met, immediate corrective controls necessary to stabilize groundwater levels	Set permissible total withdrawal at 45% of estimated pumpage (regulatory reductions of 55%) Initial allocation of 2.5 acres to wetted acres from 2020-2024 Initiate cancellation of unused rights	75% of regulatory reductions in 2028, 25% in 2034
Northeast-Crane	Yes (Overdrawn, Excessive Declines)	Already met, phased in corrective controls to stabilize groundwater levels prior to critical conditions being met	Set permissible total withdrawal at 70% of estimated pumpage (regulatory reductions of 30%) Initial allocation of 2.5 acres to wetted acres from 2020-2024 Initiate cancellation of unused rights	30% of regulatory reductions in 2028, 20% in 2034, 20% in 2040, 20% in 2046, 10% in 2052 (adjust as needed)
Silvies	Yes (About to be Overdrawn)	Not met – will be initiated if reasonably stable conditions are not maintained	Set permissible total withdrawal at estimated pumpage Encourage voluntary reductions of 10% through voluntary agreements	Achieve 10% voluntary reductions from established baseline by 2040
Silver	Yes (About to be Overdrawn)	Not met – will be initiated if reasonably stable conditions are not maintained	Set permissible total withdrawal at estimated pumpage Encourage voluntary reductions of 10% through voluntary agreements	Achieve 10% voluntary reductions from established baseline by 2040
Blitzen-Voltage	No	Not met – will be initiated if reasonably stable conditions are not maintained	Encourage voluntary reductions of 10% through voluntary agreements	Achieve 10% voluntary reductions from established baseline by 2040

Basis for Policy Proposal

Members of the RAC and the community intend to bring forward a petition to the Commission with an alternative set of Division 512 rules in 2025 that will follow all existing state policies, protect existing water rights, minimize economic impacts, promote voluntary joint action, increase cooperation, and achieve an integrated and coordinated approach to groundwater management.

The updated Division 512 rules should rely on existing statewide statutes and rules to the greatest extent possible to form the basis for action, especially the existing definition of reasonably stable. Site-specific, substantial evidence should be used to support decisions for Critical Groundwater Area designations and subsequent regulatory reductions. A mix of regulatory and voluntary approaches should be deployed to maintain reasonably stable conditions. Where there is evidence of excessive declines in median wells, immediate regulatory action should be taken to stabilize or recover groundwater levels. Where conditions are not reasonably stable and where there is evidence of some wells with excessive declines, action should be taken to prevent median wells from reaching critical conditions. The state recognized place-based integrated water resources plan will be the basis for integrated and coordinated actions to support sustainable groundwater management not undertaken through regulatory action, including efforts to monitor and remedy impacts to domestic well users, monitor and restore springs and groundwater dependent ecosystems, and other issues identified in the plan. An adaptive management process with opportunities for public involvement will be encouraged and supported.

The basis for the proposed reductions is a variation of a Scenario that was modeled by the Department in December 2024, known as “[Scenario B](#)” which included ~22% reductions in three areas, with reductions focused primarily in Weaver Springs and the Northeast-Crane area. These areas will be the focus of regulatory reductions, with regulatory reductions in Weaver Springs occurring immediately following a contested case process and regulatory reductions in Northeast-Crane being phased in over 24 years. Voluntary reductions will be the focus of all other areas with a goal of achieving 10% voluntary reductions by 2040. The reductions to Weaver Springs are increased from Scenario B due to the magnitude of the declines that have already occurred and the need to immediately stabilize and recover groundwater levels. Scenario B showed that there were no further losses to storage after 30 years and discharge to surface water was stabilized. The proposed levels of regulatory reduction alongside voluntary reductions will maintain reasonably stable groundwater levels and ensure perpetual use of groundwater in each groundwater reservoir while protecting existing rights, minimizing economic impacts, and promoting voluntary joint action consistent with existing laws.

Policy Statements

Groundwater in the Harney Basin is over-appropriated.

Groundwater in the Harney Basin in its entirety is not overdrawn but is about to be overdrawn. Groundwater in portions of the Harney Basin are overdrawn or about to be overdrawn. To prevent groundwater in the Harney Basin from becoming overdrawn, corrective controls are necessary.

Portions of the Harney Basin include wells that have declined excessively or are excessively declining and have met the threshold to declare Critical Groundwater areas.

The Department will utilize targeted corrective controls and voluntary joint action with groundwater users to preserve and protect existing rights to appropriate groundwater, to ensure use within the capacity of available sources, to assure adequate and safe supplies of ground water for human consumption while conserving maximum supplies of ground water for agricultural, commercial, industrial, thermal, recreational and other beneficial uses, to prevent depletion of groundwater supplies below economic levels, to maintain reasonably stable conditions, and sustain perpetual use of the groundwater reservoirs

In areas of the basin where wells have declined excessively or are excessively declining and where groundwater levels are not reasonably stable the Department has determined that voluntary joint action is not effective and the state must implement regulatory reductions to stabilize groundwater levels. In portions of the basin with reasonably stable groundwater levels the Department will limit additional groundwater use and pursue voluntary joint action with groundwater users to increase conservation and efficient use of groundwater so long as reasonably stable conditions persist.

Definitions

Include definition of “declined excessively” from OAR 690-008-0001.

Include definition of “declining excessively” from OAR 690-008-0001.

Include definition of “groundwater reservoir” from OAR 690-010-0110.

Include definition of “reasonably stable” from OAR 690-008-0001.

Include definition of “over appropriation” from OAR 690-008-0001.

Include definition of “overdrawn” from OAR 690-008-0001.

Include other definitions as appropriate.

Administrative Boundaries

Classification boundary is the whole groundwater study area (minus the areas lying outside of the existing basin administrative boundary).

Serious Water Management Problem Area boundary is the whole groundwater study area (minus the areas lying outside of the existing basin administrative boundary).

Delineate the Western Region from the USGS groundwater study, minus the Weaver Springs area, as a groundwater reservoir named the “Silver Creek Groundwater Reservoir”.

Delineate Weaver Springs and portions of Dog Mountain as a groundwater reservoir named the “Weaver Springs Groundwater Reservoir” following the boundaries of the Western Region from the USGS groundwater study.

Delineate the Southern Region from the USGS groundwater study as a groundwater reservoir named the “Blitzen-Voltage Groundwater Reservoir.”

Delineate two groundwater reservoirs in the Northern Region of the USGS groundwater study, the “Silvies Groundwater Reservoir” and the “Northeast-Crane Groundwater Reservoir.”

Describe location, extent, capacity, quality, and other characteristics of each groundwater reservoir.

Specify that subareas within each groundwater reservoir may be delineated for specific management purposes, including the formation of voluntary agreements.

Classification

Each groundwater reservoir is classified for permit exempt uses only and non-commercial geothermal uses.

New uses can be supported in each groundwater reservoir through the identification and voluntary cancellation of an equal amount of “offset” water (see current Division 512 rules).

Critical Groundwater Areas

Substantial evidence exists to designate the following groundwater reservoirs as Critical Groundwater Areas to allow or corrective controls.

Designate Weaver Springs as a Critical Groundwater Area (overdrawn or about to be overdrawn and wells declined excessively/excessively declining).

Designate the Northeast-Crane Subarea as a Critical Groundwater Area (overdrawn or about to be overdrawn and wells declined excessively/excessively declining).

Designate the Silvies Subarea as a Critical Groundwater Area (overdrawn or about to be overdrawn).

Designate the Silver Creek Subarea as a Critical Groundwater Area (overdrawn or about to be overdrawn).

EXCLUDE Blitzen-Voltage Subarea from the Critical Groundwater Area. Limit additional development through classification.

Groundwater users in the Critical Groundwater Area may petition the Commission to remove the designation if 10 years of groundwater level trend data show that conditions remain reasonably stable, available data show that critical conditions are not likely to be reached, authorized use does not exceed recharge, there are no threats to public welfare, safety and health, and the groundwater reservoir can sustain perpetual use.

Corrective Controls

For the Weaver Springs groundwater reservoir and Critical Groundwater Area:

- Set a permissible total withdrawal at 45% of current estimated pumpage (wetted acres from 2020-2024) apportioned by priority.
- Initiate cancellation proceedings for groundwater rights where beneficial use between 2020-2024 cannot be demonstrated and no extenuating circumstance for non-irrigation exists.
- Do not accept any new applications except where offset water is provided.

For the Northeast-Crane groundwater reservoir and Critical Groundwater Area:

- Set permissible total withdrawal at 70% of current estimated pumpage (wetted acres from 2020-2024) apportioned by priority.
- Initiate cancellation proceedings for groundwater rights where beneficial use between 2020-2024 cannot be demonstrated and no extenuating circumstance for non-irrigation exists.
- Specify that regulatory reductions as described in a final order of the Department will control in lieu of decline conditions on individual permits for this area.
- Do not accept any new applications except where offset water is provided.

For the Silver Creek groundwater reservoir and Critical Groundwater Area:

- Specify the process to establish a baseline from which voluntary reductions will be measured.
- Initiate cancellation proceedings for groundwater rights where beneficial use between 2020-2024 cannot be demonstrated and no extenuating circumstance for non-irrigation exists.
- Do not accept any new applications except where offset water is provided.

For the Silvies River groundwater reservoir and Critical Groundwater Area:

- Specify the process to establish a baseline from which voluntary reductions will be measured.
- Initiate cancellation proceedings for groundwater rights where beneficial use between 2020-2024 cannot be demonstrated and no extenuating circumstance for non-irrigation exists.
- Do not accept any new applications except where offset water is provided.

Initial Allocation

For the Weaver Springs and Northeast-Crane groundwater reservoirs, an initial allocation for groundwater rights with an irrigation use will be determined as follows to maximize irrigated acres and ensure more equitable distribution of permissible total withdrawal:

- Use a duty of 2.5 acre-feet per acre for primary and supplemental groundwater rights; and
- Consider the historic, beneficial use in the five-year period from 2020 to 2024 when identifying the number of acres that will be allotted water.

For the Silvies and Silver groundwater reservoirs, an initial allocation for groundwater rights with an irrigation use will be determined as follows:

- Allocate water only to acres that have beneficially used water in the five-year period from 2020 to 2024.

Targets for Voluntary Reductions

Express a policy preference consistent with ORS 537.525 for voluntary reductions in areas where conditions are currently reasonably stable through voluntary agreements or through a subbasin conservation plan as described in OAR 690-410-0060.

For Silver Creek groundwater reservoir and Critical Groundwater Area:

- Set a target for voluntary reductions of 10% from an established baseline by 2040 through development of a voluntary agreement.

For the Silvies River groundwater reservoir and Critical Groundwater Area:

- Set a target for voluntary reductions of 10% from an established baseline by 2040 through development and implementation of a voluntary agreement.

For the Blitzen-Voltage groundwater reservoir:

- Set a target for voluntary reductions of 10% from an established baseline by 2040 through development and implementation of a voluntary agreement.

Adaptive Management and Schedule for Reductions

- For the Weaver Springs groundwater reservoir, implement the first 75% of reductions in 2028 and the second 25% in 2034.
- For the Northeast-Crane groundwater reservoir will be scheduled for reduction to the permissible total withdrawal with 30% of the total reduction scheduled in 2028, 20% of the total reduction scheduled for 2034, 20% of the total reduction scheduled for 2040, 20% of the total reduction scheduled for 2046, and 10% of the total reduction scheduled for 2052. The year prior to each scheduled reduction the Department will analyze groundwater level trends and adjust reductions based on groundwater level trends.
- For all other areas, 10% voluntary reductions will be encouraged and reductions in water use will be tracked from an established baseline.
- The Department shall support creation of a local Groundwater Management Advisory Committee (GMAC) to be jointly appointed by the Department and the Harney County Court. The Department will work with the GMAC and individual water users to encourage the collection and use of hydrogeologic data and implementation of conservation measures. The Department shall meet with the GMAC at least once annually to review annual reports describing groundwater use and groundwater trends and to ensure that wells monitored remain representative. The GMAC can advise on effectiveness of voluntary and regulatory actions.

Thresholds for Further Corrective Controls

If median groundwater levels as measured in any groundwater reservoir exceed reasonably stable conditions, the Department will, within one year, adjust permissible total withdrawal within the rules to maintain reasonably stable conditions, to prevent groundwater levels from excessive declines, and ensure perpetual use of the groundwater reservoir.

Monitoring and Reporting

- Monthly measurement and annual reporting of all permitted groundwater rights (SWMPA) – EXPRESSLY EXCLUDE PERMIT EXEMPT USES (e.g., domestic and stockwater).
- All available data will be used to analyze groundwater level trends.
- Groundwater users in each groundwater reservoir will be consulted in the selection of representative wells or each groundwater reservoir for long-term monitoring.
- Entrance to properties to inspect flowmeters and take groundwater level measurements will be allowed with sufficient notice with a preference for consent.
- The Department will actively monitor for and enforce against unauthorized groundwater use.
- By December 31 of each year the Department will use all available data and publish an annual report that includes an estimate of groundwater used in the previous water year as well as current groundwater level trends for each groundwater reservoir.
- By December 31 of each year the Department will publish an annual report describing actions taken in the basin to identify and address unauthorized groundwater use, cancel unused groundwater rights, implement regulatory reductions, support voluntary reductions, and any other relevant actions.

Exemptions

- Exclude existing recreational water rights up to a certain total volume (e.g., Crystal Crane hot springs).
- Exclude existing tribal water rights.
- Exclude existing municipal and quasi-municipal water rights.

Transfers

Each groundwater reservoir represents a different source of water. Transfers into a groundwater reservoir from another groundwater reservoir can only occur with consent to injury from all groundwater rights holders.

Department Support of Voluntary Agreements and Actions

The Department will actively support the development and implementation of voluntary agreements consistent with ORS 537.525 and ORS 537.745.

The Department will, on a biannual basis, develop a work plan describing the actions it will undertake or support to assist with implementation of the state recognized place-based integrated water resources plan and other voluntary actions.

Division 512 Policy Proposal

The Department will foster coordinated action by federal, state and local agencies, Indian tribes, and special districts as well as public education to promote the effective management, protection and beneficial use of groundwater consistent with OAR 690-410-0010.

MEINZ Kelly A * WRD

From: Rep Owens <Rep.MarkOwens@oregonlegislature.gov>
Sent: Wednesday, August 13, 2025 3:10 PM
To: WRD_DL_rule-coordinator
Cc: HUNTINGTON Geoff * GOV; FERRARI Chandra Alene * GOV; Rep Owens; Sen McLane; bill.hart@harneycountyor.gov; rob.frank@harneycountyor.gov; patty.dorroh@harneycountyor.gov; ericquaemptswrc@gmail.com; Woody Wolfe; joemollwrc@gmail.com; janleewrc@gmail.com; juliesmithermanwrc@gmail.com; kathykiharawrc@gmail.com; janneumanwrc@gmail.com; GALL Ivan K * WRD; WOODCOCK Douglas E * WRD; RANCIER Racquel R * WRD
Subject: Division 512 Public Comment
Attachments: Letter To Doug WoodCock 512 rules May 27.docx

Good afternoon,

Please enter the attached into public record for the Division 512 Rulemaking.



Stacy Clark | Chief of Staff
Office of Representative Mark Owens
Oregon State Legislature, House District 60
900 Court Street, NE H-475, Salem, OR 97301
(503) 986-1460 (Salem office)
oregonlegislature.gov/owens

Cc: Governor's Office

Geoff Huntington - Senior Natural Resources Policy Advisor - geoff.HUNTINGTON@oregon.gov

Chandra Ferrari - Natural Resources Policy Advisory - Chandra.Alene.Ferrari@oregon.gov

State Legislators

Representative Mark Owens - rep.markowens@oregonlegislature.gov

Senator Mike McLane - sen.mikemclane@oregonlegislature.gov

Harney County Court

County Judge Bill Hart - bill.hart@harneycountyor.gov

Commissioner Rob Frank - rob.frank@harneycountyor.gov

Commissioner Patty Dorroh - patty.dorroh@harneycountyor.gov

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MEINZ Kelly A * WRD

From: Rep Owens <Rep.MarkOwens@oregonlegislature.gov>
Sent: Wednesday, August 13, 2025 12:50 PM
To: WRD_DL_rule-coordinator
Cc: HUNTINGTON Geoff * GOV; FERRARI Chandra Alene * GOV; Sen McLane; bill.hart@harneycountyor.gov; rob.frank@harneycountyor.gov; patty.dorroh@harneycountyor.gov; ericquaemptswrc@gmail.com; Woody Wolfe; joemollwrc@gmail.com; janleewrc@gmail.com; juliesmithermanwrc@gmail.com; kathykiharawrc@gmail.com; GALL Ivan K * WRD; WOODCOCK Douglas E * WRD; RANCIER Racquel R * WRD; janneumanwrc@gmail.com
Subject: Re: Public Comment for Division 512 Rulemaking

All,

Lorissa Singhose called me last night and wanted me to relay she supports the alternative laid out in the previous email, though she opposes Silver Creek being in the critical ground water area.
Mark

Mistakes by I-Phone

Rep.MarkOwens@oregonlegislature.gov

From: Rep Owens
Sent: Tuesday, August 12, 2025 2:56:09 PM
To: wrd_dl_rule-coordinator@water.oregon.gov <wrd_dl_rule-coordinator@water.oregon.gov>
Cc: HUNTINGTON Geoff * GOV <Geoff.HUNTINGTON@oregon.gov>; FERRARI Chandra Alene * GOV; Rep Owens <Rep.MarkOwens@oregonlegislature.gov>; Sen McLane <Sen.MikeMcLane@oregonlegislature.gov>; bill.hart@harneycountyor.gov <bill.hart@harneycountyor.gov>; rob.frank@harneycountyor.gov <rob.frank@harneycountyor.gov>; patty.dorroh@harneycountyor.gov <patty.dorroh@harneycountyor.gov>; ericquaemptswrc@gmail.com <ericquaemptswrc@gmail.com>; woodywolfewrc@gmail.com <woodywolfewrc@gmail.com>; joemollwrc@gmail.com <joemollwrc@gmail.com>; janleewrc@gmail.com <janleewrc@gmail.com>; juliesmithermanwrc@gmail.com <juliesmithermanwrc@gmail.com>; kathykiharawrc@gmail.com <kathykiharawrc@gmail.com>; GALL Ivan K * WRD; WOODCOCK Douglas E * WRD; RANCIER Racquel R * WRD
Subject: Public Comment for Division 512 Rulemaking

Good afternoon,

Please see the attached public comment from Representative Mark Owens for Division 512 Rulemaking.

Thank you,



Stacy Clark | Chief of Staff

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Deputy Director Doug Woodcock - douglas.e.WOODCOCK@water.oregon.gov
Deputy Director Racquel Rancier - racquel.r.RANCIER@water.oregon.gov

HARTT Laura A * WRD

From: Rep Owens <Rep.MarkOwens@oregonlegislature.gov>
Sent: Tuesday, August 12, 2025 2:56 PM
To: WRD_DL_rule-coordinator
Cc: HUNTINGTON Geoff * GOV; FERRARI Chandra Alene * GOV; Rep Owens; Sen McLane; bill.hart@harneycountyor.gov; rob.frank@harneycountyor.gov; patty.dorroh@harneycountyor.gov; ericquaemptswrc@gmail.com; Woody Wolfe; joemollwrc@gmail.com; janleewrc@gmail.com; juliesmithermanwrc@gmail.com; kathykiharawrc@gmail.com; GALL Ivan K * WRD; WOODCOCK Douglas E * WRD; RANCIER Racquel R * WRD
Subject: Public Comment for Division 512 Rulemaking
Attachments: Division 512 Comments_8.12.25 MO.pdf

Good afternoon,

Please see the attached public comment from Representative Mark Owens for Division 512 Rulemaking.

Thank you,



Stacy Clark | Chief of Staff
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Deputy Director Doug Woodcock - douglas.e.WOODCOCK@water.oregon.gov

Deputy Director Racquel Rancier - racquel.r.RANCIER@water.oregon.gov

MEINZ Kelly A * WRD

From: Mary Jo Davies <maryjodavies@hotmail.com>
Sent: Monday, August 4, 2025 10:51 AM
To: WRD_DL_rule-coordinator
Subject: OAR690Division 12- comments

Some people who received this message don't often get email from maryjodavies@hotmail.com. [Learn why this is important](#)

Harney County Groundwater!

I am commenting concerning the new proposed rules. Yes we have a problem. Unfortunately we are trying to "shut the barn door after the horse is out!" I realize we cannot go back and undo past mistakes. Therefore we need to move forward.

I believe we need to not issue any new permits or allow any new drilling for irrigation water in the entire county. We need to do this NOW! We also need to stop allowing transfers of water rights! When a moratorium on new permits was put into effect approximately 10 years ago the whole county saw an upsurge of frantic drilling for irrigation water like was never seen before. Suddenly everyone had permits that they were just "sitting on" ??! Also many transfers of water rights from all over the county were moved around from miles away! These transfers are very problematic. Now that 7 areas have been acknowledged some of these transfers were from different areas. Therefore, an older, Senior, water right may have been transferred into a different area. This is most unfair (illegal?) for the water right holders in that basin. That needs to not be allowed as we move forward. I am not against points of diversion if the same water right and ground is where the diversion occurs. This is totally different than a transfer.

If any of these so called cooperatives are put into practice they need to be scrutinized and made sure they do not interfere with the "neighbors". A copy of the agreement should be made public so any bordering or ground water users in the area can view it before approval.

Everyone who irrigates legally has a water right with a date of issue. We need to be sure the dates Senior vs Junior are utilized. All this talk of sharing and everyone giving sounds like Socialism!!

Nary Jo Davies
PO Box 3005
Princeton, OR 97721

MEINZ Kelly A * WRD

From: Matt Stashin <Matt.Stashin@pacresmortgage.com>
Sent: Thursday, August 7, 2025 3:34 PM
To: WRD_DL_rule-coordinator
Subject: Div 512 Rulemaking Harney Basin

Some people who received this message don't often get email from matt.stashin@pacresmortgage.com. [Learn why this is important](#)

Hi Kelly,

I'm writing because I am vehemently opposed to the idea of turning off farmers' ability to access groundwater from irrigation wells in the area. I have 3 separate hay farms in the area. I have invested literally millions of dollars in drilling wells, putting in pipe, assembling pivots and buying the necessary equipment to farm my lands. I have consistently contributed to the economic well-being of many people in the area.

The solution to this problem is not to cut off access to irrigation water. Not only will it be devastating to those of us who have invested so much time and money in our farms and communities, it will create undue hardship for those people who depend on farmers and ranchers for their employment not to mention the stores and businesses that depend upon the farmers and ranchers.

We've seen the devastation from the spotted owl on Oregon's economy and the small towns that depended on the forests and logging. In many ways this is a very similar situation.

If farmers and ranchers could be reimbursed for the amount they have invested, this would be a different conversation. But you and I know any relief would be just pennies on the dollar. Many farmers and ranchers would be forced into bankruptcy. For me personally it will be devastating. I cannot afford to lose all that money. My ability to retire is in large part tied up in these farms. If I lose my water rights and/or ability to irrigate, it'll do severely devalue my farms this wipe out a large portion of money I would, otherwise, be counting on to fund my retirement. The land will be worthless and I won't be able to sell it and therefore I will never be able to get the money I've invested there back out.

I'm not ignoring the water table issue. But before the government decides to start shutting off anyone's ability to legally irrigate their own land, great restraint must be shown. A program to make people whole should be an integral part of any adopted solution.

I am desperate to see a way to get my money back out of these farms. The earth can heal itself. Climate change predates humankind, obviously. There have been ice ages and climate changes for as long as the earth has existed. Things change and it should not be the government that decides who and when to shut off without appropriate compensation. Case in point: in the 1990s this area commonly flooded for long periods of time. Much of it was flooded in 2025 again. The point is mankind doesn't really know or control what's happening and should not be making decisions without fully acknowledging that the state only has a fraction of the data it should...before it makes such consequential decisions over the lives of so many.

Respectfully,

Matt Stashin

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Division 512 Rules Coordinator
Oregon Water Resources Department
725 Summer St. NE, Suite A
Salem, OR 97301-1271

August 13, 2025

RE: League of Oregon Cities in Response to Proposed OWRD Division 512 Rulemaking

On behalf of Oregon's 241 cities, the League of Oregon Cities appreciates the opportunity to provide comments on the proposed amendments to Division 512 governing groundwater management in the Harney Basin. While we support OWRD's science-based approach to addressing groundwater decline, we have significant concerns with the proposed cap on municipal water rights and the potential broader impacts to our members.

Municipal water users, such as the City of Burns, account for less than 2% of groundwater use in the Basin, yet the proposed rules would impose drastic limitations—up to an 82% reduction—on the ability of cities to serve their communities. This approach disproportionately burdens cities, penalizes past conservation efforts, and undermines their ability to accommodate future growth.

Conflict with State Planning Goals

The proposed cap conflicts with Oregon's Statewide Land Use Planning Goals, including Goal 14 (Urbanization) and Goal 10 (Housing), which require cities to plan for 20 years of growth and provide the infrastructure, especially water, to support that growth. The housing goals in particular stem directly from the Governor's office and require urgent action from all state partners. Without access to adequate water supplies, cities cannot meet housing production targets, fulfill land use obligations, or respond to the housing crisis at the scale required. These rules jeopardize cities' ability to comply with mandates from the Department of Land Conservation and Development (DLCD) and other agencies tasked with implementing Oregon's planning framework.

Economic Development & Job Growth Impacts

The proposed groundwater caps could also hinder municipalities' ability to attract new industry, support manufacturing, and promote job creation. Adequate and reliable water supplies are a fundamental requirement for many employers, and water limitations may deter new business investment or cause existing employers to scale back operations or relocate entirely. This risk is particularly acute in rural and economically distressed areas, where job retention and expansion are critical to community vitality. We request that OWRD conduct a comprehensive economic impact analysis for affected communities before adopting final rules. Such an analysis should account for both direct and indirect impacts, including

potential effects on workforce availability, tax base stability, and long-term regional competitiveness.

Need for Agency Coordination

We urge OWRD to coordinate closely with DLCD and other relevant agencies to ensure groundwater rules do not unintentionally conflict with housing, land use, and infrastructure goals. Regulatory consistency is essential for cities to meet statewide priorities and support balanced, sustainable development. This coordination should also ensure that economic development strategies are not undermined by water allocation decisions that could limit business growth.

Recommendation

We respectfully request that municipal water rights be exempt from the proposed caps or, at minimum, be subject to a proportionate curtailment framework based on actual groundwater use and contribution to overdraft. Municipal rights are legally and functionally distinct and must be protected to ensure continued access to safe, reliable water for current and future residents.

The League of Oregon Cities is committed to being a constructive partner in addressing groundwater challenges. We welcome continued collaboration with OWRD, DLCD, and other state partners to ensure the final rule reflects sound science, equity across sectors, and alignment with the state's housing, land use, and economic development goals.

Sincerely,

Michael Martin, Lobbyist
League of Oregon Cities

August 7, 2025

Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Subject: Comments on Division 512 Rules

Dear Mr. Mainz,

My name is Mike Peila. My family and I are a 4th generation farming and ranching business in the Harney Basin. Thank you for the opportunity to provide comments on the proposed Division 512 rules. I care about groundwater management in the Harney Basin. These are very complicated issues and the stakes are huge for our family-run operation. The proposed scenarios have changed numerous times and all will severely affect the sustainability of our family operation.

My primary comment has to do with the boundaries of the proposed Dog Mountain subarea. My property is currently intersected by the subarea boundary line, with wells and rights on either side of the line. My operation includes a mix of surface water and groundwater as well as a mix of primary and supplemental groundwater rights. Some of my wells are in the proposed Dog Mountain area that go to rights in the proposed Silvies subarea and some of my wells are in the proposed Silvies subarea that go to rights in the proposed Dog Mountain area. This will make management of my operation very difficult as I do not understand how the rules would affect me. My operation is already complicated enough without additional complication introduced by this boundary. **To increase the implementability of any proposed rules and reduce confusion, please adjust the boundary so that all properties above Wright's point are in the proposed Silvies subarea.** This is consistent with the boundaries used in the USGS Groundwater Model of Harney Basin Southeastern Oregon 2024-5017. If you do not adjust the boundary this will make management of my operation very difficult and I would need to figure out how to transfer my points of appropriation and places of use across subarea boundaries, which may not even be possible under the proposed rules.

I feel very strongly that I belong in the Silvies subarea as my wells and water have more in common with other wells in this subarea than they do with the Dog Mountain subarea. I am not sure how the Department decided to draw boundaries, but the Department really should consider local knowledge and input and management implications of boundaries when finalizing them. I would be happy to discuss with you further where my properties are and how to avoid introducing unnecessary complexity. Please reach out if you need additional information. My issue would be simplified if the Silvies subarea was moved to include the area north of Wright's point. Wright's point is a well known natural feature that affects weather, with a different climate on either side. Groundwater users and well drillers have observed differences in groundwater both north and south of Wright's point as well as depending on the proximity of wells to the rim of Wright's point. More time and attention should be spent on getting these subarea boundaries right and avoiding unnecessary confusion for groundwater users who may have property that falls on both sides of the proposed boundary.

Wells in the Silvies subarea, including my wells, are reasonably stable and have been since irrigation began in 1960. While there have been some declines they have not been significant in

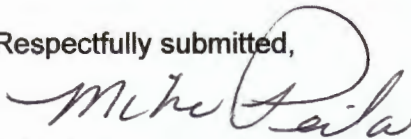
my area. **Rather than imposing regulatory reductions in the Silvies subarea I would much prefer to see the Department pursue voluntary joint action with groundwater users and setting targets or voluntary conservation efforts and partnering with us to reduce water use.** Pursuing a purely regulatory approach will be time consuming and costly and I believe better results could be achieved through cooperative approaches. I would support efforts in the Silvies subarea to develop a voluntary agreement and am interested in learning more and exploring opportunities to reduce my water use through voluntary actions.

Regarding other specifics of the proposed policies I generally agree that 2.5 acre feet is enough to grow a viable crop. This does represent a significant cut to groundwater rights though and while groundwater users should be encouraged to be efficient and conserve water I do not agree with an approach that limit water use to 2.5 acre feet by a regulatory order. The proposal to allocate water rights by aerial photos and limiting the time frame to 2020-2024 causes concern about the accuracy and conditions of use. I strongly encourage the Department to first pursue a voluntary approach in this area given that the groundwater levels are reasonably stable and there is not evidence of excessive declines warranting regulatory action.

I really think we will be able to accomplish more if we're sitting across from each other at a collaborative table rather than negotiating in courtrooms and encourage the Department to first pursue a voluntary approach in the Silvies subarea before pursuing regulation.

In summary I request the following **1) please move the boundary for the Silvies subarea to include all properties north of Wright's Point consistent with the USGS Groundwater Model boundaries, and 2) pursue a voluntary, incentive based approach to water conservation in the Silvies subarea through cooperation and partnership before relying exclusively on a regulatory approach.**

Respectfully submitted,



Mike Peila
Box 537
Hines, OR 97738
541-589-0207

AUG 11 2025

OWRD

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

PROPOSED HARNEY BASIN GROUNDWATER POLICIES – WRITTEN COMMENT FORM

This written comment form can be used to help you formulate effective written public comments for the Division 512 Harney Basin Program Rules being proposed by the Oregon Water Resources Department, which will be used to manage and regulate groundwater use in the Harney Basin. The questions provided in this form address various aspects of the rules. Each question includes space to write your answer and some questions include options for you to consider. Reach out to Harmony Burright if you want help talking through or recording your comments (541-846-8863 / harmony@saltandfresh.solutions).

Public comments and related materials must be received no later than **August 7, 2025 at 5pm:**

By Email: WRD_DL_rule-coordinator@water.oregon.gov

By Mail: Kelly Meinz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Your Name (required):	Mindy Sheley
Your Email (optional):	mindy.sheley@gmail.com
Your Phone (optional):	541-413-0440
Note: All personally identifiable information may be made public. Please do not include this information if you do not want it included in the public record. A first name and last initial must be included to be considered. See attached	

Please check all interests that apply to you:

☒	I have at least one well that supplies groundwater to my home for domestic purposes.
☒	I have at least one well that that supplies groundwater to my livestock.
☒	I have at least one well that supplies groundwater to a non-farm business (e.g., store).
☒	I irrigate/grow crops with groundwater in the Harney Basin.
☒	I have a groundwater fed spring on my property that is important to me.
☒	I value groundwater contributions to the environment (e.g., springs and native vegetation).
☒	I value fish and wildlife in the basin, including those that benefit from groundwater.
☒	I use agricultural products that are produced with groundwater.
☒	I value the economic contributions of agricultural operations that use groundwater.

Question 1. Please tell us about yourself and describe why groundwater is important to you. If you use groundwater, describe how you use it.

In the State of Oregon, agricultural property is sold with dated, recorded water rights. In addition, the State of Oregon requires that every well drilled on that property be approved by the Oregon Department of Water Resources (ODWR) and fees paid to that agency. So shouldn't it be illegal for ODWR to say to landowners years after the fact "oops, we over allocated the wells we approved to be drilled in Harney County and we now have to restrict the amount of water landowners are allowed to use?" Shouldn't there be a conversation about the State buying back water rights for a fair price and reimbursing the landowners for the thousands and thousands of dollars they invested into equipment and infrastructure? Instead, their proposed solution is to divide Harney County into 7 units (originally it was 15 units) and make farmers pay for meters at each well. The State claims they have a "sure fire" model (though it's unvalidated and unproven) that determines how much reduction of water is necessary in each unit.

First, how did the State determine that the Harney County basin should be divided into 15 units? (We all know how wonderfully the State did when they recently divided the Harney County basin into units for their Wildfire map.) Next, how did the State decide to redivide the Harney County Basin into only 7 units? Under the 15 unit division, our farm fell into the Silvies unit which the State says requires a 15-16% water reduction. Under the 7 unit division, our farm falls into the Northeast Crane unit which the State says requires a 34% water reduction. Seriously? Obviously these units have either been made from information that is based on gross averages or from a faulty model or both.

My husband has been one of the most vocal voices fighting against the State. Besides being an alfalfa farmer 20 years, he has a Phd in Rangeland Ecology from Oregon State University and has been a lead researcher for over thirty years. He is a highly qualified scientist who has extensive background in the use of modeling techniques. Good models can be a helpful tool but bad models are worthless. Even a good model can not predict the future. If it could, then we

Received
AUG 11 2025

OWRD

point that farmers can't produce enough crop to pay their bills, there will be bankruptcies. What a diabolical way for water rights and property to be confiscated! What a diabolical way to crush Harney County! What a diabolical way to kill the American dream!

HARTT Laura A * WRD

From: Neal Hadley <nealhadley@mulberryorchard.com>
Sent: Saturday, August 9, 2025 7:24 AM
To: WRD_DL_rule-coordinator
Subject: Adopt Strong Rules to Stabilize Harney Basin Groundwater Levels Now!

Some people who received this message don't often get email from nealhadley@mulberryorchard.com. [Learn why this is important](#)

Greetings,

I live in Mapleton, near the Oregon coast, and it would seem my area is awash with water; but even here it is evident that water is a resource that can't be taken for granted. With the increasing population demands and recognition of the ecosystem's and diversity's dependance on a healthy water dynamic, and the reality of our changing planet and society, strong protections and forward thinking policies are paramount to averting future loss and mounting problems.

As a regular visitor to the Harney Basin (at least once a year) and with friends in Burns, I have heard of the lowering water table that's causing so much cost and worry for people dependent on private wells. The importance of the wet habitats to migrating birds and wildlife, and a water table supportive of the native flora cannot be overstated in what is, in truth, a fragile landscape.

Please enact strong rules regarding groundwater removal and a robust monitoring program to ensure a sustainable water future and, hopefully, a properly recharging water table.

If past policies are continued, I foresee a more barren countryside and the need for air moisture capture technologies like the deserts of the Peruvian coast just for people to survive.

Thank you for your work.

Neal Hadley

Mapleton, OR 97453

Date: August 5, 2025

From: Patty Dorroh, Harney County resident

**To: Members, Oregon Water Resources Commission
Director, Oregon Water Resources Department**

Attn: Kelly Mainz, Oregon Water Resources Department

Subj: Public Comment on OWRD Division 512 Rulemaking

Introduction:

Hello, my name is Patty Dorroh and I am from Harney County.

I appreciate this opportunity to comment. I know the people and the economy of Harney County -- and I have been part of and witness to this collaborative groundwater work for many years. I serve as Harney County Commissioner but I am here as member of the public and these comments reflect my views.

This is such important and new rulemaking that will – in addition to curtailing the rate of groundwater level decline - affect an entire Oregon county. Appropriate groundwater curtailment is needed. Excessive groundwater curtailment, however, is not needed, it's not scientifically justified, and it poses a very real and unnecessary threat that will devastate the rural economy here.

If my comments, and many of the comments from other Harney County people have similar or even the same recommendations, it's because we have so many good, intelligent, well-informed, caring community members who have been involved in all the processes that the legislature and OWRD have established and facilitated for the past ten years. It's because there is widespread local understanding and consensus on these issues and these recommendations.

My comments are evidence-based, achieve the goal of successfully addressing long term groundwater declines in the Harney Basin, yet abide by Oregon law. I urge you to hear and consider my comments and those of the residents of Harney County with extra attention. They are sound, fair minded, success-oriented, and follow the law.

My comments will cover the following topics:

- 1) Mischaracterization of the Harney Basin
- 2) Addressing Areas of Decline
- 3) Fiscal and Economic Impacts of the Rulemaking
- 4) Lack of Collaboration and Meaningful Public Engagement During the Process

Here are my comments:

1) Mischaracterization of the Harney Basin: The Harney Basin is not one groundwater reservoir. The proposed Division 512 rulemaking was built on the flawed and erroneous designation of the Harney Basin as one groundwater reservoir. That foundational mischaracterization by OWRD was not supported by most Harney County members of the Division 512 Rules Advisory Committee or RAC, nor by science. OWRD claimed that the groundwater study called this all one groundwater reservoir. That statement was made in error. The term groundwater reservoir is a policy term, not a scientific one, and the delineation of a groundwater reservoir was at the discretion of OWRD. The definition in ORS 537.515 is as follows: (6) “Ground water reservoir” means a designated body of standing or moving ground water having exterior boundaries which may be ascertained or reasonably inferred. There are many different ways for the Department to ascertain or reasonably infer different boundaries.

OWRD’s decision to invoke a discretionary choice and designate the Harney Basin as one groundwater reservoir – is fundamentally wrong since it does not take into account much of the more site specific information from the groundwater study, nor does it take into account local knowledge and expertise or management implications. This definition, which members of our community have objected to from the beginning formed the technical basis for rulemaking that oversteps the State’s legal obligations and roles. It unnecessarily harms the socioeconomic health of the county, when there is no reason to do so. Once the flawed designation of the Harney Basin as one groundwater reservoir is withdrawn, appropriate groundwater curtailment rules can be adopted for the various parts of the basin that will achieve reasonably stable and sustainable groundwater levels without devastating Harney County’s economy.

OWRD mischaracterized and subsequently delineated the Harney Basin as a single groundwater reservoir, at its discretion, rather than differentiate the distinct units – or subareas. It did this rather than recognize these different groundwater reservoirs and account for their variable groundwater conditions in the rules, despite repeated local requests and feedback.

OWRD’s unilateral policy decision claiming the Harney Basin is a single groundwater reservoir enables OWRD to subject the entire Harney Basin to a purely regulatory approach even if significant portions of the basin are reasonably stable,

not overdrawn, and do not have data showing that they meet the criteria for a critical groundwater area.

This approach to the rulemaking does great harm to the people of Harney County, the agriculture and beneficial use of the groundwater, and the socio-economic health and survivability of Oregon's largest land mass county.

The term "groundwater reservoir" is ultimately a policy term that was defined at the discretion of OWRD. This discretionary and optional designation by OWRD will harm Harney County and is not needed to achieve success. To opt for this subjective and unwarranted designation, against strong local objection, implies a lack of collaboration and integrity, suggests an ulterior motive, and should be corrected immediately.

Another troubling thought: Is OWRD's move to mischaracterize Harney Basin's hydrologic and geologic realities being done in part to reduce the potential for anticipated future (and yes, by nature complicated) legal processes that must be followed for contested cases that may arise, as allowed, and are protected by law? We are concerned. That would be a sneaky way to try to justify reasons to wrongly group together and designate additional distinct subareas into one groundwater reservoir, without supporting site specific data and information, in order to cut corners, simplify work for staff, and support certain political agendas. It's wrong.

The Water Resources Commission should direct OWRD to develop a clear process with criteria that would be consistently applied in the delineation of groundwater reservoirs, including but not limited to geology, groundwater level trends, recharge areas, discharge areas, groundwater chemistry and quality, local consultation and input, and management considerations. In the event that the Commission fails to do so, the Legislature should take action.

ORS 537.735 clearly allows OWRD to "define the boundaries of the critical ground water area [by indicating] which of the ground water reservoirs located either in whole or **in part** within the area in question are included within the critical ground water area." If OWRD persists in its definition despite continued local objection then they should use their authority under ORS 537.735 to designate **part** of the groundwater reservoir as a critical groundwater area where there is sufficient supporting evidence.

2) Addressing Areas of Decline: Two things

1) Conditions across the Harney Basin are relatively stable and areas of reasonably stable groundwater levels should be excluded from a Critical Ground Water Area designation.

The majority of the Basin meets the existing definition for reasonably stable conditions (OAR 690-008-001) and the definition should be adhered to.

Additionally, hydrologic connectivity to areas of concern should not be the sole criteria for such a designation.

Four out of seven of the subareas in the Harney Basin have reasonably stable groundwater levels and should be excluded from a Critical Ground Water Area designation. These subareas are: Silver Creek, Lower Blitzen-Voltage, Upper Blitzen, and Silvies Subareas. These meet OWRD definition for reasonably stable.

2) ONLY areas that meet the definition of a Critical Ground Water Area should be designated as such and regulated.

There are many areas of the basin that ARE NOT OVERDRAWN – and they are being curtailed in these rulemaking regulations.

Only the Weaver Springs Subarea, Dog Mountain Subarea, and portions of the Northeast-Crane Subarea have wells that meet the criteria for Critical Ground Water Area designation. These and only these subareas should be designated and regulated.

The rest of the Harney Basin – those other subareas --are only included in the Critical Ground Water Area because of their purported hydrologic connection to areas of decline and OWRD's over simplified definition of a groundwater reservoir and hydrologic connectivity.

A much more sensible and legitimate approach would be to designate a Critical Ground Water Area only in the areas where substantial evidence supports the conclusion that the designation criteria are met, -- while excluding those areas which are not meaningfully contributing to—or being affected by—groundwater declines or becoming overdrawn. This is the approach that should be adopted, and the Division 512 rules should be revised to align with these comments, thereby achieving the rule's substantive goals while at the same time reducing negative economic impact of the rule on businesses.

3) Fiscal and Economic Impacts

The rules need to be revised to reduce economic impacts, especially where revisions are called for by the facts and available data.

OWRD is required to work with the advisory committee or RAC to determine “whether the rule will have a fiscal impact, what the extent of that impact will be and whether the rule will have a significant adverse impact on small businesses. If the committee indicates that the rule will have a significant adverse impact on small businesses, the agency shall seek the committee’s recommendations on compliance with ORS 183.540 (Reduction of economic impact on small business).”

We appreciate that OWRD listened to requests from the RAC to produce a comprehensive economic impact analysis of the proposed rules. This report shows that the proposed rules will have significant adverse economic impacts to Harney County. It states that over the duration of the rules, Harney County stands to lose 320 jobs, \$18M in labor income, and \$61M in annual economic output. This is a devastating economic impact to our County with a real gross domestic product of \$352M in 2023, according to the U.S. Bureau of Economic Analysis; that is a 17% reduction in economic output.

Unfortunately, despite RAC members providing numerous comments regarding how OWRD could reduce the economic impact on small businesses as is required, these comments continued to fall on deaf ears.

When a professional economic impact analysis and local input is summarily ignored or discounted, despite OWRD and the Commission’s responsibilities to reduce economic impact -- and when there are, in fact, alternatives – that is beyond disappointing, it’s bad government in action and one might argue against the law.

4) Lack of Collaboration and Meaningful Public Engagement During the Process for Developing Division 512 Rules

What started out as open, transparent communication and collaboration during early stages of the Div 512 RAC meetings (beginning in April 2023) changed - and it's important to take time during public comment to inform the Commission and raise this topic.

From April 2023 to May 2025, OWRD used language indicating its intent to foster collaboration and seek consensus. At RAC Meeting #7 (in May 2024) OWRD unceremoniously rescinded its commitment to collaboration and consensus by informing the RAC members that it had been a “mistake” to set that expectation. From that point forward, the RAC was put in the role of reacting to OWRD's proposals. This was a deeply troubling development in the RAC process and was contrary to many previous commitments OWRD had made. This is one of many commitments OWRD made, but failed to follow through.

OWRD's attempts to form discussion groups in the fall of 2024 to increase dialogue around key concepts was mostly perfunctory. Many RAC members, and members of the public, do not feel that their interests and concerns were seriously considered by OWRD, and grew increasingly disillusioned and mistrustful throughout the process. Following the recent public hearings in June 2025, there were renewed concerns that OWRD was merely defending its position on the Division 512 rules, had little interest in public input, and was relying exclusively on the agency's technical model.

How and why did this happen? It's worth noting that OWRD was not originally proposing regulatory reductions in most of the Harney Basin due a lack of corroborating data. It was only when OWRD began to use its technical model, and “optimized” the model without any real peer review or public input, that OWRD started to propose more drastic regulatory reductions for portions of the Harney Basin.

Now, areas of the Harney Basin that should be considered “reasonably stable” are facing significant proposed reductions in groundwater use. This has been decided and defended by OWRD even with significant concern and confusion repeatedly raised by RAC members. Frankly it's shocking and alarming. Harney County is concerned that OWRD increasingly relied on the preferences of interest groups that reside outside of the Basin, while largely dismissing the concerns, economic impacts and preferences of Harney County residents. This wrong must be corrected going forward.

In Summary and Moving Forward

The only parts of the Harney Basin with substantial evidence that meets the criteria for designation as a Critical Ground Water Area are the Weaver Springs, Dog Mountain, and Northeast-Crane subareas. The rest of the Harney Basin is only included in the Critical Ground Water Area because of their purported hydrologic connection to areas of decline and OWRD's over simplified definition of a groundwater reservoir and hydrologic connectivity. A much more sensible approach would be to only designate a Critical Ground Water Area in the areas where substantial evidence supports the conclusion that the criteria are met, while excluding those areas which are not meaningfully contributing to—or being affected by—groundwater declines, nor are overdrawn.

This is the approach that should be adopted here, and the Division 512 rules should be revised to incorporate these comments, thereby achieving the rule's substantive goals, while reducing negative economic impact of the rules on businesses.

OWRD has taken an approach of decide, announce, defend, and has repeatedly demonstrated that it is not open to feedback from the RAC or the Harney County public. As a result, the people of Harney County will be those who suffer the most. Let's change this starting today, with cooperative, transparent and collaborative work going forward.

If the anticipated timeframe for adoption of the Div 512 rules needs to be delayed, postponed, extended, and the work continue in order to incorporate important public comment and get this rulemaking right, I urge that to happen.

Thank you.

Respectfully submitted,

Patty Dorroh
70839 Crane Buchanan Road
Burns, OR 97720
dorrohmp@gmail.com
541-589-1898

MEINZ Kelly A * WRD

From: patty pratt <papwow1@yahoo.com>
Sent: Wednesday, August 13, 2025 4:07 PM
To: WRD_DL_rule-coordinator
Subject: Re: proposed groundwater management in Harney county

Some people who received this message don't often get email from papwow1@yahoo.com. [Learn why this is important](#)

On Wednesday, August 13, 2025 at 03:07:18 PM PDT, patty pratt <papwow1@yahoo.com> wrote:

Patty Hodge
Amber Hodge
Central Pastime
211 N. Broadway
Burns, OR 97720

My name is Patty Hodge and I am a business owner in rural Burns Oregon. I have concerns about the "proposed" ground water management "scenario" that was brought to our community from individuals who have no vested interest in the well being and longevity of a community that has managed their own stakes since it was established in 1889. With the exception of a few over zealous ranchers, us salt of the earth folk in Harney County have done just fine on our own without the "management" from those who have never been to eastern Oregon, let alone Burns.

Much of Harney County is considered the frontier, meaning that we are incredibly remote in location with fewer resources than most. As a community, we cannot afford to lose up to/around 320 jobs as your research estimates. As you know, this community is built on and runs by ranchers and agriculture, government and service-to follow through with what you're proposing will completely decimate the local economy and effectively destroy our community. The loss of 300+ jobs as is stated in your own documents, "The economic Impacts of Groundwater Management in Harney County" has a trickle down effect that then impacts every single other business, mine included and will put me out of business which then prevents me from caring for my own family as well as the 5 employee's I have and their families. The same can be said for each business in Harney County. I'm sure you have already done the math, but this then impacts all of my distributors, partners and so on. Every business in this town will lose what the ranches lose ten-fold as the ranchers are our customers and without them there is no us.

In the best case scenario, you already know the suspected impact this proposition and implementation would have on our community which could end up being worse than anticipated. As stated in your meeting, you have an obligation not only to consider the economic impact these propositions would have on a community but to also limit these negative impacts. Your research highlights the devastation already mentioned by me previously as well as by each individual who has already spoken up and fails to truly identify the environmental impact or "what's next" after.

I would hope that your own research as well as the information provided by educated and well informed community members who call Harney County home weighs heavily enough to make you reconsider your proposition. The management program you've proposed addresses Harney County as a blanket area of concern rather than properly identifying critical areas and focusing on improvement of those areas which would lessen the economic devastation you're threatening to move forward with.

Concerned business owners,

Patty Hodge
Amber Hodge
papwow1@yahoo.com
541-589-0337

HARTT Laura A * WRD

From: Shawn & Paul Jacobsen <spjacobsens@hotmail.com>
Sent: Monday, June 16, 2025 7:38 PM
To: WRD_DL_rule-coordinator
Subject: Rule Changes in the Malheur Administrative Basin

Some people who received this message don't often get email from spjacobsens@hotmail.com. [Learn why this is important](#)

Good Evening,

Please accept my comments regarding the possible rule changes to ground water use in the Malheur Basin.

I fully support making ground water use more restrictive in this basin. This is a mainly desert region with limited surface water and precipitation. There is not enough new moisture to recharge what is being removed. Ground water pumping negatively affects surface water areas such as Malheur Lake. These surface waters are critical for birds and wildlife. The majority of the water being pumped is being used to grow crops like alfalfa, which really shouldn't be grown in an arid environment, and is not a critical food for humans or wildlife.

I recommend you make pumping ground water more restrictive as it is a limited resource important to humans and wildlife.

Thank you,

Paul Jacobsen
Corvallis

From: paulschlegelmann@gmail.com
Sent: Monday, June 16, 2025 4:32 PM
To: WRD_DL_rule-coordinator
Subject: CGWA proposal for Harney Basin

You don't often get email from paulschlegelmann@gmail.com. [Learn why this is important](#)

I recently read the following from OWRD:

“OWRD is proposing the designation of the Harney Basin as a Critical Ground Water Area (CGWA) to address the overallocation of groundwater rights and severe groundwater declines within the basin. A CGWA designation allows the Department to reduce the allowed pumping for an existing permitted or certificated water right. OWRD is further proposing to designate areas within the Malheur Lake Administrative Basin as a Serious Water Management Problem Area (SWMPA), requiring groundwater rights holders throughout the SWMPA boundary to measure and report their groundwater use. Additionally, the proposed rules will expand the existing classification boundary to restrict new groundwater permits and allow for exempt uses and nonconsumptive geothermal uses only.”

I completely support this proposal to designate the Harney and Malheur Lake Administrative Basin as a Serious Water Management Problem Area (SWMPA). Over the years, I have often visited the Malheur region and National Wildlife Refuge along with the Summer Lake area. Over the years, droughts have contributed to reduced water levels in these basins. However, even in non-drought years, there have been reduced water levels. As deduced by many scientists and investigators, groundwater extraction for agricultural use has increased significantly and is likely contributing to the reduced water levels in these critical wildlife/bird habitats.

Therefore, I am in support of SWMPA designation with its concomitant restrictions on groundwater extraction and usage. I understand that farmers need to make a living. But, there are many ways they can control water usage and waste that will help them accommodate their water needs without more groundwater extraction.

Thank you for pursuing greater controls on groundwater extraction in these basins.

Paul Schlegelmann
Corvallis, OR
Paulschlegelmann@gmail.com

MEINZ Kelly A * WRD

From: penelope kaczmarek <penkaczmarek@gmail.com>
Sent: Friday, August 1, 2025 5:25 PM
To: WRD_DL_rule-coordinator
Subject: Proposed Rules for groundwater in Harney Basin

Some people who received this message don't often get email from penkaczmarek@gmail.com. [Learn why this is important](#)

To Whom it May Concern,

To Whom it May Concern,

We were encouraged to learn that with help from entities such as the Tribal/State Task Force and WaterWatch OWRD is proposing new rules that will set Harney basin on a more sustainable path for groundwater allocation. We appreciate this is a thorny issue.

We would like to also express our concern that the proposed rules appear to allow significant additional pumping which will lead to further ground level water decline. This combined with the projected 'extinction' of up to an additional 100 wells without plans for addressing potential water poverty to be suffered by folks who depend on these wells strikes us as both impractical and inhumane. Again, we thank you for working to create rules that will help to conserve water for the long haul. We urge you to also please carefully consider what can be done to add or to fortify rules that will prevent further pumping destined to result in life and livelihood threatening problems for people and biota who depend on sustainable water sources.

Respectfully,

Penelope Kaczmarek
Jack Kaczmarek, MD

111 Fred Taylor Rd.
Siletz, OR 97380
Owyhee7@msn.com
penkaczmarek@gmail.com

MEINZ Kelly A * WRD

From: Peter Paquet <pjpaquet@gmail.com>
Sent: Tuesday, August 12, 2025 4:25 PM
To: WRD_DL_rule-coordinator
Subject: Please Adopt Strong Rules to Stabilize Groundwater Levels in the Harney Basin

You don't often get email from pjpaquet@gmail.com. [Learn why this is important](#)

Dear Kelly Mainz,

Dear Oregon Water Resources Department,

I am writing about the rules the Oregon Water Resources Department (OWRD) recently proposed to address groundwater declines in the Harney Basin.

I support stabilizing groundwater levels in the Harney Basin, which would provide the basin with a more sustainable future and help prevent additional impacts to groundwater dependent ecosystems such as springs, streams, wetlands, and native vegetation. It would also reduce the number of existing domestic wells that would be dried up due to irrigation pumping.

I offer the following additional comments:

1. I place a high value on the springs, streams, and other groundwater dependent ecosystems in the Harney Basin, and all of the fish, wildlife, and plants that rely on these ecosystems.
2. These groundwater dependent ecosystems have already been significantly degraded from the over-pumping of groundwater. Please ensure that these systems are protected in the Division 512 rules for the Harney Basin.
3. I support the requirement in the Proposed Rules for water use measurement and reporting on all non-exempt groundwater rights in the basin.
4. OWRD should not adopt rules that would dry up additional existing domestic wells, especially when it has no viable program in place to help these residents who will lose their drinking water.
5. Please consider strengthening the Proposed Rules by adopting a tighter schedule for imposing the lower pumping amounts ("Permissible Total Withdrawals"). I encourage a shorter timeline than the proposed 30 years to achieve stable groundwater levels in light of the major declines that have already occurred, and the significant impacts to groundwater dependent ecosystems and domestic wells that this has already caused.

Thank you for your kind attention and consideration of my comments.

Sincerely,
Peter Paquet
355 9th St
Lake Oswego, OR 97034, OR 97034

MEINZ Kelly A * WRD

From: Philip Klimbal <philip.klimbal@gmail.com>
Sent: Tuesday, July 22, 2025 10:08 AM
To: WRD_DL_rule-coordinator
Subject: Comments on Division 512 Rules

Some people who received this message don't often get email from philip.klimbal@gmail.com. [Learn why this is important](#)

Philip Klimbal
Burns Oregon

I am located in the proposed Silvies subarea of the proposed Harney Basin critical groundwater area.

I have both residential and agricultural wells on my property. The agricultural well is used to irrigate/grow crops and would be subject to the proposed rules.

I am writing to provide comments on 690-512-0060 *Determination of Initial Allotment for All Groundwater Rights* in the proposed rules.

I purchased my property outside of Burns Oregon at the end of January of 2025. The decision to purchase the property was in a large part based upon the allocated senior water right associated with the property, which provided for a total of 15.7 irrigated acres at a maximum of 3 acre-feet per acre.

While I can understand a need to possibly reduce the allocation from 3.0 to 2.5 acre-feet per acre to maintain a reliable supply into the future, I don't have a way to reconcile limitations on my use based upon the previous occupants irrigation practices.

I have no way of knowing how the previous owners utilized the ground water during the period from 2020 to 2024, or what portions of the land they kept in production during those years. The agricultural practices of the previous owners should not be encumbering upon my ability to use my property to the fullest extent allowed.

I purchased the property with the intent of farming all of the available land and should not be limited by arbitrary limits not disclosed or in place at the time of the purchase.

I'd ask that section 690-512-0060 (2) be amended to apply to the acreage stipulated in the water right and not limited by historical use patterns, which may or may not be known or associated with the current owners of the property.

Best,

Philip Klimbal
Pleased as Punch Farms

MEINZ Kelly A * WRD

From: Richard Stoltze <rstoltze52@gmail.com>
Sent: Friday, August 1, 2025 7:57 PM
To: WRD_DL_rule-coordinator
Subject: Please Adopt Strong Rules to Stabilize Groundwater Levels in the Harney Basin

You don't often get email from rstoltze52@gmail.com. [Learn why this is important](#)

Dear Kelly Meinz,

Dear Oregon Water Resources Department,

As a resident of La Pine Oregon I make frequent trips to Harney County and I am writing about the rules the Oregon Water Resources Department (OWRD) recently proposed to address groundwater declines in the Harney Basin.

I support stabilizing groundwater levels in the Harney Basin, which would provide the basin with a more sustainable future and help prevent additional impacts to groundwater dependent ecosystems such as springs, streams, wetlands, and native vegetation. It would also reduce the number of existing domestic wells that would be dried up due to irrigation pumping.

I offer the following additional comments:

1. I place a high value on the springs, streams, and other groundwater dependent ecosystems in the Harney Basin, and all of the fish, wildlife, and plants that rely on these ecosystems.
2. These groundwater dependent ecosystems have already been significantly degraded from the over-pumping of groundwater. Please ensure that these systems are protected in the Division 512 rules for the Harney Basin.
3. I support the requirement in the Proposed Rules for water use measurement and reporting on all non-exempt groundwater rights in the basin.
4. OWRD should not adopt rules that would dry up additional existing domestic wells, especially when it has no viable program in place to help these residents who will lose their drinking water.
5. Please consider strengthening the Proposed Rules by adopting a tighter schedule for imposing the lower pumping amounts ("Permissible Total Withdrawals"). I encourage a shorter timeline than the proposed 30 years to achieve stable groundwater levels in light of the major declines that have already occurred, and the significant impacts to groundwater dependent ecosystems and domestic wells that this has already caused.

Thank you for your kind attention and consideration of my comments.

Sincerely,
Richard Stoltze
14226 Whitewater Loop
La Pine, OR 97739

July 30, 2025

Lesley Richman &
Matthew Bixby
70541 Red Barn Rd.
Burns, OR 97720

Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Subject: Public Comments on Proposed Division 512 Rules

Dear Mr. Mainz,

Please accept these additional comments regarding the Proposed Division 512 Rules.

- 1) I have some real misgivings about the boundaries of some of the Subareas. Specifically,
 - a) including the area on the north side of Wright's Point in the Dog Mountain Subarea rather than in the Silvies Subarea.
 - b) Including the area on the south side of Windy Point in the Northeast Crane Subarea rather than in the Lower Blitzen-Voltage Subarea.

As drawn, including the above described areas within the Subareas in the Proposed Rules does not make sense as far as hydrostratigraphic units go. As stated by the Department at the information sessions and public hearings in June, the Harney Basin is made up of distinct hydrostratigraphic units distinguished by underlying geology, different areas of recharge, different responses to groundwater use, groundwater quality and chemistry, among other factors.

I strongly urge the Department to relook at those boundaries. Whatever data was used to include those areas as depicted in the Boundary Maps should be double-checked and if warranted, re-draw those boundaries.

- 2) Another point of concern is that the Department is proposing a more restrictive standard in the Harney Basin than anywhere else in the State of Oregon. This will have a devastating impact on families and farms and the entire Harney County economy and community. All other basins in Oregon are held to the existing definition of reasonably stable and are not expected to achieve a rate of groundwater level change of 0 feet per year. If the Department effectively applied its current policies, the majority of the Harney basin would be considered reasonably stable and only portions of the basin would be managed as critical areas. The Harney Basin should not be held to a drastically different standard than the rest of the state. I urge the State to reconsider its approach to the Division 512 rules and focus on effective application of its existing policies.

- 3) In order for Irrigators and the community of Harney County to understand and effectively manage our adjudicated water resources it is essential that we have accurate Lists by Subarea of current Wet Acres being irrigated that details the water right holders, permitted ACF (actually being irrigated) and their priority date. Having this information would help inform our ability to meaningfully respond to the Proposed Rules.

Thank you for the opportunity to comment.

July 30, 2025

Lesley Richman &
Matthew Bixby
70541 Red Barn Rd.
Burns, OR 97720

Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Subject: Public Comments on Proposed Division 512 Rules

Dear Mr. Mainz,

Please accept our comments regarding the Proposed Division 512 Rules.

Our farm is within the Silvies Subarea. We have been measuring our water levels since we purchased the farm in June of 2022 and have not seen any reduction in the static water level. We believe that groundwater in this Subarea is currently reasonably stable and that the conditions do not exist for regulatory action if the Department adheres to its own policies for groundwater allocation. As currently drafted, the current rules have the potential to decimate our local economy, bankrupt local businesses, disrupt families, and destroy the social fabric and culture of our community. We recommend an approach that is more tailored to the reality and needs of each Subarea, that encourages and incentivizes conservation, and that reduces economic impacts.

We request that the Department follow its existing policies and make a greater effort to limit the economic impacts of proposed groundwater reductions in this area.

Specific to the 512 Rules,

- Include the definition of “reasonably stable” and “overdrawn” from OAR 690-008-0001 in the Division 512 rules and apply it in a management context.
- Prioritize voluntary reductions in groundwater use through the development of voluntary agreements in this Subarea rather than through regulatory action. Encourage and incentivize voluntary groundwater reductions of 10-15% through the rules.
- Set a threshold by which regulatory action would be triggered when a median of wells in this Subarea exceed “reasonably stable” conditions (e.g., exceed 25 ft or 0.6 ft/yr of decline). Do not pursue regulation until the thresholds have been met.
- Allow groundwater levels to stabilize at or around “reasonably stable” conditions (e.g., around 25 feet of decline). Adjust the permissible total withdrawal as necessary to reflect these thresholds.
- Actively partner with groundwater users to monitor groundwater levels and groundwater use and rebuild credibility and trust in Department data and science.

According to ORS 537.525 and ORS 536.220 the Department is required by law to protect existing water rights unless except when, under certain conditions, the public welfare, safety and health require otherwise. The proposed rules will violate existing policies and will actually be detrimental to the public welfare, safety and health because of the significant impacts to individual farms, including ours, as well as the broader community.

We participated in the Community Groundwater Planning Process for many years and provided input from an irrigators' perspective to The Plan that was developed. During that process OWRD attended those meetings and appeared to be interested in that process and encouraging inclusion of the Community Solutions and recommendations from that planning process in the development of the 512 Rules. We do not see that that is happening and strongly encourage the Department to relook at that Plan and recognize the significant investment of time and process that went into it's development, in anticipation of including those recommendations in the Rulemaking Process.

ORS 536.525 also clearly states a preference for voluntary joint action with groundwater users prior to relying on the police power of the state. We urge the Department to honor previous commitments and existing statutory requirements and first meaningfully pursue voluntary joint action with groundwater users in the Silvies Subarea prior to pursuing punitive regulatory action. We are committed to maintaining our way of life and sustainably managing groundwater resources for current and future generations and believe that is possible in this Subarea.

For most of the rulemaking process the Department was proposing no reductions in the Silvies area. The Department changed its approach relatively late in the rulemaking process and is now requiring that the entire basin reach "durably stable" conditions (0 ft/yr of decline) within 30 years. The terminology and concept of "durably stable" came to the table at the last minute and is not supported by the Department's own definitions or any ORS.

The Department is currently proposing a 15% regulatory reduction from current estimated pumpage in the Silvies Subarea despite the fact that groundwater conditions meet the definition of "reasonably stable." This level of reduction is not warranted for this Subarea based on existing policies and existing data.

Groundwater levels in the Silvies Subarea are reasonably stable as per the definition in OAR 690-008-0001. The Department's own data shows that declines throughout this area have been minimal. The Groundwater Level Trends analysis performed in 2024 show that the median overall decline is -2.6 ft and the median rate of decline is -0.3 ft/yr. Notably, these trends are well within the range of what is considered reasonably stable by the Department. Data recently collected by groundwater users in the area are showing that groundwater levels in portions of the basin are stable depending on the timeframe used for analysis and some wells have even risen in recent years. No available data show that this area has met the criteria for designation as a critical groundwater area. There are no wells that have met the Department's threshold for declining excessively or excessively declined.

We recognize that the Department has concerning data about parts of the Northeast-Crane area and has identified areas of decline that need to be addressed before they reach critical conditions. We also understand that the Silvies Subarea is a recharge area for the Northeast-Crane area. That being said, if the basin is treated as "one groundwater reservoir" as the Department suggests, the whole basin is not overdrawn by the Department's own definition because estimated pumpage is

less than recharge. If the area is treated separately, which we believe it should be, the groundwater study shows that this “region” is overdrawn by only -2,700 afy when measured against current pumpage. Fortunately, this is far less than the -96,454 afy of overuse that would occur if all groundwater rights had been fully developed. We commend the Department for focusing attention and effort on our basin before things could worsen, but disagree with the severity of the Department’s proposed approach.

Groundwater users have been responsibly using water within the terms and conditions of their permits for decades. We have been responsibly using water within the terms and conditions of our permit since we purchased this farm in 2022. The Department previously made a determination in this area that groundwater is available, within the capacity of the resource, and that groundwater use was in the public interest as required by ORS 537.621. We urge the Department and Commission to adhere to existing statutes and rules rather than pursuing unprecedented groundwater reductions through regulations that lack a defensible legal and technical basis.

While we do not agree with inclusion of this Silvies Subarea in the Critical Groundwater Area boundary, if it is included in the Critical Groundwater Area, then existing groundwater users should be protected and the permissible total withdrawal should be set at an updated estimate of current pumpage. We do not agree that reducing groundwater use via regulation is warranted. Within this area we believe that voluntary reductions are possible and beneficial and should be the preferred approach rather than regulation.

Many groundwater users within this area, including ourselves, have proactively implemented water conservation measures and have invested in measures to responsibly and sustainably use groundwater in this Subarea. Conservation should continue to be encouraged and supported within this Subarea rather than pitting groundwater users against one another or creating an atmosphere of uncertainty that will stifle innovation.

When and if groundwater levels are no longer considered to be “reasonably stable” then the rules should specify the proposed regulatory actions that could be taken once that threshold is met. This backstop will incentivize joint action to prevent groundwater conditions from reaching that point.

Within this Subarea, we are not aware of homes or stockwater wells that have lost access to groundwater due to declining groundwater levels, except for very shallow wells or wells with well construction issues.

These proposed changes would adhere to existing law and policy and minimize economic impacts as required by law while preserving public welfare, safety, and health and ensuring adequate and safe supplies of groundwater for human consumption while also conserving maximum supplies of groundwater for agricultural and all other beneficial uses consistent with ORS 537.525.

We appreciate the opportunity to comment and look forward to partnering with the Department on building a sustainable groundwater future for the Silvies Subarea and all of the Harney Basin.



August 13, 2025

Merissa A. Moeller
760 SW Ninth Avenue, Suite 3000
Portland, OR 97205
D. 503.294.9455
merissa.moeller@stoel.com

BY EMAIL DELIVERY

Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301
WRD_DL_rule- coordinator@water.oregon.gov

Re: Riddle Ranch Inc. Comments on Division 512 Proposed Rules

Dear Mr. Mainz,

Enclosed, please find written comments on the Division 512 Proposed Rules that we are submitting on behalf of Riddle Ranch Inc. Thank you for your and the Department's consideration.

Sincerely,

A handwritten signature in blue ink that reads 'Merissa A. Moeller'.

Merissa A. Moeller

Enclosure

cc: Joe C. Matteo
Dan Otley

August 13, 2025

Riddle Ranch Inc.
40710 N. Diamond Lane
Diamond, OR 97722

Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301
WRD_DL_rule- coordinator@water.oregon.gov

RE: Riddle Ranch Inc. Comments on Division 512 Proposed Rules

I. INTRODUCTION

My name is Dan Otley. I am the Vice President of Riddle Ranch Inc. (“**Riddle Ranch**”). I am submitting these comments on behalf of myself and my family members Katie Otley, Larry Otley, Susan Otley, Bryce Otley, Kacie Otley, and Casey Otley, who also live on and help operate Riddle Ranch. Riddle Ranch is a family-owned and operated cattle ranch. Our family has lived and ranched in Harney County, Oregon for 138 years and seven generations. Several of our wells and pivots are located near Windy Point, within the proposed boundary of the Division 512 Critical Ground Water Area (“**CGWA**”). We irrigate from these wells to grow hay to feed livestock during the winter months.

My family and I have been following the Division 512 Rulemaking (the “**Rulemaking**”) for the past two years. We are very concerned about the financial impacts on our family business if our wells are included within the CGWA. If we are forced to stop irrigating from our wells within the CGWA, we will lose approximately \$210,000 a year and be forced to reduce our herd size by 100 head or more of cattle.

We are also concerned about the subarea boundaries proposed by the Oregon Water Resources Department (the “**Department**” or “**OWRD**”) in its most recent May 2025 proposed subarea map. Until recently, we understood that our wells would probably be included in the Windy Point subarea. Although we are generally concerned about our wells being included in the CGWA at all, the prior subarea proposal made more sense than the Department’s most recent proposal, as groundwater in the Windy Point area is different from groundwater to the north in the former proposed Crane and Crane-Buchanan subareas. Our wells and our neighbors’ wells do not have the same recharge issues as wells to the north. The behavior of our wells and groundwater is much more similar to our neighbors to the south in the Lower Blitzen-Voltage subarea.

We are providing formal written comments on the Department’s proposed rules (the “**Proposed Rules**”) and requesting that OWRD revisit and revise its Proposed Rules consistently with these comments before issuing final Division 512 rules (the “**Final Rules**”).

II. DISCUSSION

A. The CGWA boundary should be moved to exclude our wells consistent with state law.

Under state law, the Water Resources Commission (“**Commission**”) may designate a CGWA only if certain hydrological criteria are met, including that “[g]round water levels in the area in question are declining or have declined excessively,” ORS 537.730(1)(a), or that “[t]he available ground water supply in the area in question is being or is about to be overdrawn,” ORS 537.730(1)(e). If applicable criteria are met, “exterior boundaries of a critical groundwater area” must be based on “the presence of physical natural boundaries, hydrological conditions, or recharge or discharge areas” when possible. OAR 690-010-0130(3)(a); ORS 537.735(1)(a). Considering these requirements, our wells should not be placed within the CGWA boundary at all.

First, our wells are located in the United States Geological Survey (“**USGS**”) Water Budget Southern Region (“**USGS Southern Region**”). As explained in Section II.B.1 below, the USGS Southern Region does not have the overdraw issues that are characteristic of the USGS Water Budget Northern and Western Regions (respectively, the “**USGS Northern Region**” and the “**USGS Western Region**”). Because our wells are located in the USGS Southern Region, our wells do not have recharge issues that are typical of other wells proposed for inclusion in the CGWA. Likewise, as explained in Section II.B.2 below, our wells were originally proposed for inclusion in the Windy Point subarea that was not being considered for curtailment and that the Department explicitly considered to be a “low priority” for regulation. Our wells’ location within the USGS Southern Region and the originally proposed “low priority” Windy Point subarea demonstrates that, based on “hydrological conditions” and “recharge areas,” our wells should be excluded from the CGWA entirely, because the area where our wells are located does not meet the criteria for designation of a CGWA under ORS 537.730.

Second, based on the requirements of OAR 690-010-0130(3)(a), the physical proximity of our wells to wells outside of the CGWA illustrates that our wells do not belong within the CGWA. The Proposed Rules exclude wells approximately 2.5 miles southeast of our wells from the CGWA boundary that are (1) remarkably close to our wells and (2) also within the USGS Southern Region. *See* Exhibit A. The physical characteristics and locations of our wells are similar to those nearby wells that the Department has proposed to exclude from the CGWA. Therefore, according to state law, the exterior boundary of the CGWA should be drawn to exclude our wells as well.

Finally, the proposed inclusion of our wells in the CGWA is counterintuitive because our wells are not contributing to the drawdown concerns that the Proposed Rules aim to address. The time and resources spent regulating our wells will not help achieve the goals of the Rulemaking. Instead, regulating our wells will cause the Department to needlessly expend time, money, and resources that could otherwise be spent regulating wells that *are* causing serious groundwater decline issues.

For these reasons, we request that the Department redraw the CGWA boundary in the Final Rules to exclude our wells from the CGWA entirely.

B. Alternatively, the proposed boundary line between the Lower Blitzen-Voltage subarea and Northeast-Crane subarea should be relocated to match the boundary line between the USGS Northern Region and USGS Southern Region.

The Department's current proposed boundary between the Lower Blitzen-Voltage and Northeast-Crane subareas is arbitrary, inconsistent with sound science, and contrary to the requirements of OAR 690-010-0130(3)(c).

Based on the *Evaluation of Division 512 RAC Alternate PTW Scenario*, we expect that additional modeling may lead to a significantly lower permissible total withdrawal ("PTW") in the Lower Blitzen-Voltage subarea than the Northeast-Crane subarea, which is consistent with this subarea being located in the USGS Southern Region that does not have drawdown concerns.¹ We request that OWRD adjust the proposed boundary line between the Lower Blitzen-Voltage subarea and Northeast-Crane subarea, as detailed further below, to prevent this unreasonable outcome. If OWRD does not revise the Northeast-Crane and Lower Blitzen-Voltage boundary consistent with the USGS Northern and Southern Region boundary, it will not only lead to arbitrary and unscientific outcomes, as explained below, but the increased likelihood of curtailment for our wells will create devastating impacts for our ranch's operations, our livelihoods, and our family's legacy.

1. USGS data demonstrate that our wells are more like wells in the proposed Lower Blitzen-Voltage subarea than wells in the proposed Northeast-Crane subarea.

The proposal to include our wells within the Northeast-Crane subarea is inconsistent with USGS data and the Department's treatment of similarly situated wells. There are relatively few wells, including ours, south of Windy Point and within OWRD's proposed Northeast-Crane subarea. However, *all* wells in the Northeast-Crane subarea that are south of Windy Point are located in the USGS Southern Region. *See* Exhibit A. Meanwhile, the rest (and vast majority) of the wells proposed for inclusion in the Northeast-Crane subarea are within the USGS Northern Region. When examining the Harney Basin through the lens of the Northern, Southern, and Western USGS Regions, OWRD previously determined that, "[i]n two out of the three water budget regions the available groundwater supply is being or is about to be overdrawn (537.730(1)(e))."² Importantly, the third region, the USGS Southern Region, includes the area where our wells are located and is not overdrawn or facing recharge issues like the other two regions.³ The proposed Lower Blitzen-Voltage subarea is located almost entirely within the USGS Southern Region.⁴ Accordingly, including wells from the USGS Southern Region in the

¹ Memorandum from Ben Scandella, OWRD, to Jason Spriet (May 30, 2025), <https://www.oregon.gov/owrd/Documents/Evaluation%20of%20RAC%20Alternate%20PTWs%20Memo%2020250530.pdf>.

² Darrick E. Boschmann, OWRD, *Groundwater Report for the Harney Basin Critical Groundwater Area Rulemaking* at 14 (June 17, 2024), <https://www.oregon.gov/owrd/Documents/Groundwater%20Report%20for%20the%20Harney%20Basin%20CGWA%20Rulemaking.pdf>.

³ *See id.* at Table 5 (attached hereto as Exhibit B).

⁴ OWRD, *Division 512 Rulemaking, Harney Basin Critical Groundwater Area Process Interactive Map*, https://experience.arcgis.com/experience/2db5f0d5e50142138304801e09b72fb7/#data_s=id%3A_dataSource_2-

Northeast-Crane subarea instead of the Lower Blitzen-Voltage subarea would be arbitrary and inconsistent with USGS data upon which the Department has relied.

Relying on the USGS data is appropriate because the USGS regions were developed based on hydrological conditions.⁵ By contrast, the Department’s proposed boundary between the Northeast-Crane and Lower Blitzen-Voltage subareas ignores the regulatory requirement that subarea boundaries be consistent with “the presence of physical natural boundaries, hydrological conditions, or recharge or discharge areas.” See OAR 690-010-0130(3)(c) (citing OAR 690-010-0130(3)(a) and explaining that subarea boundaries must be determined in the same manner as the exterior boundaries of a critical groundwater area). Relocating the proposed Lower Blitzen-Voltage and Northeast-Crane boundary line to the boundary between the Northern and Southern USGS Regions is consistent with both science and state law.

Finally, as the Department explained in previous Rule Advisory Committee (“RAC”) meetings, subareas are intended to group wells together that “behave similarly.”⁶ Our wells do not “behave similarly” to the wells in the Northeast-Crane subarea. Namely, they do not have the same shortage and drawdown issues as wells in the Northeast-Crane subarea. A review of the Department’s *Groundwater Level Trends in the Proposed Harney Basin Critical Groundwater Area – Summary Statistics by Subarea*⁷ demonstrates that the wells in the original Windy Point subarea, which included our wells, behave very similarly to the wells in the Lower Blitzen-Voltage subarea compared to wells in the former Lawen, Rock Creek, North Harney, Crane, and Crane-Buchanan subareas, subareas which are now a part of the Northeast-Crane subarea. See Exhibit C.⁸ Meanwhile, our wells are much closer to other wells in the Lower Blitzen-Voltage subarea than they are to wells in the Northeast-Crane subarea, and our wells are physically separated from the Northeast-Crane subarea by Windy Point. See Exhibit A. The Department’s proposal to include our wells in the Northeast-Crane subarea is arbitrary and contrary to the Department’s overarching principle that subareas should group wells together that “behave similarly.”

2. Relocating the subarea boundary line to Windy Point is consistent with the Department’s original proposal at the outset of the Rulemaking.

Under the Department’s original subarea proposal, our wells would have been located within the Windy Point subarea. 2023 RAC resources reflect that the Windy Point subarea and the Lower Blitzen-Voltage subarea were “low priority” subareas for the Department from the outset of the Rulemaking, while the originally proposed Crane subarea was a “high priority”

[17981ba7dfa-layer-39-1966a024f1c-layer-63%3A3](#) (last visited August 13, 2025) (noting that there is one irrigation well in the Lower Blitzen-Voltage subarea that is within the USGS Western Region).

⁵ Boschmann, *supra* n.2, at 12 (“In the lowlands, regions are based on presumed groundwater-flow paths during 2018 hydrologic conditions.”).

⁶ OWRD, *Summary of Division 512 Rules Advisory Committee Meeting 12* at 5 (Jan. 22, 2025 & Jan. 29, 2025), <https://www.oregon.gov/owrd/Documents/RAC%2012%20Meeting%20Summary.pdf>.

⁷ Darrick E. Boschmann, OWRD (last updated July 23, 2024), <https://www.oregon.gov/owrd/Documents/Groundwater%20Level%20Trends%20in%20the%20Proposed%20Harney%20Basin%20Critical%20Groundwater%20Area%2020240723.pdf>.

⁸ See *id.* at 8-9, Table 2 & Figure 2 (attached hereto as Exhibit C).

subarea.⁹ RAC materials indicate that “high priority subareas” were the Department’s “focus for reducing use.”¹⁰ For example, the *Explanation of Draft Harney Basin Critical Groundwater Area Map* from the November 29, 2023 RAC meeting stated that “while there are 15 proposed subareas, the Department **does not intend to propose curtailment in all of them.**” (Emphasis added.)¹¹ Meanwhile, if the Proposed Rules are implemented, the Northeast-Crane subarea will be one of the subareas with the most reduction in PTW.

Said differently, at the outset of the Rulemaking, the Department’s position was that the Windy Point and Lower Blitzen-Voltage subareas were low priority areas that were not intended to be curtailed.¹² The Department maintained this position throughout 18 months of RAC meetings, only to change course at the eleventh hour and propose including our wells in the Northeast-Crane subarea without any explanation. It is arbitrary and unreasonable for the Department to shift its position overnight, without citing any scientific basis, and propose to relocate our wells from a “low priority” subarea where, at one point, curtailment was not even contemplated, to a high priority subarea that is now anticipated to see significant curtailment.

Furthermore, including our wells in the Northeast-Crane subarea would be counterproductive to the Department’s efforts to stabilize groundwater levels throughout the Harney Basin. As explained in Section II.B.1 above, our wells are within the USGS Southern Region, which is not overdrawn. In other words, our wells are not contributing to the drawdown concerns the Rulemaking aims to address. Attempting to solve drawdown issues in the Northeast-Crane subarea through wells like ours is a highly flawed approach. It would almost certainly result in significant regulatory burdens on landowners like me and my family while very likely providing little to no commensurate benefit for overall groundwater levels in the Northeast-Crane subarea.

In short, after OWRD took the scientifically supportable position that Windy Point wells are not plagued with the same problems as wells in high priority subareas, it has now arbitrarily proposed to move the boundaries in a manner that treats our wells as equivalent to wells in high priority subareas. If the Department does not decide to exclude our wells from the CGWA entirely, as proposed above, OWRD must, at minimum, move the boundary between the Lower Blitzen-Voltage subarea and the Northeast-Crane subarea north to the boundary between the USGS Northern and Southern Regions. This boundary adjustment is consistent with the Department’s original analysis in 2023 that our wells were a “low priority” to resolve the basin’s larger groundwater concerns.

⁹ See OWRD, *Division 512 Rulemaking: Ground Water Regulation for the Malheur Lake Administrative Basin*, slides 41-42 (Nov. 29, 2023) (“RAC Meeting #4 Slides”), <https://www.oregon.gov/owrd/Documents/Division%20512%20RAC%20Number%204%20Presentation%20.pdf>.

¹⁰ *Id.* at slide 45.

¹¹ Available at <https://www.oregon.gov/owrd/Documents/Explanation%20of%20Subareas%20Map.pdf> (last visited July 31, 2025).

¹² See RAC Meeting #4 Slides, *supra* n.9, at slide 45 (explaining that (1) high priority subareas would “be the focus for reducing use”; (2) listing voluntary reduction and regulatory curtailment as means for reducing use in high priority subareas; and (3) listing only voluntary reduction, not curtailment, as an approach for the low priority subareas).

3. The boundary between the Lower Blitzen-Voltage and the Northeast-Crane subareas must be moved to Windy Point (i.e., the boundary between the Northern and Southern USGS Regions) to prevent a nonsensical and unscientific outcome.

Given the lack of hydrological justification and scientific reasoning for including wells south of Windy Point in the Northeast-Crane subarea, it appears that OWRD haphazardly used the former proposed boundary between the (now nonexistent) Windy Point subarea and the Lower Blitzen-Voltage subarea when forming the Northeast-Crane subarea without considering its own processes and procedures for defining subarea boundaries. *See* Exhibit D. Instead of following boundaries supported by science (e.g., the USGS Northern and Southern Region boundary), this portion of the proposed boundary follows Public Land Survey System section lines. *See* Exhibit E.

Given the presence of natural features (i.e., hydrology, recharge areas, and physical natural boundaries) available to develop subarea boundaries in this Rulemaking, the Department's use of the administrative PLSS section lines as the boundary between the Lower Blitzen-Voltage subarea and the Northeast-Crane subarea is impermissible. The Department's rules require that CGWAs and CGWA subareas be defined by "the presence of physical natural boundaries, hydrological conditions, or recharge or discharge areas" when possible. OAR 690-010-0130(a),(c). The Department may use alternative "[a]dministrative[]" boundaries only when the "affected area * * * does not have boundaries defined by natural features." OAR 690-010-0130(3)(b). Both Windy Point and the corresponding USGS Northern and Southern Region boundary line reflect "physical natural boundaries" and "hydrological conditions" that the Department must respect in drawing its subarea boundary line.

In short, while the Rulemaking is full of contentious decisions, the subarea boundary adjustment requested in these comments should not be controversial. Redrawing the Northeast-Crane / Lower-Blitzen-Voltage subarea boundary at Windy Point is consistent with USGS science, the Department's position throughout the vast majority of the RAC process, and the Department's ultimate goal for the Rulemaking to regulate "high priority" wells that can meaningfully support stabilization of the groundwater resource throughout the basin.

C. We request that OWRD further clarify the proposed mechanics of voluntary agreements, including by outlining a clear process for the Department or Commission to approve voluntary agreements.

Throughout the RAC and rulemaking process, the Department has taken the position that voluntary agreements between landowners may provide an alternative mechanism to alleviate regulatory burdens associated with the CGWA designation. Based on these commitments from the Department, landowners throughout the basin are already investing significant resources attempting to negotiate voluntary agreements. However, the lack of discussion related to voluntary agreements in the Proposed Rules creates significant uncertainty for well owners who are interested in participating in voluntary agreements. The Department has suggested that voluntary agreements may be an important mechanism for landowners in the CGWA, but it is extremely unclear from the Proposed Rules and guidance prepared by the Department what types

of voluntary agreements may even be approvable. At minimum, we request that the Department clarify the following:

- (1) What would participating landowners need to demonstrate to have a voluntary agreement approved?
- (2) The *Proposed Guidance for Voluntary Agreements Among Groundwater Users from the Same Groundwater Reservoir* dated October 25, 2024 (the “**Draft Guidance**”)¹³ states that the “[t]he minimum level of participation in a voluntary agreement must consist of water right holders whose total rights represent at least 30% of the total allocated Permissible Total Withdrawal (PTW) or Target for Voluntary Reduction (TVR).” Please clarify whether the 30% of PTW requirement for voluntary agreements means:
 - a. 30% PTW of the subarea(s) that a voluntary agreement falls within;
 - b. 30% of the PTW of any geographic area proposed for a voluntary agreement;
 - or
 - c. something else.
- (3) If a voluntary agreement crosses subarea boundaries, how will OWRD determine whether the 30% PTW requirement referenced in the Draft Guidance is satisfied?
- (4) Earlier draft guidance documents did not include a 30% PTW requirement for voluntary agreements.¹⁴ At minimum, the Department must provide an explanation regarding how the Department reached the 30% PTW explanation.
- (5) Will the Department/Commission approve voluntary agreements before the rules are finalized in December?

D. Voluntary agreements should be allowed to cross subarea boundaries.

Department staff have previously indicated that voluntary agreements across subarea boundaries may be permissible; however, the Proposed Rules do not explicitly confirm that approach and the Draft Guidance does not clearly explain how a multi-subarea voluntary agreement would work. If the Department is sincere in its commitment to support voluntary agreements, then further clarification is needed on this point.

Allowing voluntary agreements to include wells from more than one subarea is essential to provide just and equitable support to landowners attempting to work within the Department’s newly proposed administrative boundaries. Riddle Ranch’s physical location within the CGWA highlights this necessity. For example, if the Department chooses not to relocate the proposed

¹³ Memorandum from OWRD to Div. 512 Harney Basin Rules Advisory Comm. (Oct. 25, 2024), <https://www.oregon.gov/owrd/Documents/Guidance%20for%20Prospective%20Voluntary%20Agreements.pdf>.

¹⁴ See Memorandum from OWRD to Div. 512 Harney Basin Rules Advisory Comm. (July 24, 2024), <https://www.oregon.gov/owrd/Documents/Guidance%20for%20Prospective%20Voluntary%20Agreements%20-%20Draft%201.pdf>; Memorandum from OWRD to Div. 512 Harney Basin Rules Advisory Comm. (Sept. 27, 2024), <https://www.oregon.gov/owrd/Documents/Guidance%20for%20Prospective%20Voluntary%20Agreements%20-%202nd%20Draft.pdf>.

Northeast-Crane / Lower Blitzen-Voltage subarea boundary line as requested in these comments, Riddle Ranch may want or need flexibility to enter into a voluntary agreement with similarly situated neighbors who happen to be located in a different subarea. If a voluntary agreement across subareas is not permissible (either as a legal matter or as a practical one because the Commission ultimately will not approve such an agreement), then Riddle Ranch may find that its only option is to enter into a voluntary agreement with water right holders in the Northeast-Crane subarea whose wells do not “behave similarly.” Thus, Riddle Ranch may find that its only option to avoid curtailment by OWRD is to enter a voluntary agreement where Riddle Ranch is one of the only well owners without recharge issues. This could unfairly lead to Riddle Ranch compensating, by reducing its use, for problematic wells that are impacting groundwater levels or, alternatively, having no meaningful option to enter into a voluntary agreement at all.

If OWRD retains its proposed arbitrary boundary between the Lower Blitzen-Voltage and Northeast-Crane subareas, then voluntary agreements must be allowed to include wells from multiple subareas. If voluntary agreements can only be made within the same subarea, then it is critical that the Lower Blitzen-Voltage and Northeast-Crane boundary be moved to Windy Point consistent with sound science, logic, and OAR 690-010-0130(3)(c) as explained in Section II.B above.

E. OWRD should revisit its modeling and related proposal to account for site-specific details.

OWRD’s modeling and proposals related to its modeling were made at an exceedingly high level that provided a coarse and zoomed-out scale that does not account for the nuance and site-specific details of groundwater activity within the region. The proposal to include our wells in the Northeast-Crane subarea despite their location within the USGS Southern Region is one example of this shortcoming. Accordingly, OWRD’s coarse approach to its modeling and proposals should be corrected. When making adaptive management decisions and other determinations to implement the Proposed Rules, OWRD should take an approach that is more granular than simply regulating wells at the subarea level.

OWRD can take a more nuanced approach by employing the use of more wells and being transparent about which wells are used to make determinations regarding groundwater activity. Utilizing more wells in each subarea will help paint a more holistic picture of groundwater dynamics across various portions of the CGWA. For example, when OWRD makes adaptive management decisions under OAR 690-512-0080 of the Proposed Rules, it should use as many wells as possible to evaluate water levels throughout the CGWA. This approach is not only more transparent, but it will allow for more targeted reductions in areas of concern, while limiting unnecessary reductions in areas of little to no concern.

F. The Department should clarify and revisit its proposal for reductions in the Lower Blitzen-Voltage subarea.

In the Proposed Rules, the Lower Blitzen-Voltage subarea faces one of the highest proposed reductions for any subarea. Given the lack of recharge issues in the Lower Blitzen-Voltage subarea, the proposal to impose significant reductions in this subarea does not make sense and is inconsistent with scientific data relied upon by the Department. As discussed in Section II.B.1, the Lower Blitzen-Voltage subarea lies almost entirely within the USGS Southern

Region, and the USGS Southern Region is the only USGS Region that does not have drawdown issues.

G. More commitments and support from the State of Oregon are needed to mitigate economic impacts on landowners.

Ultimately, the Proposed Rules aim to address historic overallocation of groundwater by the State of Oregon. The State, therefore, must share in the burden of the new Proposed Rules, including by providing funding for programs that encourage and help irrigators adopt more efficient irrigation systems. Meaningful commitments from the State are needed to address the economic realities of the Proposed Rules and their impending impacts on small businesses and individuals throughout the Harney Basin. Examples of meaningful commitments from the State could include the following:

First, the Proposed Rules would impose a 2.5 ac/ft duty throughout the basin. Riddle Ranch supports this proposal as a reasonable approach by the Department. However, further proactive support from the Department is needed to help irrigators develop more efficient irrigation systems to comply with this duty and promote water conservation efforts. Specifically, the Department should develop a program that provides funding and resources to irrigators seeking to develop more efficient irrigation systems.

Second, OWRD could encourage voluntary reductions by creating a program that provides meaningful compensation to landowners who have their water rights curtailed as a part of the Rulemaking. The curtailment of water rights in the region will create widespread negative economic impacts, and implementing a compensation program will help prevent the risk of a catastrophic economic fallout from the curtailment.

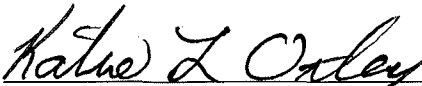
Third, OWRD should also create a program that allows water rights holders to voluntarily forfeit their water rights in return for meaningful compensation. This will encourage voluntary reductions in use which would benefit groundwater levels, and the voluntary reductions of some landowners would reduce the risk of curtailment for other landowners that wish to continue their operations.

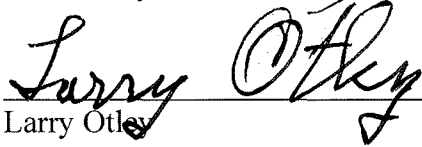
III. CONCLUSION

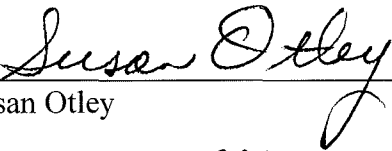
Thank you for the opportunity to provide these comments. The Proposed Rules will have very real impacts on our family and our business. We appreciate the Department's consideration and welcome the opportunity to provide additional information to assist the Department in revising and finalizing its Proposed Rules.

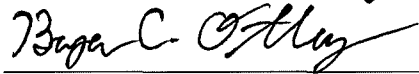
Sincerely,


Dan Otley


Katie Otley


Larry Otley


Susan Otley


Bryce Otley


Kacie Otley

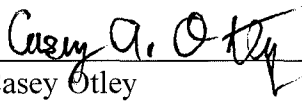

Casey Otley

Exhibit A

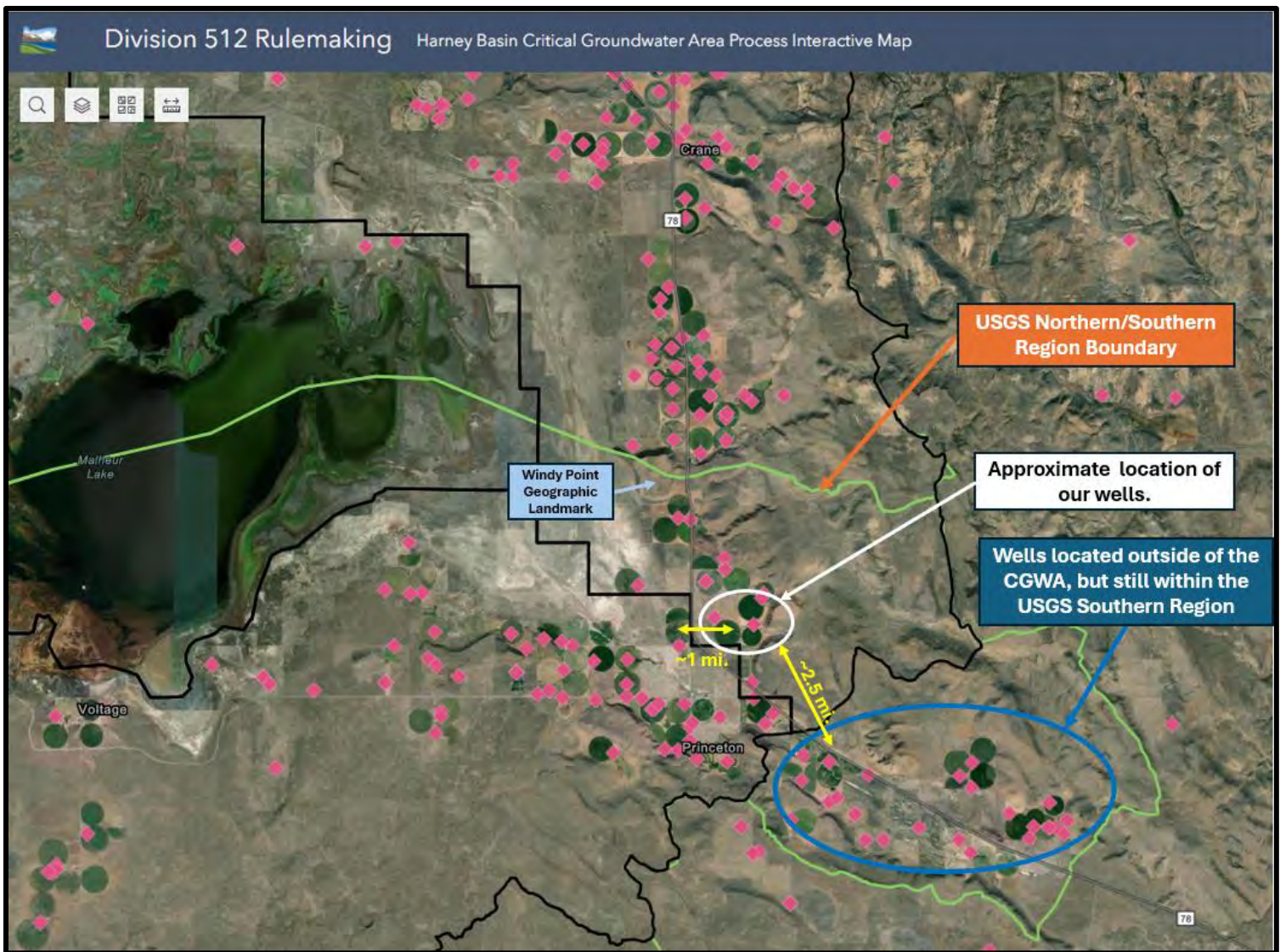


Exhibit A

Exhibit B

Table 5: Mean annual recharge, mean annual groundwater pumpage, and authorized irrigation use by water budget region. Regions and lowland boundary are shown on Figure 5.

Water Budget Region	Mean annual lowland recharge (acre-feet)*	2017-2018 mean groundwater pumpage (acre-feet)**	Difference between lowland recharge and 2017-18 mean pumpage (acre-feet)	Authorized use (acre-ft/yr)***	Difference between lowland recharge and authorized use (acre-feet/yr)
Northern region	78,000	80,700	-2,700	174,454	-96,454
Southern region	48,000	21,600	26,400	37,443	10,557
Western region	47,000	42,500	4,500	65,204	-18,204
Harney Basin	173,000	144,800	28,200	277,101	-104,101

*Estimated mean annual lowland groundwater recharge by region 1982-2016. From Garcia and others, 2022.

**From Garcia and others, 2022.

***Authorized primary and supplemental irrigation use assuming 3 acre-feet per acre duty.

Does not include municipal, commercial, and other authorized non-irrigation uses.

Does not include exempt uses.

Authorized acres calculated from mapped places of use April 5, 2024.

Exhibit C

*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=34)	-10.5	-0.5	-4.7	-4.3
Lawen (n=16)	-7.0	0.4	-2.1	-2.2
Dog Mountain (n=19)	-5.5	-0.4	-1.9	-1.6
Rock Creek (n=12)	-5.0	-0.6	-3.1	-3.3
Crane (n=20)	-4.7	1.3	-1.2	-0.9
Upper Silver Creek (n=23)	-4.4	-0.1	-0.5	-0.4
North Harney (n=7)	-4.0	-0.9	-2.3	-2.2
Crane-Buchanan (n=40)	-3.8	4.9	-1.3	-1.4
Poison Ck-Rattlesnake Ck (n=20)	-3.0	0.7	-0.9	-0.8
Windy Point (n=6)	-2.2	-0.7	-1.1	-0.9
Silvies (n=26)	-1.1	0.6	-0.3	-0.3
Lower Blitzen-Voltage (n=27)	-1.1	0.4	-0.3	-0.3
Harney Lake (n=11)	-0.9	-0.1	-0.4	-0.4
Upper Blitzen (n=4)	-0.2	0.1	0.0	0.1
Malheur Lake (n=1)	0.3	0.3	0.3	0.3

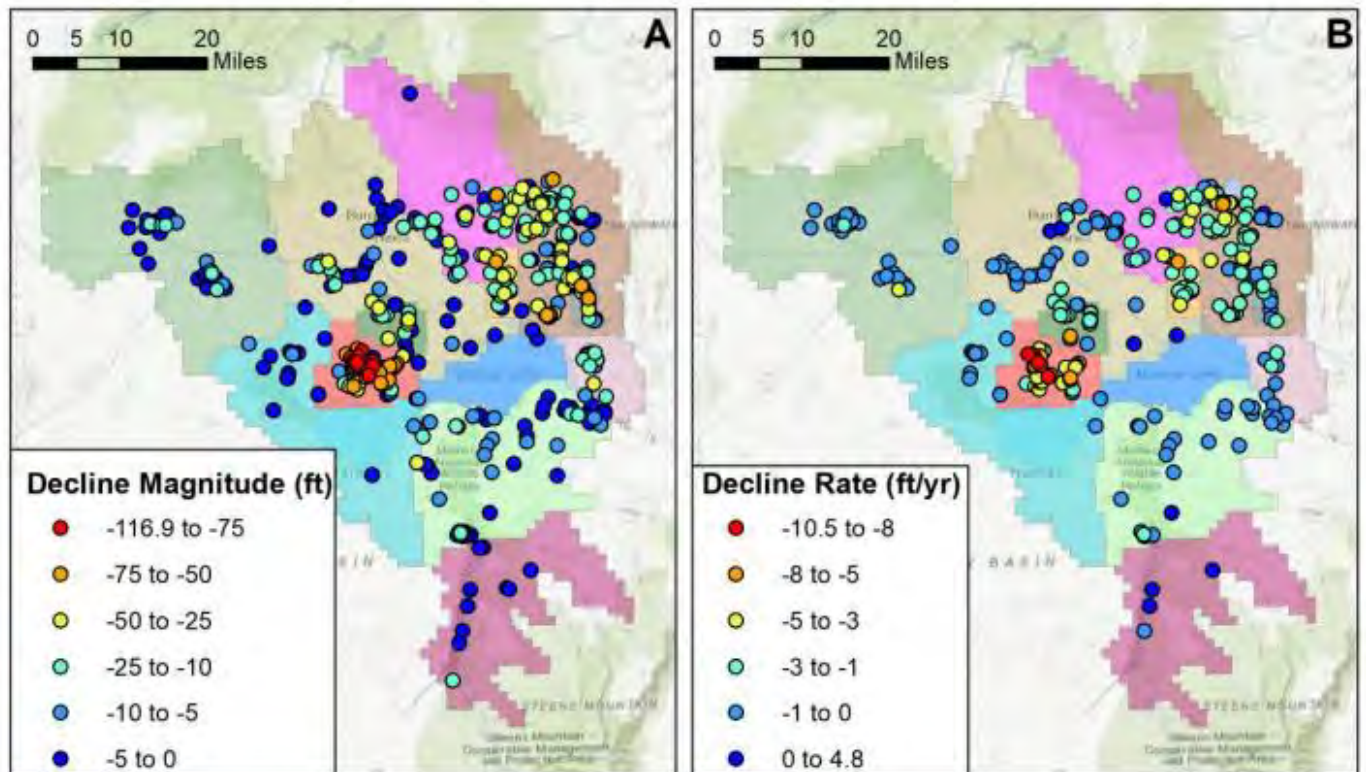


Figure 2: Maps showing the distribution of decline magnitude values (A) and decline rate values (B) across the proposed Harney Basin Critical Groundwater Area.

Exhibit D

The purple shaded area was the former Windy Point subarea, the green shaded area is the original Lower Blitzen-Voltage subarea, and the black line between them is the new boundary between the Lower Blitzen-Voltage and the Northeast-Crane subareas.

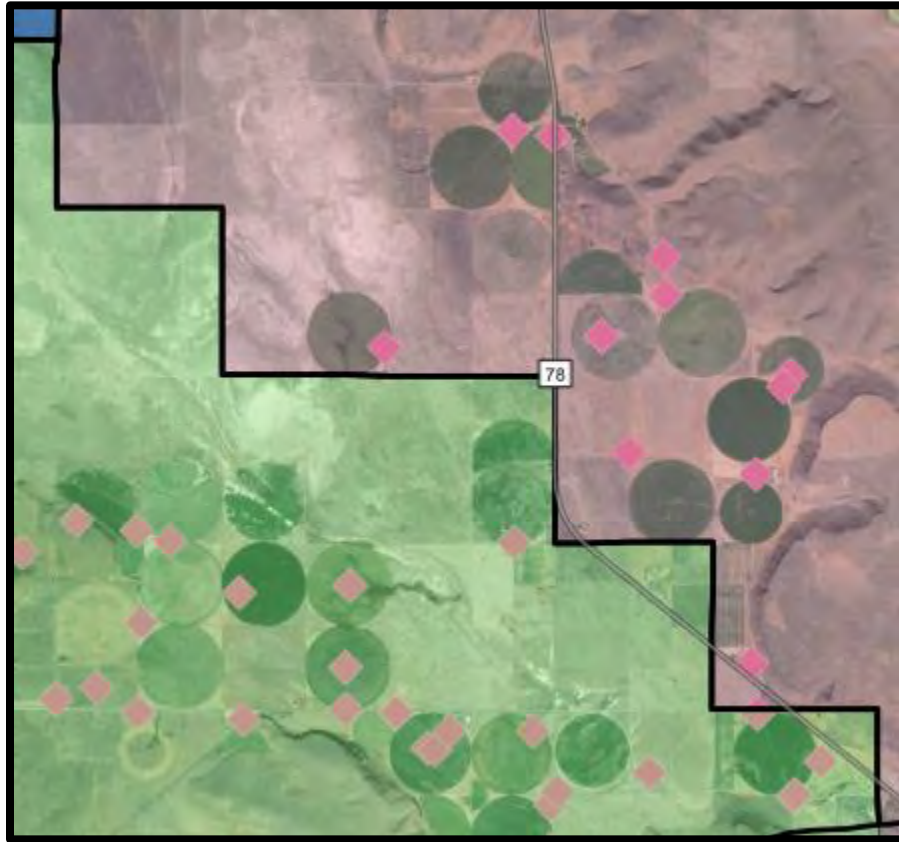


Exhibit E

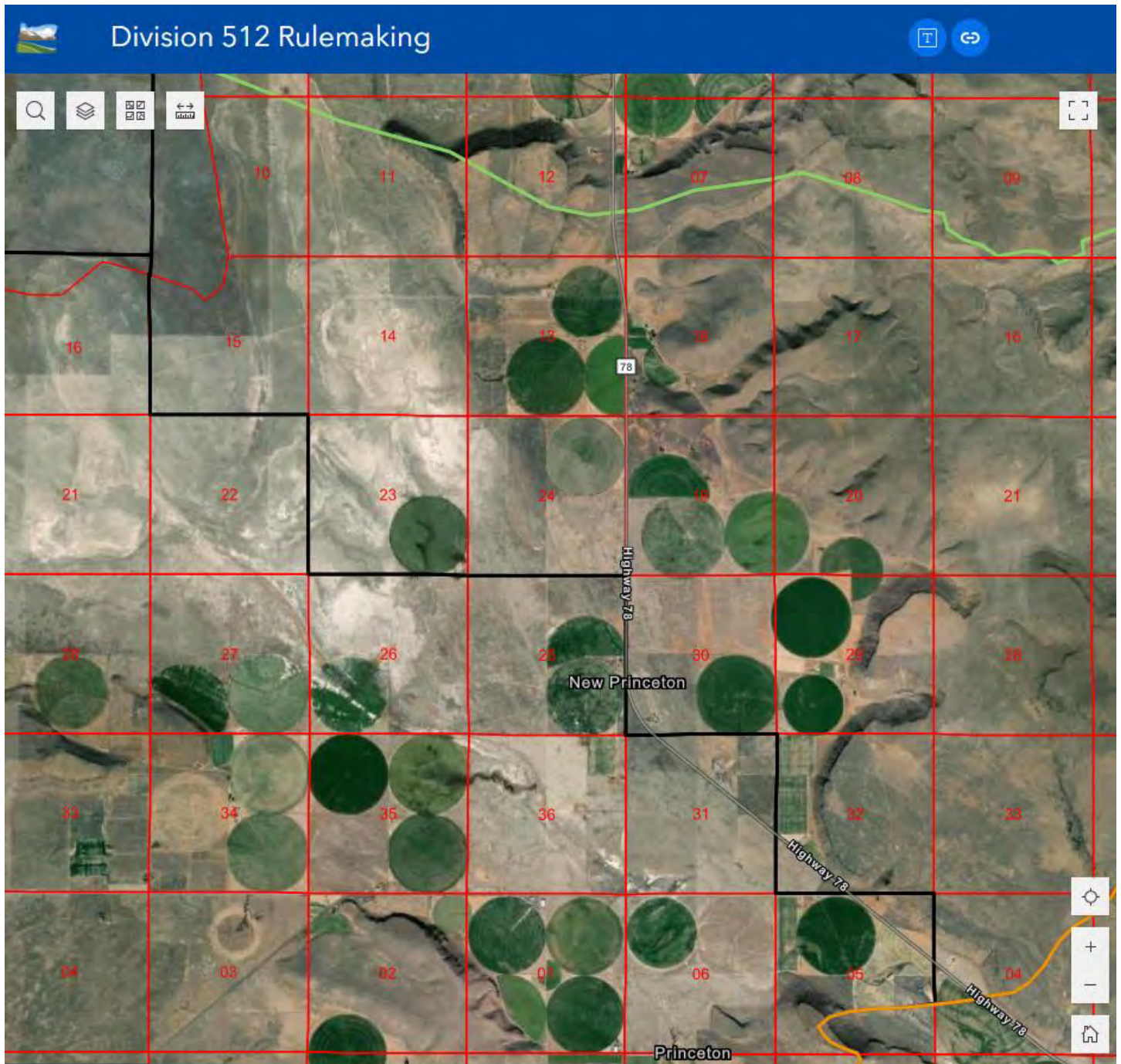


Exhibit E

MEINZ Kelly A * WRD

From: Robert Bumstead <robertgbumstead@gmail.com>
Sent: Friday, August 1, 2025 4:53 PM
To: WRD_DL_rule-coordinator
Subject: Please Adopt Strong Rules to Stabilize Groundwater Levels in the Harney Basin

You don't often get email from robertgbumstead@gmail.com. [Learn why this is important](#)

Dear Kelly Meinz,

Dear Oregon Water Resources Department,

I am writing about the rules the Oregon Water Resources Department (OWRD) recently proposed to address groundwater declines in the Harney Basin.

I support stabilizing groundwater levels in the Harney Basin, which would provide the basin with a more sustainable future and help prevent additional impacts to groundwater dependent ecosystems such as springs, streams, wetlands, and native vegetation. It would also reduce the number of existing domestic wells that would be dried up due to irrigation pumping.

I offer the following additional comments:

1. I place a high value on the springs, streams, and other groundwater dependent ecosystems in the Harney Basin, and all of the fish, wildlife, and plants that rely on these ecosystems.
2. These groundwater dependent ecosystems have already been significantly degraded from the over-pumping of groundwater. Please ensure that these systems are protected in the Division 512 rules for the Harney Basin.
3. I support the requirement in the Proposed Rules for water use measurement and reporting on all non-exempt groundwater rights in the basin.
4. OWRD should not adopt rules that would dry up additional existing domestic wells, especially when it has no viable program in place to help these residents who will lose their drinking water.
5. Please consider strengthening the Proposed Rules by adopting a tighter schedule for imposing the lower pumping amounts ("Permissible Total Withdrawals"). I encourage a shorter timeline than the proposed 30 years to achieve stable groundwater levels in light of the major declines that have already occurred, and the significant impacts to groundwater dependent ecosystems and domestic wells that this has already caused.

Thank you for your kind attention and consideration of my comments.

Sincerely,
Robert Bumstead
1770 Skyline Blvd
Eugene, OR 97403

MEINZ Kelly A * WRD

From: Rachel Shahidzadeh <rachels@water-law.com>
Sent: Wednesday, August 13, 2025 4:42 PM
To: WRD_DL_rule-coordinator
Cc: Laura Schroeder; Kelsey Seibel; Bob Long; Ian Godwin
Subject: RE: Comment on the Proposed Revised Division 512 Rules
Attachments: SLO to OWRD re Comment on the Proposed Revised Division 512 Rules.pdf

Some people who received this message don't often get email from rachels@water-law.com. [Learn why this is important](#)

Dear Ms. Mainz,

Please see the attached correspondence from our office, which was inadvertently sent to the incorrect email address.

Sincerely,

Rachel Shahidzadeh

Paralegal

Schroeder Law Offices, P.C.

1915 NE Cesar E. Chavez Blvd., Portland OR 97212

P: (503) 281-4100 | F: (877) 600-4971

From: Rachel Shahidzadeh
Sent: Wednesday, August 13, 2025 4:39 PM
To: WRD_DL_rule-coordinator@water.oregon.gov
Cc: Laura Schroeder <schroeder@water-law.com>; Kelsey Seibel <k.seibel@water-law.com>; Bob Long <Bob.Long@cwmh2o.com>; Ian Godwin <lgodwin@cwmh2o.com>
Subject: Comment on the Proposed Revised Division 512 Rules

Dear Ms. Mainz,

Attached, please find the correspondence from our office.

Please let us know if you have any difficulty opening the attachment.

Sincerely,

Rachel Shahidzadeh

Paralegal

Schroeder Law Offices, P.C.

1915 NE Cesar E. Chavez Blvd., Portland OR 97212

P: (503) 281-4100 | F: (877) 600-4971



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Laura A. Schroeder
Oregon, Idaho,
Nevada, Washington & Utah

Therese A. Ure Stix
Oregon & Nevada

Caitlin R. Skulan
Nevada & Idaho



SCHROEDER
LAW OFFICES, P.C.

William F. Schroeder
(1928 - 2015)

James Browitt
Of Counsel
Idaho & Washington

August 13, 2025

VIA ELECTRONIC MAIL

Oregon Water Resources Department
Attn: Kelly Meinz, Rule Coordinator
Email: WRD_DL_rule-coorinator@water.oregon.gov

RE: Comment for Proposed Oregon Administrative Rules Chapter 690, Division 512

Dear Ms. Meinz:

On behalf of Roaring Springs Ranch, LLC we submit this comment which includes the comments enclosed from CwM H2O for the Proposed Oregon Administrative Rules Chapter 690, Division 512, which seek to designate portions of the Malheur Lake Basin Administrative Boundaries as a Critical Groundwater Area ("CGWA") and a Serious Water Management Problem Area.

The proposed rulemaking from Oregon Water Resources Department ("OWRD") attempts to address a concern regarding declining groundwater levels in the Harney Basin; but, the proposed rulemaking fails to align with Oregon's statutory framework governing groundwater rights, particularly the principle of prior appropriation. Under Oregon water law, water rights are administered based on priority date, and any curtailment or regulation of groundwater use must be executed in accordance with this foundational legal doctrine. The steps outlined to "achieve" the "permissible total withdrawal" in the Proposed Oregon Administrative Rules Chapter 690, Division 512 appear to circumvent the statutory requirement that OWRD curtail junior water users due to a shortage before affecting senior water rights holders.

At the outset, the priority dates of the water rights should dictate how the water use is controlled. *See* ORS 537.525(1)&(2). A senior water right should not be curtailed before a junior water right is shut off under the prior appropriation doctrine adopted by the Oregon State Legislature. The increased (confusing and likely to be contested) regulation as opposed to following prior appropriation will only cause delays in implementing the program, when the statutes are already in place to regulate the water by priority date.

While priority date is considered in the schedule for reductions, this will only be within a particular subarea, not within the entire CGWA. Proposed Rule OAR 690-512-0070(2). Priority date should be the sole way to obtain the reductions based on statutory requirements since these are general areas, not a specific issue to one individual instance. *See* ORS 537.525(2).

In addition, the proposed rule will cut to the duty of all irrigation water rights to 2.5 acre-feet ("AF") for determining the "initial allotment." Proposed Rule OAR 690-512-0060(2)(a). OWRD issued the irrigation water rights as final orders. Promulgating and using an administrative rule rather than a final order contemplating a judicial procedure to change a term and condition of a water right established by a final order fails to adhere to Oregon's

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10615 Double R Boulevard, Suite 100, Reno, Nevada 89521 (775) 786-8800

www.water-law.com counsel@water-law.com

requirements of administrative and property law. Arguably, such a rule might be considered a regulatory taking requiring compensation to the affected water right holders.

As stated in the information sessions conducted by OWRD on the proposed rules, this will cause reductions to all but five of the irrigation water rights in the proposed CGWA, with no regard for priority date. This universal deduction does not protect the public welfare, health and safety in accordance with the intent and purpose of the Ground Water Act of 1955. *See* ORS 537.735(3)(d).

Lastly should OWRD proceed with its rulemaking and while Roaring Springs Ranch, LLC does not by its comments here agree that the rulemaking as proposed is required, Roaring Springs LLC requests OWRD utilize the proposed reduction from the proposed alternate scenario presented by the RAC in the July 30, 2025 Memorandum from Jason Spriet to Ben Scandella enclosed as **Exhibit 1** for the Lower Blitzen-Voltage and Northeast-Crane subareas. This will result in a larger overall reduction of water use of 37% for the entire CGWA.

In light of these concerns, we urge the Department to at minimum revise the proposed rules to:

1. Remove the 2.5 AF cut to all irrigation water rights for determining the initial allotment.
2. Ensure that any curtailment measures are preceded by a comprehensive and transparent priority date analysis.
3. Begin the curtailment process with the junior water rights in the CGWA before reaching the senior water users.
4. Utilize the proposed reduction from the RAC proposed alternate scenario outlined in Table 1 of the Memorandum enclosed as **Exhibit 1** resulting in an 18% reduction for the Lower Blitzen-Voltage subarea and a 45% reduction in the Northeast-Crane subarea with all other areas remaining the same as in the WRD proposal.

Absent these revisions, the proposed rulemaking risks undermine the legal integrity of Oregon's water rights system and exposes the Department to legal challenges from affected water right holders.

Thank you for the opportunity to provide a written comment.

Very truly yours,
SCHROEDER LAW OFFICES, P.C.



Laura A. Schroeder

LAS:kjs

Enclosures

cc: CwM H2O & Client – *via email only*

August 13, 2025

Oregon Water Resources Department
Attn: Kelly Mainz, *Rulemaking Coordinator*
725 Summer St. NE Ste A
Salem, Oregon 97301

RE: HARNEY BASIN DIVISION 512 RULESMAKING – BASIN AND SUB-BASIN BOUNDARIES

Dear OWRD staff,

CwM-H2O, LLC (CwM) presents this technical memorandum in review of the Oregon Water Resource Department's (OWRD) proposed Division 512 Rules affecting water users in the Harney Basin. OWRD's proposed new Division 512 Rules would create a Critical Groundwater Area (CGA) within the Harney Basin aimed at addressing the ongoing groundwater declines over the last several decades. Modeling by Gingerich et al., 2024, and multiple other Basin reports, indicate that continued water use at present-day rates would result in severe groundwater declines, with some areas experiencing nearly 200 feet of aquifer drawdowns over the next 75 years (Gingerich et al., 2024). CwM agrees with OWRD that conservation actions are necessary to slow or reverse these harmful trends in the Basin, though specifics of the CGA and its sub-area boundaries require additional consideration.

The proposed CGA is divided into seven sub-areas (subbasins). These are defined as “...a portion of a groundwater reservoir that shares similar hydrogeologic properties and groundwater conditions or behavior that may include similar water level elevations, seasonal and annual water level trends, and response to natural and human stresses” (Proposed Rules for Protecting Groundwater in the Harney Basin – Frequently Asked Questions, OWRD, 2025). CwM understands that the criteria considered in the definition of these subbasins include:

- **Hydraulic Gradient** defined by:
 - Groundwater level elevation contours (Gingerich and others, 2022), surface topography, USGS hydrologic units (HUCs) from the National Watershed Boundary Dataset (WBD), and Groundwater level hydrographs.
- **Groundwater Level Trends** defined by:
 - USGS and OWRD annual, quarterly, and hourly static groundwater level measurements archived in USGS and OWRD databases, water right-required groundwater level measurements and other groundwater level measurements reported to OWRD archived in OWRD database.

- **Subsurface Materials** defined by:
 - The nine hydro-stratigraphic unit determinations from Gingerich and others (2022), published geologic mapping, drillers' formation descriptions, and aquifer test and specific capacity data.

Based on these criteria, CwM believes that there are several adjustments that should be made to the overall CGA boundaries and those of the sub-areas, specifically in the Upper Blitzen and Lower Blitzen-Voltage sub-areas. The establishment of the CGA and its sub-areas will have significant impacts on water users in the Basin. The placement of those boundaries should therefore be done in a consistent and careful manner. This memo provides the technical reasoning for boundary adjustments to those proposed by OWRD under OAR 690-512 to improve consistency and equity in boundary setting during this rulemaking process.

Exclusion of Closed Basins from the CGA

The Harney Basin is a large watershed which drains eventually into either Harney Lake or Malheur Lake near the center of the Basin. These lakes are endorheic, meaning there is no surface water leaving the Basin. All surface water entering these lakes leaves either through groundwater flow or evapotranspiration, and largely through the latter (Garcia et al., 2022). However, the nearly 1,500 mi² Basin includes several other smaller endorheic, or closed, drainages.

The Riddle and Smyth Creek watersheds drain to the Barton Creek Reservoir, which is itself an endorheic lake and basin (Figure 1 – Exclusion of Closed Basins from CGA). Water that flows through Riddle and Smyth Creeks does not reach Harney or Malheur Lake, or the region defined as the Basin Lowlands by Gingerich et al., 2024, and does not contribute to hydrology of the rest of the Basin. For these reasons, Smyth Creek and the Upper and Middle Riddle Creek watersheds were excluded from the CGA boundary. However, the Lower Riddle Creek HUC-12 sub-watershed was included within the CGA boundary as part of the Lower Blitzen-Voltage sub-area. This does not appear consistent with the criteria for definition of a subbasin. OAR 690-512 rules appear to arbitrarily place the Lower Riddle Creek HUC-12 sub-watershed into the CGA when by definition it should be grouped with HUC-12 sub-watersheds draining to the Barton Lake Reservoir outside of the CGA.

The Lower Riddle Creek watershed, despite its name, drains into the Middle Riddle Creek watershed and into the Barton Lake Reservoir. It does not contribute to or participate in the hydrology of the Blitzen River watershed. If the endorheic Barton Lake Reservoir is excluded, as well as two thirds of its catchment area and surrounding Basin Uplands, the entire catchment area should be removed from the CGA.

For this reason, CwM recommends for the removal of the Lower Riddle Creek HUC-12 sub-watershed from the CGA boundary. The resulting boundary (see Figure 1) would leave the entire

physical catchment of the Donner und Blitzen River, a major surface water body and tributary of Malheur Lake, within the CGA and eliminate curtailment to the relatively few water users within the separate Barton Lake Reservoir drainage.

Arbitrary Cross-cutting CGA Boundary North of Diamond

With few exceptions, the CGA boundary follows either the physical boundaries of the Harney Basin watershed (such as the eastern edge of the Northeast-Crane sub-area or western edge of the Silver Creek sub-area) or of the internal sub-watersheds. This makes sense based on the close relationships between surface and groundwater behaviors in the Basin (Gingerich et al., 2024). A notable exception to this watershed-based boundary occurs in the Lower Blitzen-Voltage sub-area. Just north of Diamond, there is rectangular, eastward protrusion of the CGA boundary that encloses nearly 5,000 acres and does not follow natural watershed boundaries or other geologic or geographic physical boundaries (see Figure 2 – Arbitrary Cross-cutting CGA Boundary).

Based on CwM's review of regional geology, groundwater behavior, and groundwater trends (the criteria for the delineation of the CGA and sub-areas), this rectangular protrusion does not capture any unique geologic features, topographic features, or water uses. Instead, the boundary at this location cross-cuts four different HUC-12 watersheds (Lower Riddle Creek, Middle Riddle Creek, Upper Riddle Creek, and Smyth Creek), the latter three of which are excluded from the CGA other than this small protruding region (Figure 2).

CwM has been unable to determine the origin or purpose of this rectangular CGA boundary irregularity and believes it would be advantageous to remove arbitrary features that do not align with underlying hydrology or geology. The presence of this boundary feature does not follow the hydrologic or geologic reasoning for the boundaries set in the rest of the Basin. At the very least if the CGA boundaries are not adjusted to remove the Smyth and Riddle Creek watersheds entirely, the CGA boundary in this particular location should follow either:

- A) the HUC-12 watershed boundaries, as it does immediately to the north and south of this rectangular feature, or
- B) the physical contact between sedimentary deposits in the Upper Blitzen subarea and the younger volcanic deposits to the northwest (see Proposed Geology-based Boundary Adjustment on Figure 2), which correspond with changes in groundwater gradient and meet the criteria of a difference in hydro-stratigraphic units defined by Gingerich et al. (2022).

CONCLUSIONS

The delineation of the Harney Basin CGA and its sub-area boundaries and their corresponding proposed water reductions will have major impacts on the groundwater and surface water users of the region. For this reason, and to maintain scientific rigor, these boundaries should be drawn using

technically backed and consistently applied rules. In parts of the southern CGA as it is currently drawn, boundaries do not follow the underlying criteria stated in the proposed rules (groundwater gradient, groundwater trends, and geologic properties) or watershed dynamics.

CwM recommends that OWRD consider modifying the CGA and sub-area boundaries in the following ways:

- A) Completely remove the Lower Riddle Creek HUC-12 Sub-Watershed from the CGA and re-draw the Lower Blitzen-Voltage and Upper Blitzen Subbasins based on this boundary;
- B) Remove the rectangular feature N-NE of Diamond and re-draw the boundary between the Lower Blitzen-Voltage and Upper Blitzen subbasins to more closely follow the geological boundary between the volcanic and sedimentary deposits.

Sincerely,

CwM H2O, L.L.C.



Robert Long, CWRE

References

- Garcia et al., 2022. Hydrologic Budget of the Harney Basin Groundwater System, Southeastern Oregon. Scientific Investigations Report 2021-5128. United States Geological Survey. Reston, VA. November 2022.
- Gingerich et al., 2022. Groundwater Resources of the Harney Basin, Southeastern Oregon. Scientific Investigations Report 2021-5103. United States Geological Survey. Reston, VA. 2022.
- Gingerich et al., 2024. Groundwater Model of the Harney Basin, Southeastern Oregon. Scientific Investigations Report 2024-5017. United States Geological Survey. Reston, VA. 2024.

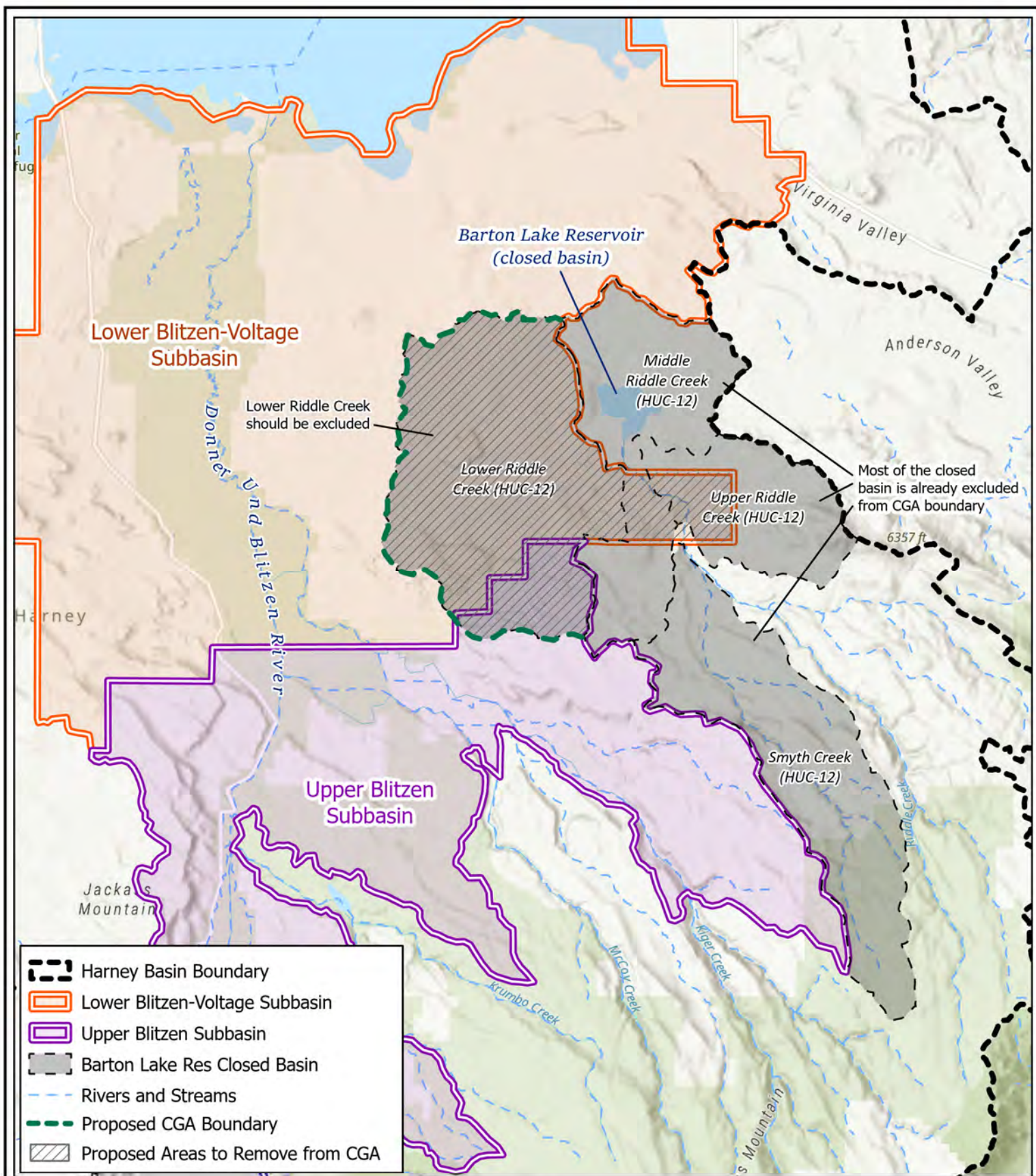
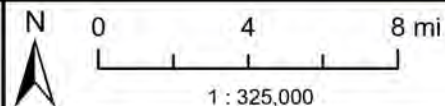


Figure 1
Exclusion of Closed Basins from
Critical Groundwater Area Boundary



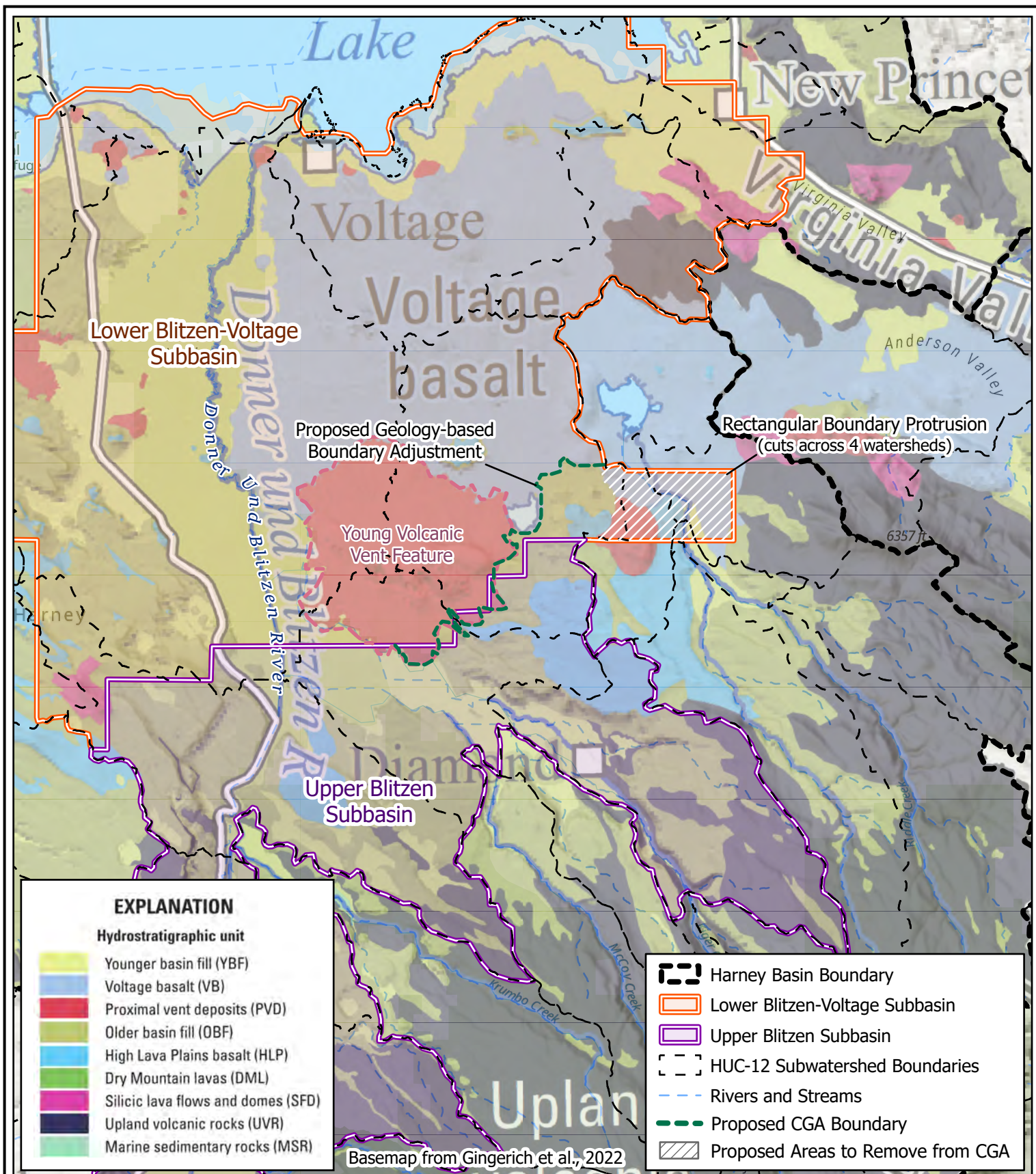
CwM-H2O 
 Complete Water Management

311 B Avenue, Suite P
 Lake Oswego, Oregon 97034
 (503) 954-1326

1	DATE	AUTH	DRAFT
No.	Date	By	Revisions

Proj#: 2526001
 Proposed Division 512
 Rulemaking - Public Comments

Robert Long 9/15



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311 B Avenue, Suite P
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(503) 954-1326

Figure 2
Arbitrary Cross-cutting CGA
Boundary

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Proj#: 2526001
Proposed Division 512
Rulemaking - Public Comments

Robert Long 10/15

Memorandum

TO: Jason Spriet
FROM: Ben Scandella
DATE: July 30, 2025
SUBJECT: Corrected: Evaluation of Division 512 RAC Alternate PTW Scenario

A previous version of this memo, published on May 30, 2025, had an error in the caption of Table 3 that incorrectly identified the basis year as 1980. This version changes that number to the correct year, 2018.

Following the proposal of a set of Permissible Total Withdrawal (PTW) numbers by OWRD in the Division 512 RAC #14 meeting, some members of the RAC expressed concern about the quantity of reductions proposed in the Lower Blitzen-Voltage subarea when compared to the severity of groundwater level declines in that subarea. These RAC members asked the Department to investigate if there was an alternative set of PTW numbers that could achieve the goal with less curtailment in that specific subarea. A RAC member also proposed an alternate set of PTW values that the Department could test with the model. The Department analyzed the WRD Proposal and confirmed that it achieved the goal in the timeline set with the least quantity of basin-wide reductions (~35% of 2018 pumpage). The Department also ran the RAC member proposed alternate scenario and evaluated the results. The alternate scenario achieves the goal by decreasing pumpage reductions in Lower Blitzen-Voltage to 18% of 2018 modeled pumpage, increasing Northeast-Crane reductions to 45%, and increasing basin-wide reductions to ~37%. This document describes the two PTW proposals and presents the major differences between their results.

Inputs

The model was run using PTWs from the WRD Proposal and the RAC Alternate scenario, shown in Table 1. The schedule for pumpage reductions in both scenarios followed the same timing as the WRD Proposal.

Table 1: Summary of pumpage input values used for simulating the PTWs proposed by WRD and an alternate from a member of the RAC following meeting #14.

Subarea	Historic Model	WRD Proposal	RAC Alternate	WRD Proposal	RAC Alternate
Units	kaf/yr			% Reduction from 2018	
Dog Mountain	4.6	4.2	4.2	9%	9%
Lower Blitzen-Voltage	13.7	8.3	11.2	39%	18%
Northeast-Crane	53.1	35.0	29.1	34%	45%
Silver Creek	21.0	15.2	15.2	28%	28%
Silvies	24.8	21.2	21.2	15%	15%
Upper Blitzen	0.1	0.1	0.1	0%	0%
Weaver Springs	19.2	4.8	4.8	75%	75%
All	136.5	88.8	86.0	35%	37%

Results

Water Levels

Increased pumpage in Lower Blitzen-Voltage caused water levels there to decrease in the RAC Alternate scenario compared with the WRD Proposal, with the median among well-cells reaching about 2 feet lower by the end of the century (Figure 1). By the same token, reduced pumpage in the Northeast-Crane subarea caused water levels there to decline less than the WRD Proposal (Figure 2). The increasing water levels following 2040 in the RAC Alternate scenario brought median water levels about 11 feet higher than the WRD Proposal by the end of the century in Northeast-Crane. The changes in pumpage had a minor impact on water levels in the Silvies subarea, raising the median water level by about 0.3 feet by the end of the century (Figure 3).

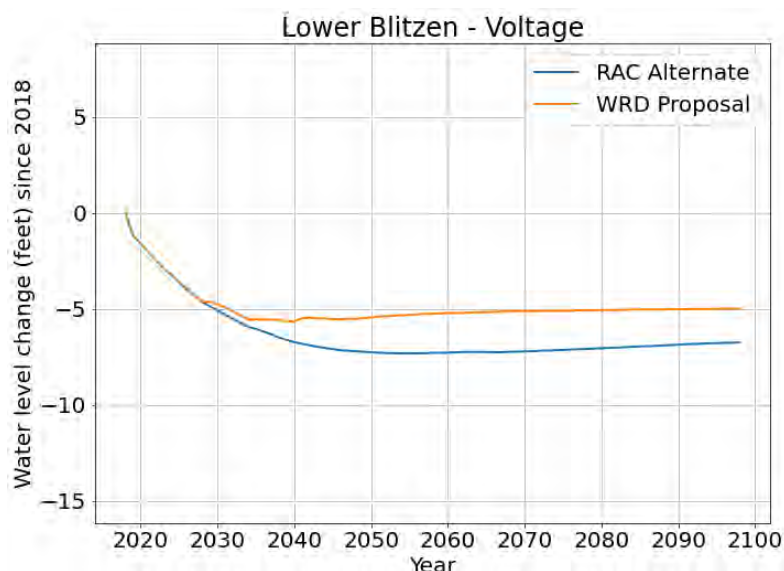


Figure 1: Median water level trajectories in the Lower Blitzen-Voltage Subarea beginning in 2018. The RAC Alternate scenario (blue) causes water levels to decline more than the WRD Proposal (orange), by about 2 feet at the end of the century.

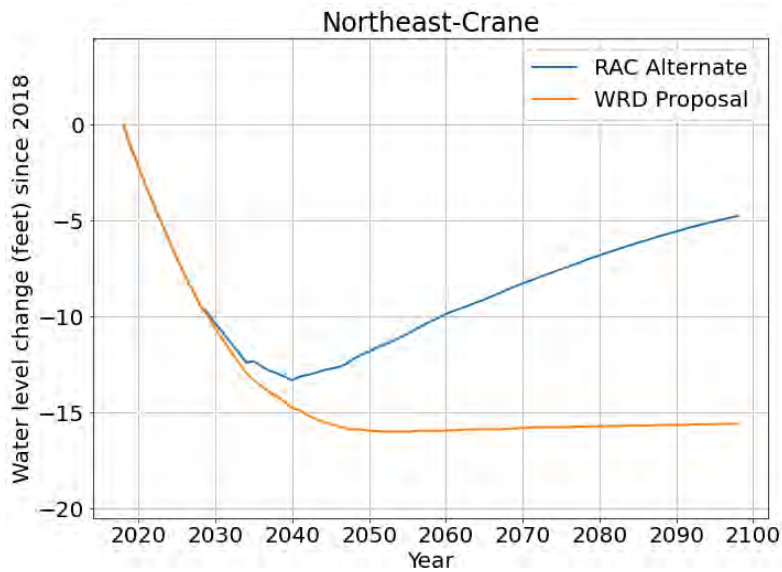


Figure 2: Median water level trajectories in the Northeast-Crane Subarea beginning in 2018. The RAC Alternate scenario (blue) causes water levels to decline less than the WRD Proposal (orange). The increasing water levels following 2040 in the RAC Alternate scenario bring water levels about 11 feet higher than the WRD Proposal by the end of the century.

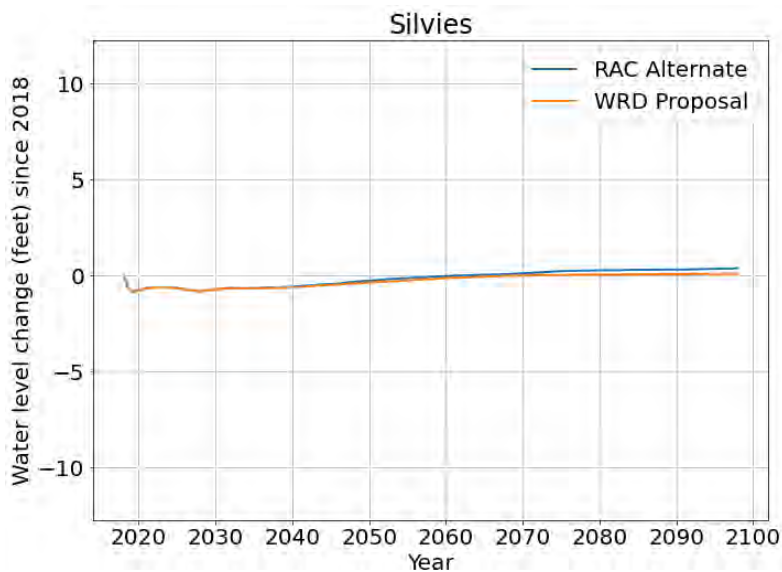


Figure 3: Median water level trajectories in the Silvies Subarea beginning in 2018. The RAC Alternate scenario (blue) causes water levels to recover compared with the WRD Proposal (orange), by about 0.3 feet at the end of the century.

Groundwater Discharge to Springs & Streams

Annual groundwater discharge to springs and streams was summarized in the lowland portions of each subarea, as shown in Table 2. The modeled discharge estimates in the year 2058 (30 years after the start of reductions) are shown alongside values in the same subareas in 1980 and 2022. Discharge numbers from 1980 presented in Table 2 are slightly larger than those presented in slide 181 of the presentation for RAC meeting #14 due to an accounting error used in development of that presentation.

Table 2: Annual groundwater discharge to springs and streams in lowland portions of each subarea, in units of kaf/yr (thousand acre-feet per year). Results are presented from 1980 under the historical pumpage scenario and 2022 under the full-pumpage (constant beginning in 2018) scenarios developed by Gingerich and others (2024), as well as in year 2058 from the WRD Proposal and RAC Alternate scenarios.

Subarea	Historic Model	Full Pumpage	WRD Proposal	RAC Alternate
Year	1980	2022	2058	2058
Dog Mountain	0.0	0.0	0.0	0.0
Lower Blitzen-Voltage	9.2	2.8	2.9	2.7
Northeast-Crane	4.0	2.0	2.0	2.1
Silver Creek	17.8	11.7	9.6	9.6
Silvies	8.9	3.2	3.4	3.5
Upper Blitzen	11.6	10.4	11.2	11.2
Weaver Springs	0.2	0.0	0.0	0.0
All	51.8	30.1	29.0	29.1

Comparing the discharge between the WRD Proposal and the RAC Alternate scenario, the increased pumpage in Lower Blitzen-Voltage reduced discharge to springs and streams (Table 2), as well as lowering water levels (Figure 1). On the other hand, reduced pumpage in Northeast – Crane caused discharge in springs and streams to increase. The balance of these two effects increased discharge to springs & streams in the Silvies subarea.

Natural Evapotranspiration

Annual lowland natural evapotranspiration (ET) estimates showed reduced ET in Lower-Blitzen Voltage under the RAC Alternate scenario, consistent with more pumpage and lower groundwater levels compared with the WRD Proposal (Table 3). Conversely, further-reduced pumpage in Northeast-Crane caused water levels there to rise and increase natural ET as compared with the WRD Proposal, though the overall magnitude of ET in that subarea remained smaller in 2058 as compared to 2018 values. Despite the slightly higher median water levels at the end of the century in Silvies (Figure 3), Natural ET was lower under the RAC alternate scenario than under the WRD proposal. Basin-wide, lowland natural ET was slightly lower under the RAC Alternate scenario than under the WRD Proposal.

Table 3: Annual natural evapotranspiration in lowland portions of each subarea, in units of kaf/yr. Results are presented from 2018 under the historical pumpage scenario, as well as in year 2058 from the WRD Proposal and RAC Alternate scenarios.

Subarea	Historic Model	WRD Proposal	RAC Alternate
Year	2018	2058	2058
Dog Mountain	0.3	0.2	0.2
Lower Blitzen-Voltage	4.8	4.1	3.6
Northeast-Crane	2.0	0.4	0.8
Silver Creek	17.9	14.7	14.6
Silvies	21.8	17.5	17.1
Upper Blitzen	1.5	1.5	1.6
Weaver Springs	0.7	0.6	0.6
All	49.0	38.9	38.5

Dry Wells

Domestic wells that lost access to water due to modeled water levels falling below the bottom of the well are counted in Table 4. Consistent with the lower groundwater levels in Lower Blitzen-Voltage, 3 additional wells were modeled as going dry there. Conversely, higher water levels in Northeast-Crane reduced the number of wells that went dry there by 10. All other subareas had the same number of dry wells in the year 2058 under both scenarios.

Table 4: Counts of number of domestic wells that lose access to water due to modeled water levels dropping below the bottom of the well.

Subarea	Historic Model	WRD Proposal	RAC Alternate
Year	2018	2058	2058
Dog Mountain	4	7	7
Lower Blitzen-Voltage	7	9	12
Northeast-Crane	27	46	36
Silver Creek	4	4	4
Silvies	23	25	25
Upper Blitzen	1	1	1
Weaver Springs	11	9	9
All	77	101	94

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.

66839 S. Harney Rd.
Burns, OR 97720
July 24, 2025

Received
JUL 29 2025
OWRD

Kelly Mainz
Oregon Water Resource Department
725 Summer St., Suite A
Salem, OR 97301-1271

Subject: Response for invitation for public comment

Dear Ms. Mainz:

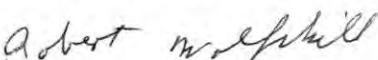
I have studied the proposed groundwater rules published in the local Burns paper July 23rd and find them very good especially the division into "subareas" but I do have concerns to share.

My major concern is that the State will not enforce the rules and my experience indicates that it is impossible for the State to enforce the rules. Lax enforcement will further burden honest folks who are already doing what is right, will challenge the rascals to devise ways to flaunt the rules, and will create another group of folks that would like to be honest but feel that they, too, must flaunt the rules in order to compete with the rascals that are making money via their schemes. I retired from a position after 33 years in which my major responsibility was contract administration and law enforcement. The last eleven years I had responsibility to train contracting officers and inspectors; I trained many, inspected their work and the summation of my inspections was that even the best folks could not keep the "playing field" even enough to stop the profit-taking of the rascals. Many enforcement officers were unable to uphold the rules adequately to prevent a visible change in honest people entering into practices that made them look just like the rascals. The quality of the rule is not important if it is not enforced.

Based upon the experience that I have had with my own well and the assurance from neighbors that I am not alone, leads me to believe your time line is much to lax. Up until twenty years ago my pump set at 40 feet provided all the water I needed; Now it is set at 90 feet and the recharge will not sustain filling a 275 gallon water tank with one $\frac{3}{4}$ inch hose.

Thirdly, I believe the addition of equipment (meters, etc.) should be staggered. To do so, would lessen the shock to the local community as spending on equipment means less money spent in the local stores. Over-appropriation of water-rights led to the problem rather than any action by the senior-users but now they are caught up in the same dilemma as the new-comers. The senior-user could enjoy some relief if those that began pumping and/or those that moved their water-right into a new subarea, as now defined, since 1995 would install the required equipment within the next couple of years while senior-users could wait until the 2028 CY deadline.

Respectively Submitted,



Robert Wolfskill



Mr. Robert Wolfskill
66839 S Harney Rd
Burns, OR 97720



Kelly Mainz
Oregon Water Resource Department
725 Sumner St., Suite A
Salem, OR 97301-1271

PROPOSED HARNEY BASIN GROUNDWATER POLICIES – WRITTEN COMMENT FORM

This written comment form can be used to help you formulate effective written public comments for the Division 512 Harney Basin Program Rules being proposed by the Oregon Water Resources Department, which will be used to manage and regulate groundwater use in the Harney Basin. The questions provided in this form address various aspects of the rules. Each question includes space to write your answer and some questions include options for you to consider. Reach out to Harmony Burrig if you want help talking through or recording your comments (541-846-8863 / harmony@saltandfresh.solutions).

Public comments and related materials must be received no later than **August 7, 2025 at 5pm:**

By Email: WRD_DL_rule-coordinator@water.oregon.gov

By Mail: Kelly Meinz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Your Name (required): Roger Sheley
Your Email (optional): Karla Farmer@gmail.com
Your Phone (optional): 541-413-0450
Note: All personally identifiable information may be made public. Please do not include this information if you do not want it included in the public record. A first name and last initial must be included to be considered.

See Attachment

Please check all interests that apply to you:

☐	I have at least one well that supplies groundwater to my home for domestic purposes.
☐	I have at least one well that that supplies groundwater to my livestock.
☐	I have at least one well that supplies groundwater to a non-farm business (e.g., store).
☐	I irrigate/grow crops with groundwater in the Harney Basin.
☐	I have a groundwater fed spring on my property that is important to me.
☐	I value groundwater contributions to the environment (e.g., springs and native vegetation).
☐	I value fish and wildlife in the basin, including those that benefit from groundwater.
☐	I use agricultural products that are produced with groundwater.
☐	I value the economic contributions of agricultural operations that use groundwater.

Question 1. Please tell us about yourself and describe why groundwater is important to you. If you use groundwater, describe how you use it.

Received

AUG 04 2025

OWRD

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

Question 2. If you use groundwater in the Harney Basin, mark with a color dot on the map provided where you use groundwater (this can be a rough approximation).



Question 3: The Water Resources Department proposes to designate the area in the map outlined in black as a Critical Groundwater Area which would give them the authority to regulate or curtail/reduce groundwater use. Do you have any feedback on the boundaries or the basis for designating a Critical Groundwater Area described in the Division 10 report? (See 609-512-0041 in the proposed rules)

The boundaries are based on a model that has never had an actual model validation. Calibration is not validation! The size of each area is too large and lumps problem areas with non problem areas. Originally, 15 areas and not just 7 areas were designated. Fifteen areas was the better model. But I have a contract with the State that already describes circumstances for action by the State. Each permit should be dealt with individually. In the first proposal I was positioned in the Silvies area, with no reduction in use, and in the 7 areas system I was positioned in the Crane area, which is severely reduced water usage. This is not fair at all. The State is using data collected in Crane to make decisions on my water usage. My water usage has no relationship with Cranes' water usage and their problems!

Question 4: The map on the previous page shows the seven proposed subareas that the Department will use to regulate groundwater use (with different levels of regulation for each area). Based on your knowledge of the basin, are there any changes you would suggest to the boundaries? Draw them on the map and describe the reason below. (See 609-512-0041 in the proposed rules)

Yes, each property should be assessed and managed at the well. This is the same way the permit was written and each individual well should be managed based on individual well usage. The 7 areas are simply averaging the problem across space which is not how the water was allocated. The model used by the State is no good if it has no true validation.

Question 5: Please describe groundwater conditions where you are and what changes in groundwater levels or other groundwater changes you have observed in the last decade. If you have not observed any changes, please note that. You are also welcome to note any questions you have.

In 1990, The US Forest Service stopped managing the Malheur Forest. They destroyed the entire timber industry in this area! Since then, the forest has grown out of control and transpired massive amounts of water. From that point on, Harney Basin has had less and less water in the ground. Their actions caused a loss of inflow to the Harney County Basin and now the state is trying to destroy farming because of the groundwater problems created by forest mismanagement.

Question 6: If you have been or expect to be impacted by changing groundwater conditions, please describe how you have been impacted.

I have had no loss of water and should be part of the Silvies area (not Crane).

Question A: The Water Resources Department proposes to achieve the groundwater management goal of durably stable groundwater levels (0 feet per year of decline) by the year 2036 for the entire basin by curtailing groundwater use in 8-year intervals. Do you have feedback on the groundwater level goal and target groundwater level trend? (See SRP 512-004 in the proposed rules.)

☐	I support the groundwater management goal and target groundwater level trend as proposed.
☐	I support the target groundwater level trend, but I would like to see more time allowed to achieve the goal. Year achieved:
☐	I support the target groundwater level trend, but I would like to see the goal achieved in less time on a quicker timeline. Year achieved:
☐	I think minor declines are acceptable and should be allowed. Acceptable amount of decline (in total feet or feet per year):
☐	I would like to see groundwater levels come back up or recover. Desired amount of recovery (in feet):
☒	I would like to be able to see groundwater levels be allowed to fluctuate between certain levels (+/- within a certain "band" of acceptable declines) <i>Manage the forest.</i>

I think the US Forest Service should manage the Malheur forests properly and there would be plenty of water in the Basin! Last year over 210,000 acres of these overgrown forests burned. The very next spring, the water flow was so intense that it flooded areas that had not seen water for a decade. This spring the Water Resources department had to cancel a meeting because the town was flooded. WE MUST MANAGE THE FOREST TO MANAGE BASIN WATER!

Question B: The proposed initial allocation (only) for groundwater irrigation rights is 2.5 acre feet of water per acre for acres that were irrigated to other acres sometime between 2010-2024. Do you have feedback do you have on this proposal? (See SRP 512-050 in the proposed rules.)

☐	I support the initial allocation of 2.5 acre feet for groundwater irrigation rights.
☐	I think the initial allocation should be greater than 2.5 acre feet. Proposed amount:
☐	I think the initial allocation should be less than 2.5-acre feet. Proposed amount:
☐	I support that wetted acres should be calculated based on use between 2020-2024.
☐	I think wetted acres should be calculated based on a different time period. Suggested time period:

The allocated water should be the amount described in the initial water rights. If the forest (uplands) are managed there is plenty of water for irrigation. If not, we need to cut water based on seniority, These were the rules when we bought the property and should remain the rules . Now the rules are very unfair since many of us made major financial decisions based on those rules. If the state wants to change the rules, the need to compensate anyone for their loss.

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

Question 9. The proposed **initial allocation** for municipal or quasi-municipal groundwater rights is 110% of water equal to 110% of the greatest single year in the previous five-year period. What feedback do you have on this proposal? (See 690-512-0060 in the proposed rules)

I have no comment. Manage the upland forest vegetation and there will be plenty of water for growth.

Question 10. The proposed **permissible total withdrawal (PTW)** for each of the seven subareas is described below. This is the amount of water that represents the amount of water that the Water Resources Department has determined can achieve the target groundwater level trend by 2058. The Department may not reduce groundwater pumping to a value less than the permissible total withdrawal. Highlight your feedback about the level of reductions for each area below. A memo produced by the Department explores a different allocation between the Lower Blitzen-Voltage area and the Northeast-Crane area. What additional feedback do you have on these proposed levels of groundwater use (PTW) and reductions? (See 690-512-0050 in the proposed rules)

Weaver Springs	Lower Blitzen-Voltage	Northeast-Crane	Silver Creek	Silvies	Dog Mountain	Upper Blitzen
PTW: 4,800 afy	PTW: 8,300 afy	PTW: 35,000 afy	PTW: 15,200 afy	PTW: 21,200 afy	PTW: 4,200 afy	PTW: 100 afy
75% reduction from 2018 use	39-40% reduction from 2018 use	34% reduction from 2018 use	27-28% reduction from 2018 use	15-16% reduction from 2018 use	9-10% reduction from 2018 use	0% reduction from 2018 use
Too much?	Too much?	Too much?	Too much?	Too much?	Too much?	Too much?
Too little?	Too little?	Too little?	Too little?	Too little?	Too little?	Too little?
Just right?	Just right?	Just right?	Just right?	Just right?	Just right?	Just right?
I don't know	I don't know	I don't know	I don't know	I don't know	I don't know	I don't know

These are all made from information that is either gross averages or from the unvalidated model. We need a much better understanding of the upland/basin watershed to attempt to create these numbers. The idea that the Federal government has not been involved in solving the groundwater problem invalidates any of these conclusions. The forest mismanagement controls the inflow of water and that was never considered.

Question 11: The reductions in each subarea will be phased in over time following a **proposed reduction schedule**, with the largest percent of reductions made initially and later reductions phased in over 6-year intervals based on existing groundwater level trends to ensure that groundwater levels are on track to achieve the groundwater management goal. Reductions will be based on priority date using the initial allocation as a starting point. What feedback do you have on the proposed reduction schedule? (See OAR 690-512-0070 in the proposed rules)

	2028	2034	2040	2046	2052	2058
Other Subareas	40% of total reductions	30% of total reductions	15% of total reductions	10% of total reductions	5% of total reductions	Stability achieved
Weaver Springs	75% of total reductions	25% of total reductions	--	--	--	--

	I support the proposed reduction schedule (percent reductions and implementation timeframe).
	I would like to see higher reductions implemented in the near-term.
	I would like to see lower reductions implemented in the near-term.
	I would like to see 20% reductions implemented at each step.
	I would like to see all reductions implemented immediately.
	I would like to see a shorter implementation timeframe (achieve stability sooner).
	I would like to see a longer implementation timeframe (longer period to achieve stability).
	If groundwater levels have not been declining in a subarea, I would like to see a grace period during the first 6-year period where no reductions are implemented.

We should increase our groundwater monitoring and work with the Forest Service to begin to regain proper forest management before we start reducing water use.

Question 12: The Department is proposing to follow an **adaptive management approach** for implementing reductions informed by groundwater level trends. If groundwater level trends are "on track" then no adjustments would be made. This approach allows the Department to make changes to the reductions to achieve the goal. Reductions could be adjusted up or down depending on how groundwater levels change over the previous 6 years. What feedback do you have on the adaptive management approach? (See 690-512-0080 in the proposed rules)

The adaptive management approach portion is very good.

Question 13: By 2028 all groundwater users within will be required to install a flow meter to measure groundwater use and will be required to report groundwater use on an annual basis. A flow meter must be installed on this timeframe in order to continue to legally use groundwater under existing rights. What feedback do you have on this requirement? Will you seek any assistance to meet this requirement? (See 690-512-0110 in the proposed rules)

Why? You are proposing managing based on large areas (7 areas) so there would be no reason to monitor individual well use. If we were to manage at each well, the flow meters would/could be helpful. It strikes me as a waste of everyone's money unless you are planning to charge for water use sometime in the future. This flow meter idea will also be a waste without methods for managing and analyzing the data.

Question 14: Under the proposed rules the only new uses that will be allowed are those uses that do not require water rights (i.e., permit exempt uses), such as domestic and stockwater wells, and non-consumptive geothermal uses. What feedback do you have on the proposed new uses? (See 690-512-0030 in the proposed rules)

We bought our land based on existing rules. If you change the rules mid-game, you must be willing to compensate those whom the rule changes harm.

Question 15: Please describe what personal impacts you expect these rules might have on you (either positive or negative).

I don't expect to be affected directly but I believe the combination of federal reductions in timber management followed by loss of farming will devastate Harney County and destroy what economy exists.

I believe that my farm property will become unsellable. Who would want to buy a farm that they have little or no control over their water usage? Personally I feel that this is a ploy by the state to bankrupt farmers and acquire our land for nothing.

Question 16: Please describe what basin impacts you expect these rules might have on the broader basin or community (either positive or negative). (See the Fiscal Impact Statement).

It will be destroyed and water will continue to decline until the Malheur Forest is properly managed.

Question 17: Describe actions that you would like the Department to consider that could mitigate or minimize anticipated impacts to water in the basin. This could include support for proposed projects or changes to the proposed rules as:

1. Work with your Federal partners to better manage the forest uplands
2. Compensate people properly for their financial losses.

Question 18: When you look into the future, what is most important to you? What do you hope to see for yourself and for the basin? What are you most concerned about?

I see a dark future because everytime the real problem (upland forest management) is brought up, it is completely ignored. We need a whole ecosystem approach to solving the groundwater issue. OWRD is ignoring the water input side of the water issue.

Question 19: What else is important for you to communicate to the Department?

The US Forest Service's management of the Malheur forests is the key to the solution to Harney County's basin groundwater solutions.

Oregon State is responsible for every approved well permit. If they feel they have over allocated the groundwater they need to buy the landowners right back.

Question 20: Do you have any other feedback on the proposed rules or groundwater management?

The combined actions of the 1993 Forest Service decision destroyed the timber industry and now the State is using the results of this mismanagement to destroy irrigated farming. This is as Orwellian as it gets!

For questions about the proposed rules, please contact Kelly Mainz at the Water Resources Department (WRD) on rule coordination@water.oregon.gov or 503-713-7087.

For assistance with developing effective written comments, please reach out to Harmony Blumenthal with the High Desert Partnership who can help (541-845-8863 or harmony@hdpandfresh.com).

Summary: *Since 1994, federal and state governments in the western US have destroyed the logging industry and mismanaged forests in the name of protecting the northern spotted owl, which has allowed forests to become massively overgrown with vegetation. Vegetation captures and transpires increasing quantities of water from winter rain and snowfall as forests become overgrown. Groundwater recharge has been decreasing since 1994 and state governments are now blaming irrigated farming for the diminishing water tables. State governments are creating new water right rules to remove farms ability to use ground water that was allocated to them decades ago. Federal and state governments have created a cascade of mismanagement that is ultimately going to ruin small farms and lives in rural America.*

1. In 1990, the northern spotted owl was officially listed as a threatened species under the Endangered Species Act (ESA). This designation triggered a series of legal and regulatory actions aimed at protecting the owl's habitat. The decision was largely driven by research indicating that logging, particularly in old-growth forests, was a primary factor in the owl population decline.

2. A major response to the spotted owl issue was the Northwest Forest Plan (NWFP), signed into law in 1994. This plan represented a significant shift in forestry management. The listing of the spotted owl prompted the USFS and other agencies to implement restrictions on logging in the owl's primary habitat—old-growth forests in the Pacific Northwest. These forests, characterized by large, old trees, provide the owl with nesting sites and ample prey. As a result, much of the logging that had taken place in these rural areas was either halted or greatly reduced.

3. Snowy mountains and adjacent uplands provide water for neighboring basins, some of which is used for irrigation by family farms. Forest policies have allowed forest ecosystems to grow wildly out-of-control. Massive overgrown forests have dramatically decreased the amount of water recharge from the mountains to the basins through increased transpiration. The water table is declining in these regions because of the loss of recharge water from nearby overgrown mountains.

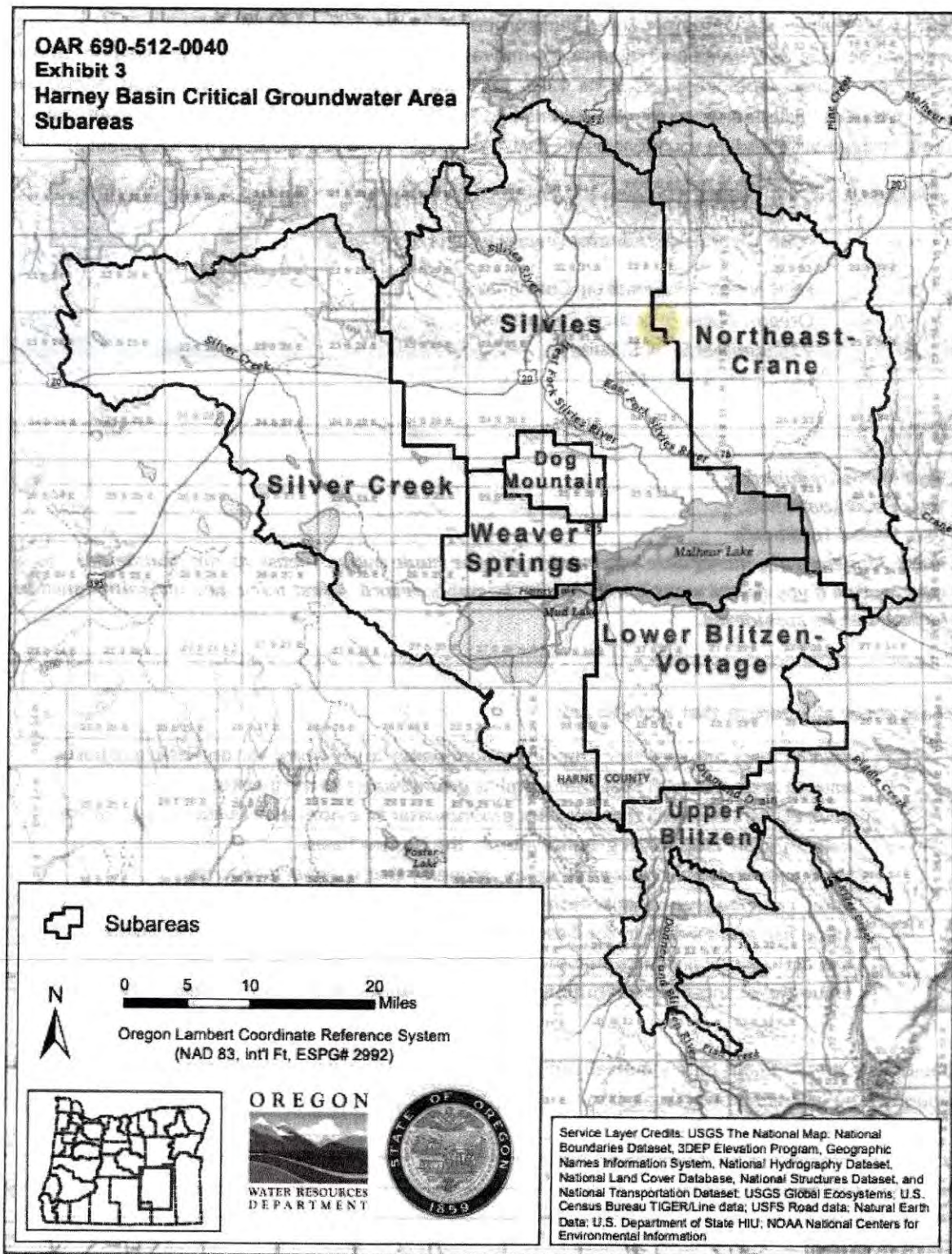
4. While NWFP disrupted logging communities and destroyed an entire industry, the spotted owl populations have not recovered, but the people have struggled to survive by finding new businesses and opportunities. Most people were forced to move from rural areas to find jobs. Rural frontier communities have largely disappeared. But some people stayed and became farmers and are critical to supporting the remaining remnant rural communities.

5. Now, state governments are blaming farmer's use of irrigation as the factor reducing the static water table. Alarmingly, they are developing new rules to reduce the number of irrigated farms because they have mismanaged the adjacent forests and uplands, which caused a declining water table. State water resources are attempting to massively reduce irrigated farms' use of water by reducing water rights previously granted and/or reducing water amounts useable with each water right. The state government is destroying rural America by reducing irrigated farming by up to 70% in some areas. They are creating and enforcing rules and regulations that are only necessary because of the initial federal mismanagement of adjacent forests in response to declining spotted owl populations. This is terrible injustice to those who have invested their entire lives developing and operating farms.

Solution: Federal forest managers must restore proper forest management to allow water to recharge adjacent basin groundwater. State agencies must develop a slow and carefully designed system of incentives programs to encourage less ground water use by irrigators without punishing them for forest mismanagement and implement adaptive management programs based on monitoring the recovery of groundwater recharge. If the state wants to solve this solely on the backs of irrigators, they must be properly compensated for their losses.

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

Question 2. If you use groundwater in the Harney Basin, mark with a color dot on the map provided where you use groundwater (this can be a rough approximation).



High Desert Partnership
PO Box 252
Burns OR 97720-0252



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Kelly Mainz - Rulemaking Coord.
OR Water Resources Dept.
725 Summer St. N.E. Suite A
Salem, OR 97301-1271



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RDC 99

From: Roger Sheley <karmafarmer1@gmail.com>
Sent: Monday, August 11, 2025 11:25 AM
To: WRD_DL_rule-coordinator
Subject: Public Comments on Division 512 Rules

Some people who received this message don't often get email from karmafarmer1@gmail.com. [Learn why this is important](#)

Dear WRD

I am writing this note regarding the OWRD rule-making process in southeastern Oregon. As you know, your decision will have a major impact on the people and environment of eastern Oregon. I want to provide you with a little information that I have been trying to help people understand about the watershed that must be considered when deciding if adopting this OWRD rule is the best thing to do for the ecosystem, including people.

First, I would like you to know that I am an ecosystem ecologist working for the Agricultural Research Service on the ecology and management of ecosystems for the past 21 years, in Burns, Oregon. I received my PHD from Oregon State University, was a full Professor in the Department of Land Resources and Environmental Sciences at Montana State University for 10 years, and I am also the Editor-in-Chief of the scientific journal, Rangeland Ecology and Management. I was also a member of the series of meetings associated with the rule making process, called the RAC.

The only solution to ecosystem problems is by addressing the actual causes of ecosystems disfunction. There is one issue critical to the rule-making process that has been avoided but is the actual cause of the reduction in static groundwater levels. Simply stated, the USFS has mismanaged the uplands around the Harney Basin since 1990. These forests have grown out of control for decades (*I have attached a description of the complete story as a second page of this note*). As the vegetation in the uplands increases, water transpiration increases, in some cases, by 30 gallons of water per day per tree. Surely irrigation has some effect on water tables, but the real cause of the water table decline is the loss of forest management and resulting in overgrowth of forest vegetation. In fact, the forest is so overgrown that it ignited and burned 210,000 acres last summer, and as I predicted, the entire Harney Basin was flooded, including the town. That in itself shows that the overgrowth of the upland vegetation controls the basin water table. Without addressing the upland vegetation mismanagement, we cannot solve the declining water table problem in the Basin.

Throughout the RAC meeting, I begged OWRD to include the USFS and to consider the role of upland vegetation management in creating rules for irrigators. This actual cause of the water table decline was never addressed in the RAC meetings. Adopting the rule created by OWRD without addressing the upland vegetation management will unfairly put on all of the burden of this ecological disaster on irrigators, when the primary focus should be on the USFS mismanagement of the uplands. I beg you to require the rule-making process to include the USFS so the true cause of the decline in the water table can be addressed and the problem can be solved.

Thank you for considering my request.

Sincerely,

Roger Sheley, 541-413-0450
71111 Ruhl Road
Burns, Oregon 97720

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

PROPOSED HARNEY BASIN GROUNDWATER POLICIES – WRITTEN COMMENT FORM

This written comment form can be used to help you formulate effective written public comments for the Division 512 Harney Basin Program Rules being proposed by the Oregon Water Resources Department, which will be used to manage and regulate groundwater use in the Harney Basin. The questions provided in this form address various aspects of the rules. Each question includes space to write your answer and some questions include options for you to consider. Reach out to Harmony Burright if you want help talking through or recording your comments (541-846-8863 / harmony@saltandfresh.solutions).

Public comments and related materials must be received no later than **August 7, 2025 at 5pm:**

By Email: WRD_DL_rule-coordinator@water.oregon.gov

By Mail: Kelly Meinz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Received
AUG 04 2025
OWRD

Your Name (required): Roger Shelley
Your Email (optional): Kathia Farmer 1@gmail.com
Your Phone (optional): 541-413-0450
Note: All personally identifiable information may be made public. Please do not include this information if you do not want it included in the public record. A first name and last initial must be included to be considered.

Please check all interests that apply to you:

☒	I have at least one well that supplies groundwater to my home for domestic purposes.
☒	I have at least one well that that supplies groundwater to my livestock.
☐	I have at least one well that supplies groundwater to a non-farm business (e.g., store).
☒	I irrigate/grow crops with groundwater in the Harney Basin.
☒	I have a groundwater fed spring on my property that is important to me.
☒	I value groundwater contributions to the environment (e.g., springs and native vegetation).
☒	I value fish and wildlife in the basin, including those that benefit from groundwater.
☒	I use agricultural products that are produced with groundwater.
☒	I value the economic contributions of agricultural operations that use groundwater.
☒	<u>I value the US constitution</u>

Question 1. Please tell us about yourself and describe why groundwater is important to you. If you use groundwater, describe how you use it.

In 1993, I earned my Phd in Rangeland Ecology from Oregon State University. For the next 10 years, I was employed by Montana State University as professor in Land Resources and Environmental Science. In 2003, I moved my family to Harney County where I had accepted a Lead Research position with the USDA Agricultural Research Service in Burns, Oregon. Then in 2016, I took on additional duties by becoming the editor and chief of the journal of Rangeland Management & Ecology. I am including this professional information to let you know that besides being a Harney County alfalfa grower, I am a highly qualified research scientist who has extensive background in the use of modeling techniques.

When I relocated my family to Harney County, I purchased a home on 80 acres of alfalfa growing property. I purposely purchased property with senior water rights to ensure my farms sustainability. Over the past 20 years, my son and I have grown our alfalfa farm to 800 acres. We have a debt of about \$800,000. We use the groundwater to make quality hay to pay our bills. We have been operating at a loss or break-even point just to own the land and water rights.

From: Roger Sheley <karmafarmer1@gmail.com>
Sent: Monday, August 11, 2025 11:22 AM
To: WRD_DL_rule-coordinator
Subject: Comments on Division 512 Rules

You don't often get email from karmafarmer1@gmail.com. [Learn why this is important](#)

August 9, 2025

Kelly Mainz – Rulemaking Coordinator

Oregon Water Resources Department

725 Summer St. N.E. Suite A

Salem, OR 97301-1271

Subject: Comments on Division 512 Rules

Dear Mr. Mainz,

My name is Roger Sheley and I am a researcher from the OSU Extension Eastern Oregon Agricultural Research Center. I have 40 years of experience in scientific research and am a trusted member of this community. I am also an irrigator in the basin, but still don't really know what subarea I'm in because the boundaries have moved and I haven't seen a detailed enough map to help me determine where I will be placed. I was a member of the RAC though did not feel that my involvement or contributions were meaningfully sought or used in the process. I am sending along comments that I have already sent to the Department during the last 6 months. Much of my feedback was not addressed in the process since there really wasn't time for RAC members to discuss and deliberate amongst ourselves. We really spent most of the time reacting to OWRD's presentations. From the beginning OWRD did not really seem interested in what most of the RAC members had to say and did not appear to value local knowledge and expertise.

OWRD has a responsibility to protect existing water rights, which is stated clearly in ORS 536.220 and ORS 537.525. This proposal does not protect existing water rights. This proposal does not adhere to the Department's own policies. This proposal penalizes law abiding water rights holders in areas where conditions are reasonably stable. The Department keeps changing the goal post without a clear basis to do so. We have repeatedly requested the Department's rationale for certain decisions that they never provide, they spend all their time and energy defending themselves and just tell us it's based on "best available science" and move on. This approach has completely undermined my trust in the science and the Department. This proposal is contrary to existing laws. It threatens water rights and threatens the economic vitality of our community. Nothing has been done by the Department to reduce economic impacts. They chose their preferred alternative and told us the impact it is going to have. They never meaningfully engaged the RAC to identify ways to reduce the economic impact as required by ORS 183.333 and ORS 183.540.

The Department has said that pumpage is less than recharge and so the whole basin is not actually overdrawn. Why doesn't the Department just cancel unused water rights, limit pumping to what is already being used, address the massive declines in Weaver Springs and call it a day? Why drag us all into a critical groundwater area and drag us all into a legal battle with the state? This is going to cost us a fortune, including the taxpayers. If the Department didn't want to deplete the groundwater resources, they shouldn't have determined that water is available

and given us all water rights. Why are we the ones being punished now for the state's poor decision-making? How can the state regulate us off if there is actually water available by their own definitions? This makes no sense to me.

The Department relied too much on its own model and not enough on community input. They never discussed the assumptions that are included in the model despite repeated requests to do

so. Models are only as good as the data and assumptions they include. Models can't predict the future. The amount of reductions they were proposing changed drastically from one meeting to another based on their "optimization" of the model and its prediction of future results, but many of us never really understood what they were optimizing for. The model results didn't really make sense to me and I have a lot of experience with models. The use of the model as the sole basis for developing and defending THEIR proposal is irresponsible and offensive to this community. They started to work with us through the Discussion groups, but then decided that they could do it better by themselves and cut the community out of THEIR process. This violates the spirit and intent of the law. I lived through the spotted owl controversy and this seems to be a repeat of that. How is it that the government can continue to insist that it alone knows what's best for us, make sweeping decisions, and leave us with the mess? What is the state doing to make this right?

My feedback and recommendations are as follows:

- I appreciate the ability to adaptively manage based on new data, but would like to see this occur more in a voluntary context rather than a regulatory one.
- Include local knowledge, expertise, and input into the boundary between the Northeast-Crane Subarea and the Silvies Subarea.
- Only areas that have data showing they meet the thresholds of a critical area should be included in a critical area. My wells are reasonably stable and have been for as long as I've been on my property. The rest of the basin should not be punished because one or two parts of the basin were overdeveloped. Areas that aren't critical should be encouraged to conserve water and the Department should partner with us on that rather than relying on regulation alone. We were promised conversations about this and never got it.
- Get local input or input from the RAC on how to reduce economic impacts to small businesses. The Department presented its results, but never asked for our feedback on how they could reduce impacts, which was an oversight.

Thank you for considering these comments.

Input/Feedback from Roger Sheley (5/9/25)

I think the RAC effort was a failed effort. There has not been the time to discuss ideas that may be useful. I never saw anything get ironed out. I only saw people proposing ideas or the Department making proposals and then asking everyone to react. There was no effective back and forth, there was no real discussion. This is a failed process in my opinion. I understand now that we're just there to listen and possibly provide some consultation. It's now clear that we were just there so that the Department could check a box. If the RAC was doing anything other than just trying to understand what the Department is trying to do then it failed. I still don't really understand how the Department came up with this proposal. It certainly doesn't reflect what I've been hearing in the RAC. Rarely have any ideas that were brought forward influenced the process. No one on the RAC is in agreement with what is being proposed. The Department was just going to do whatever they wanted to do and we were along for the ride.

What changes, if any, would you make to: The CGWA boundary rule language? Please

include specific language that you would like to see in rule, if possible.

It's wrong that all wells and all areas are lumped into the same critical groundwater Area. Each part of the basin is different. If there is an area with a problem then it should be its own critical groundwater area. If an area is not having problems then it shouldn't be a critical groundwater area. If data shows that an area is okay or is recovering, there should be the ability to lift the designation. If data shows that an area is not okay or is declining, then it should be a critical area. But really we need to be considering what's happening well by well and it doesn't seem fair that if my well has never declined and is in a part of the basin that is not declining that I would be included in a critical groundwater area and regulated off just because I'm lumped in with problem areas and problem wells.

What changes, if any, would you make to: The subarea rule language? Please include specific language that you would like to see in rule, if possible.

The model is not appropriate for making a determination for how many subareas we should have. There are so many scientifically and politically defensible ways to consider and delineate boundaries. I thought we were going to have more conversation about this. My place has not declined at all. I think I'm now lumped in with the Northeast-Crane area, which doesn't make sense. I have two wells about 10 feet apart at the same depth with different water levels. The geology of this system means that the wells are not as linked as people would think they are. Predicting with accuracy the linkage between wells isn't really possible at this point. I'm right on the edge between Silvies and Crane-Buchanan – there is ultimately an arbitrariness in these boundaries. The Department kept adjusting boundaries and changing the subareas and it wasn't always clear why or how that was happening. I kept thinking we were going to have more discussions about it, but the Department just keeps asking us to react to what they're proposing. I would like to request that the Department provide a clear, written, scientific basis/rationale for: 1) how they determined that the Harney Basin is a single groundwater reservoir, including the scientific definition of a "groundwater reservoir" and the scientific criteria they used; and 2) how the Department determined the seven different subareas. I ultimately don't understand how it's legal that my water hasn't dropped at all and they might regulate me off. Again, I did my research to make sure that I had a relatively senior priority date and it seems wrong that the Department can now come in and draw arbitrary boundaries that essentially change my priority and potentially regulate me off.

What changes, if any, would you make to: The target groundwater level trend and the date to achieve the target groundwater level trend rule language? Please include specific language that you would like to see in rule, if possible.

Continuous declines aren't sustainable. I think it's a good goal to not allow continuous declines. Groundwater levels should be allowed to fluctuate though. A relatively stable water table is what I'm after but it's not a concrete zero – some years it goes down and some years it goes up. We need to actually talk about the tradeoffs with all of these decisions. I don't think we've had enough conversation about all the real tradeoffs.

I don't get the median thing. You can't come up with confidence values with a median, you can with a mean. How confident can you actually be with the median? I much prefer the mean over the median. I really don't understand why they insist on a median. We need to account for variance over time. As long as the mean stays zero then there should be allowed variance around that mean. Zero is not realistic, groundwater levels are going to change. I'd like to see that taken into consideration.

What changes, if any, would you make to: The proposed permissible total withdrawal for

subareas rule language? Please include specific language that you would like to see in rule, if possible.

The PTW is totally made up. I don't give the model any credit. I would rather ignore that and keep making reductions until we achieve the goal. I don't think they actually have the information to actually know how much reductions will result in long-term stability. They're putting a lot of trust in the model. I wish they put as much trust in the community as they did in their model. They don't really seem to care at all what we say even though most of us have a lot of knowledge and experience managing this system. They feel pretty comfortable ignoring us. The PTW is really just a suggestion of what the Department thinks is needed. The PTW would make more sense to me as a range of numbers rather than a specific number to allow for that variation or fluctuation over time and to also account for inherent uncertainties. Rather than one number I recommend that the PTW be a range of use that the Department thinks would result in stable conditions, but stable needs to allow for some variation over time too. We're going to have good years and bad years, good decades and bad decades. There are a lot of factors affecting groundwater levels that I really don't think they're fully accounting for. There needs to be a process to evaluate and reevaluate the PTW. I would like to see the PTW determined on a 6 year basis rather than just having one number in rule.

What changes, if any, would you make to: The determination of initial allocation for groundwater rights rule language? Please include specific language that you would like to see in rule, if possible.

I'm fine with the initial allocation of 2.7 acre feet.

What changes, if any, would you make to: The proposed reduction schedule rule language? Please include specific language that you would like to see in rule, if possible.

First reduction should be 10% reduction max – they need to see what this burn did to us. My water went up to the surface. They need to implement the reductions in smaller increments over a longer period of time. The Department needs to minimize making huge, devastating, irreversible impacts. If you turn wells off, they probably aren't coming back online.

I don't think there is the economic, technical, or legal basis to limit reductions in order to protect springs. We don't know enough about the flow paths to actually understand what would impact springs. We don't have the baseline information or legal ability or economic ability to use springs as the limiting factor or indicators for how we're doing. They are important and we need to invest in learning more and figure out how to manage them, but this seems like too broad of a brush stroke, especially if there's no plan to even measure springs. We need to be able to fine tune reductions and look at how that is affecting static water levels. Really we should just start with the static groundwater levels and manage to those. Reductions need to be based on how the static groundwater levels are responding. They should try it at 10% reduction.

What changes, if any, would you make to: The proposed adaptive management rule language? Please include specific language that you would like to see in rule, if possible.

I would like to give the Department credit for finally thinking about and talking about an adaptive management approach. I think this is a step in the right direction and I appreciate that they're doing this. This is a positive development in the RAC process and I think the emphasis should be on adaptive management and how we do it over time to minimize negative impacts and achieve a realistic goal.

There should be a designated committee in Harney County that works with the state to collect and understand data over a 6 year period. This group should consult with the Department about

ways to implement the rules. If I had a choice, I would make a formal committee for groundwater management. Ongoing buy-in would be critical.

Monitoring has to be in association with someone designated from the community. There needs to be someone or a group alongside the Department to build trust and confidence in measurements. By having someone from the community join someone from the state in making the measurements – that will go a long way towards building trust. The state doesn't have any trust at all.

Every well with data should be considered, not just wells determined by the Department. At a meeting they told us all the data would be considered. This should be clear in the rules.

What changes, if any, would you make to: The proposed reduction schedule changes in the adaptive management rule language? Please include specific language that you would like to see in rule, if possible.

I have no confidence in the "envelope" determined by the model. They should rely on static groundwater level measurements. They need to use adaptive management and go really slow.

Any other changes to Critical Groundwater Area rule language? Please include specific language that you would like to see in rule, if possible.

What changes, if any, would you make to: The proposed classification for new uses rule language? Please include specific language that you would like to see in rule, if possible.

What changes, if any, would you make to: Other Classification rule language? Please include specific language that you would like to see in rule, if possible.

What changes, if any, would you make to: Other Serious Water Management Problem Area (SWMPA) rule language? Please include specific language that you would like to see in rule, if possible.

I have come to the conclusion that there's no rationale for forcing everyone to buy \$4500 metering systems for every POD and then be managing on a seven subarea scale. You don't need us to spend that money on every point of diversion, you just need to know what the general numbers are. I've always advocated for OpenET or electrical bill approach to get an area wide view of what's going on. My view is that they are actually moving towards charging farmers for water use by the gallon – I'm convinced that's what is happening. At the international level they are trying to find a way to generate income/charge for use. The only rationale for wanting every POD to have a meter is that they intend to charge. That scares me. That's the same dialogue at the World Economic Forum – that's the hot dialogue right now in international forums.

Outside of the rules, what are other important elements of adaptive management? And what commitments are needed from OWRD or others on those?

Other Comments

In the 90s they quit managing the forest. The forest grew without active management meaning there was less water available for groundwater recharge. The forest got so out of control there was hardly any water in the basin. Last year 210,000 acres burned. That is 210,000 acres of trees that aren't holding back or consuming water. We had a lot of snow and early spring. For the next 15-20 years I think this is going to have a significant impact on groundwater recharge. Time will tell what forest management will look like and if we'll just go back to mismanaged forests. No harvest rules meant to protect the spotted owl meant that there was less water available for groundwater recharge and also contributed to the mega fires. I think the Department and USGS completely underestimated the degree to which the forest affects groundwater in the basin. This is a complex social-ecological system. We need to recognize it is

no longer the same system. Everything is on a cycle. There is still a lot we don't fully understand about these cycles and we have to remain adaptive.

They really haven't talked much about the deeper versus the shallower system. I don't know that native vegetation will really be all that affected by most of the declines because the most of the wells aren't drawing from the shallower groundwater where the plants are. Plus, we get surface water that recharges the shallow system for much of the basin most of the year. I really don't think that the groundwater is affecting native vegetation in the lowlands to the extent they suggest.

This needs to be a never-ending project. We need to make adjustments continually. The Department actually needs to treat us like partners in figuring this out.

Roger Sheleys's Feedback on the Proposed Management Scenario (From 2/9/25)

What changes, if any, would you make to: The number of subareas? (Proposal: 7 subareas)

The 15 subareas was fine. With the 7 subareas there are areas that have no problems right now combined with areas that have major problems. I really don't like that about the 7 subarea. We should be using the basin-wide priority system, but I don't agree with the model results that show that the one management area approach results in the least amount of allowed pumping. I don't think the model is being used appropriately. The model is not validated and even the data used did not have appropriate levels of statistics for any confidence. We must abandon the use of the models for clear scientific violations.

I bought property with water rights based on the priority system. I've invested all of my life savings in the farm based on the priority of the water date. I bought water rights that I thought were safe. I don't have any problems at all where I'm at and I'm maybe going to be squeezed into a problem area. I still really can't tell which area I'm in now. Senior users should be protected. I don't agree with the idea of singling out senior users. There are problems with all of the different proposals. 15 made sense to me from a management standpoint but 7 areas lumps too much area together. One subarea made sense to me because it would follow prior appropriation and be consistent with the rules under which we purchased the property and its associated water rights.

What changes, if any, would you make to: The stability success metric? (Proposal: Median/50th percentile of wells)

I really think we should be managing well by well versus managing it as a unit. My incentive to reduce water use is much lower because I'm tied to the actions of other people and the outcomes of their actions. This is a perfect example of the well documented "Tragedy of the Commons". The management unit they should be looking at is well by well just as the SWMPA metering are going to require. I might have two wells close to each other with one well that hasn't changed and one well that has gone dry. That can't be accounted for in the model or subarea concepts or the metric. We have contracts with the state for water rights, that's how this should be managed. My well doesn't have problems and I don't think it should be curtailed because someone else's well in the basin is having problems. Part of the reason I don't have problems is that I manage my water use very carefully. I minimize water use and am careful to over water. I have converted my pivots from MESA to LESA. Regardless, we should be managing our water well by well as defined by our current water rights.

A median is not a good metric. I think the mean is more representative rather than the mean. The mean and the variants represent much more concrete description of what's happening in that area. Mean and the standard deviation is much more appropriate than a median. The standard deviation tell about the confidence in the metric. All scientific publications are done

using mean because they have a way to determine the confidence in the number and we should use the mean and standard deviation as well.

What changes, if any, would you make to: The phasing timeline? (Proposal: Reductions are phased in every 6 years for 24 years).

This feels too fast. The 6-year interval is too fast. We should have 10-12 year intervals or longer. It's really difficult to tell in 6-year increments. I prefer a little slower approach where you reduce things and then you see if you can get an impact or outcome and just keep doing it over time. It's a never-ending iterative process but you're always aiming for balancing recharge and discharge over time. It's never-ending. Need to be slow and cautious. Need to continually look at what you did and what the response is and whether its heading in the right direction.

What changes, if any, would you make to: The timeline to achieve stability goal? (Proposal: 30 years to achieve the goal)

This is too fast. I think it needs to be 50 years.

How would you incorporate or address discharge to streams and springs? (Proposal: Permissible total withdrawals are constrained in each subarea to maintain more than 50-70% of discharge to streams and springs from a 2022 baseline).

Each of these are important considerations. We have been monitoring groundwater levels. We haven't been monitoring these other parameters. To add parameters on the front end that we don't know much about is presumptive. If we want to collect data and try to understand it more while we're looking at groundwater level trends, it might make sense to add criteria later. Unless your goal is to get rid of agriculture then you shouldn't use these new parameters. If they're important, continue to improve our understanding, find other ways to manage for them, and over time maybe it will make sense to add management criteria. For the first 10 years we need to

monitor impacts. We need to start a monitoring program and add parameters over time if we need to. We need to understand these criteria before adding them.

How would you incorporate or address changes in natural evapotranspiration? (Proposal: permissible total withdrawals are constrained in each subarea to maintain more than 60% of native vegetation maintains access to groundwater from a 2018 baseline).

The majority of native plants do not need access to ground water and its shown they rarely us it if it's not a riparian area.

How would you incorporate or address changes in dry domestic wells? (Proposal: Permissible total withdrawals are constrained in each subarea so that less than 170% of domestic wells lose access to water at their current depth from a 2018 baseline).

We should keep offering help to domestic well users (I am one too). People like MS. Moon may need a safe water storage system.

How would you incorporate or address changes in agricultural production? (Proposal: 24yrs of phasing, 30 years to achieve stability, and using subareas are designed to help reduce impacts to farms and associated small businesses; But agricultural production would be reduced by ~38% over 24 years under this scenario).

There should be reductions in groundwater use but we shouldn't be regulating people off. We should be talking about implementing a program that deals with reducing water usage by priority and not regulating people off or on. More of a mandatory conservation effort. Maybe we could reduce some amount by priority. For instance, water rights between 2010-2020 would have to reduce by 1afy, water rights between 2000-2010 would reduce by 0.5 afy, water rights between 1990-2000 would reduce by 0.25 afy, and rights older than that wouldn't need to reduce. I think there's a way to propose proportional cuts by priority. On or off is too extreme and permanent. How would you incorporate or address economic impacts associated with lost agricultural

production from proposed reductions? (Proposal: There are economic impacts for all groundwater uses, losses in agricultural production result in a losses to farm revenue [~38%] and tax revenue [still being assessed]).

I'm still not sure that the Department is actually considering and accounting for economic impacts. This reminds me of the spotted owl and how it ruined entire communities and economies and over time they found out that maybe they didn't actually know everything. There were permanent, irreversible impacts on peoples' lives. I don't think the Department is actually thinking holistically about this issue. They aren't considering the whole social and ecological system, they're just thinking about groundwater levels. I'd like to see them take a more holistic perspective. I'd like to actually hear their concern about how these decisions might destroy our community and economy. I'd like them to acknowledge that how we manage our uplands has an affect on our overall water budget. I know they aren't going to manage it, but it would be nice to know that they are trying to grapple with the complexity of this issue rather than just hiding behind their model.

How would you incorporate or address subarea specific considerations? For example, the sequencing of actions in various subareas or important considerations for different subareas (Proposal: All subareas have 24 years to implement reductions and 30 years to achieve stable conditions and the permissible total withdrawals are constrained by different factors depending

on what has the highest impact [impacts to domestic wells, discharge to springs and streams, or impacts to native vegetation]).

I don't know. This is tough. I bought my place for the water rights and thought I would be secure in those rights, but now maybe I'm going to be lumped in with a problem areas. I followed all the rules and don't have a problem at my place. I just don't think it's fair to maybe cut someone off because a model is saying that would help solve the problem. If my well is fine then that should matter. I don't know that it's fair that someone should be regulated off because someone on the other side of the basin is having problems.

What changes, if any, would you make to: The adaptive management plan? (Every 6 years, adjust based on groundwater levels only)

I appreciate that they are including adaptive management. I feel like the Department listened and is finally being responsive. The proposed timing is too fast though.

Outside of the rules, what are other important elements of adaptive management? And what commitments are needed from OWRD or others on those?

Since 200,000 acres of forest burned, I'm pretty optimistic about the water table. It's not a good way to manage forests or water obviously. Forests definitely have an impact on our water balance though. Our forests need to be properly managed and thinned. I believe that we will recover the water table just from the forest fires. The reason we're losing our water is forest mismanagement. This is why I don't want us to cut back too far too fast. I don't want to cut people off until we see what the response of the fire is. I think we're going to get more surface water and groundwater as a result of the fires. I am an ecosystem person and I know the relationship between uplands management and downstream water. I don't want the state to act too quickly so that we can't observe the results of this massive ecological change.

I honestly believe that in order to be fair we need to come up with a groundwater rights buyout program for the affected people. The state made a promise that water is available and people followed the rules and invested a lot of money. We need to make farmers and the community whole. The CREP program isn't quite enough money. This needs to be the focus. I'm worried about the broader community and economic impacts of reducing agriculture. This is the next spotted owl and I want to make sure we do this right and don't arbitrarily and irreversibly

devastate the community or economy. The persistent people who live out here keep suffering losses. We don't value rural people and rural communities or economies. We just keep making it harder for people to live in rural places and make a living off of natural resources. But we've all got to make a living, and we've all got to eat. We're all doing our part, but some of us are punished for where we choose to live or how we make a living.

What other feedback would you like to give us right now on the proposed management scenario?

I would like to see the Department be more cooperative. Most of us are willing to do lots of stuff and take some hits and reduce the amount of water we use. I'm willing to reduce my water use, I just need help. The voluntary approach hasn't been utilized and should be a priority.

Summary: Since 1994, federal and state governments in the western US have destroyed the logging industry and mismanaged forests in the name of protecting the northern spotted owl, which has allowed forests to become massively overgrown with vegetation. Vegetation captures and transpires increasing quantities of water from winter rain and snowfall as forests become overgrown. Groundwater recharge has been decreasing since 1994 and state governments are now blaming irrigated farming for the diminishing water tables. State governments are creating new water right rules to remove farms ability to use ground water that was allocated to them decades ago. Federal and state governments have created a cascade of mismanagement that is ultimately going to ruin small farms and lives in rural America.

1. In 1990, the northern spotted owl was officially listed as a threatened species under the Endangered Species Act (ESA). This designation triggered a series of legal and regulatory actions aimed at protecting the owl's habitat. The decision was largely driven by research indicating that logging, particularly in old-growth forests, was a primary factor in the owl population decline.
2. A major response to the spotted owl issue was the Northwest Forest Plan (NWFP), signed into law in 1994. This plan represented a significant shift in forestry management. The listing of the spotted owl prompted the USFS and other agencies to implement restrictions on logging in the owl's primary habitat—old-growth forests in the Pacific Northwest. These forests, characterized by large, old trees, provide the owl with nesting sites and ample prey. As a result, much of the logging that had taken place in these rural areas was either halted or greatly reduced.
3. Snowy mountains and adjacent uplands provide water for neighboring basins, some of which is used for irrigation by family farms. Forest policies have allowed forest ecosystems to grow wildly out-of-control. Massive overgrown forests have dramatically decreased the amount of water recharge from the mountains to the basins through increased transpiration. The water table is declining in these regions because of the loss of recharge water from nearby overgrown mountains.
4. While NWFP disrupted logging communities and destroyed an entire industry, the spotted owl populations have not recovered, but the people have struggled to survive by finding new businesses and opportunities. Most people were forced to move from rural areas to find jobs. Rural frontier communities have largely disappeared. But some people stayed and became farmers and are critical to supporting the remaining remnant rural communities.
5. Now, state governments are blaming farmer's use of irrigation as the factor reducing the static water table. Alarmingly, they are developing new rules to reduce the number of irrigated farms because they have mismanaged the adjacent forests and uplands, which caused a declining water table. State water resources are attempting to massively reduce irrigated farms' use of water by reducing water rights previously granted and/or reducing water amounts useable with each water right. The state government is destroying rural America by reducing irrigated farming by up to 70% in some areas. They are creating and enforcing rules and regulations that are only necessary because of the initial federal mismanagement of adjacent forests in response to declining spotted owl populations. This is terrible injustice to those who have invested their entire lives developing and operating farms.

Solution: Federal forest managers must restore proper forest management to allow water to recharge adjacent basin groundwater. State agencies must develop a slow and carefully designed system of incentives programs to encourage less ground water use by irrigators without punishing them for forest mismanagement and implement adaptive management programs based on monitoring the recovery of groundwater recharge. If the state wants to solve this solely on the backs of irrigators, they must be properly compensated for their losses.

MEINZ Kelly A * WRD

From: Roger Sheley <karmafarmer1@gmail.com>
Sent: Monday, August 11, 2025 11:22 AM
To: WRD_DL_rule-coordinator
Subject: Comments on Division 512 Rules

You don't often get email from karmafarmer1@gmail.com. [Learn why this is important](#)

August 9, 2025

Kelly Mainz – Rulemaking Coordinator

Oregon Water Resources Department

725 Summer St. N.E. Suite A

Salem, OR 97301-1271

Subject: Comments on Division 512 Rules

Dear Mr. Mainz,

My name is Roger Sheley and I am a researcher from the OSU Extension Eastern Oregon Agricultural Research Center. I have 40 years of experience in scientific research and am a trusted member of this community. I am also an irrigator in the basin, but still don't really know what subarea I'm in because the boundaries have moved and I haven't seen a detailed enough map to help me determine where I will be placed. I was a member of the RAC though did not feel that my involvement or contributions were meaningfully sought or used in the process. I am sending along comments that I have already sent to the Department during the last 6 months. Much of my feedback was not addressed in the process since there really wasn't time for RAC members to discuss and deliberate amongst ourselves. We really spent most of the time reacting to OWRD's presentations. From the beginning OWRD did not really seem interested in what most of the RAC members had to say and did not appear to value local knowledge and expertise.

OWRD has a responsibility to protect existing water rights, which is stated clearly in ORS 536.220 and ORS 537.525. This proposal does not protect existing water rights. This proposal does not adhere to the Department's own policies. This proposal penalizes law abiding water rights holders in areas where conditions are reasonably stable. The Department keeps changing the goal post without a clear basis to do so. We have repeatedly requested the Department's rationale for certain decisions that they never provide, they spend all their time and energy defending themselves and just tell us it's based on "best available science" and move on. This approach has completely undermined my trust in the science and the Department. This proposal is contrary to existing laws. It threatens water rights and threatens the economic vitality of our community. Nothing has been done by the Department to reduce economic impacts. They chose their preferred alternative and told us the impact it is going to have. They never meaningfully engaged the RAC to identify ways to reduce the economic impact as required by ORS 183.333 and ORS 183.540.

The Department has said that pumpage is less than recharge and so the whole basin is not actually overdrawn. Why doesn't the Department just cancel unused water rights, limit pumping to what is already being used, address the massive declines in Weaver Springs and call it a day? Why drag us all into a critical groundwater area and drag us all into a legal battle with the state? This is going to cost us a fortune, including the taxpayers. If the Department didn't want to deplete the groundwater resources, they shouldn't have determined that water is available

and given us all water rights. Why are we the ones being punished now for the state's poor decision-making? How can the state regulate us off if there is actually water available by their own definitions? This makes no sense to me.

The Department relied too much on its own model and not enough on community input. They never discussed the assumptions that are included in the model despite repeated requests to do

so. Models are only as good as the data and assumptions they include. Models can't predict the future. The amount of reductions they were proposing changed drastically from one meeting to another based on their "optimization" of the model and its prediction of future results, but many of us never really understood what they were optimizing for. The model results didn't really make sense to me and I have a lot of experience with models. The use of the model as the sole basis for developing and defending THEIR proposal is irresponsible and offensive to this community. They started to work with us through the Discussion groups, but then decided that they could do it better by themselves and cut the community out of THEIR process. This violates the spirit and intent of the law. I lived through the spotted owl controversy and this seems to be a repeat of that. How is it that the government can continue to insist that it alone knows what's best for us, make sweeping decisions, and leave us with the mess? What is the state doing to make this right?

My feedback and recommendations are as follows:

- I appreciate the ability to adaptively manage based on new data, but would like to see this occur more in a voluntary context rather than a regulatory one.
- Include local knowledge, expertise, and input into the boundary between the Northeast-Crane Subarea and the Silvies Subarea.
- Only areas that have data showing they meet the thresholds of a critical area should be included in a critical area. My wells are reasonably stable and have been for as long as I've been on my property. The rest of the basin should not be punished because one or two parts of the basin were overdeveloped. Areas that aren't critical should be encouraged to conserve water and the Department should partner with us on that rather than relying on regulation alone. We were promised conversations about this and never got it.
- Get local input or input from the RAC on how to reduce economic impacts to small businesses. The Department presented its results, but never asked for our feedback on how they could reduce impacts, which was an oversight.

Thank you for considering these comments.

Input/Feedback from Roger Sheley (5/9/25)

I think the RAC effort was a failed effort. There has not been the time to discuss ideas that may be useful. I never saw anything get ironed out. I only saw people proposing ideas or the Department making proposals and then asking everyone to react. There was no effective back and forth, there was no real discussion. This is a failed process in my opinion. I understand now that we're just there to listen and possibly provide some consultation. It's now clear that we were just there so that the Department could check a box. If the RAC was doing anything other than just trying to understand what the Department is trying to do then it failed. I still don't really understand how the Department came up with this proposal. It certainly doesn't reflect what I've been hearing in the RAC. Rarely have any ideas that were brought forward influenced the process. No one on the RAC is in agreement with what is being proposed. The Department was just going to do whatever they wanted to do and we were along for the ride.

What changes, if any, would you make to: The CGWA boundary rule language? Please

include specific language that you would like to see in rule, if possible.

It's wrong that all wells and all areas are lumped into the same critical groundwater Area. Each part of the basin is different. If there is an area with a problem then it should be its own critical groundwater area. If an area is not having problems then it shouldn't be a critical groundwater area. If data shows that an area is okay or is recovering, there should be the ability to lift the designation. If data shows that an area is not okay or is declining, then it should be a critical area. But really we need to be considering what's happening well by well and it doesn't seem fair that if my well has never declined and is in a part of the basin that is not declining that I would be included in a critical groundwater area and regulated off just because I'm lumped in with problem areas and problem wells.

What changes, if any, would you make to: The subarea rule language? Please include specific language that you would like to see in rule, if possible.

The model is not appropriate for making a determination for how many subareas we should have. There are so many scientifically and politically defensible ways to consider and delineate boundaries. I thought we were going to have more conversation about this. My place has not declined at all. I think I'm now lumped in with the Northeast-Crane area, which doesn't make sense. I have two wells about 10 feet apart at the same depth with different water levels. The geology of this system means that the wells are not as linked as people would think they are. Predicting with accuracy the linkage between wells isn't really possible at this point. I'm right on the edge between Silvies and Crane-Buchanan – there is ultimately an arbitrariness in these boundaries. The Department kept adjusting boundaries and changing the subareas and it wasn't always clear why or how that was happening. I kept thinking we were going to have more discussions about it, but the Department just keeps asking us to react to what they're proposing. I would like to request that the Department provide a clear, written, scientific basis/rationale for: 1) how they determined that the Harney Basin is a single groundwater reservoir, including the scientific definition of a "groundwater reservoir" and the scientific criteria they used; and 2) how the Department determined the seven different subareas. I ultimately don't understand how it's legal that my water hasn't dropped at all and they might regulate me off. Again, I did my research to make sure that I had a relatively senior priority date and it seems wrong that the Department can now come in and draw arbitrary boundaries that essentially change my priority and potentially regulate me off.

What changes, if any, would you make to: The target groundwater level trend and the date to achieve the target groundwater level trend rule language? Please include specific language that you would like to see in rule, if possible.

Continuous declines aren't sustainable. I think it's a good goal to not allow continuous declines. Groundwater levels should be allowed to fluctuate though. A relatively stable water table is what I'm after but it's not a concrete zero – some years it goes down and some years it goes up. We need to actually talk about the tradeoffs with all of these decisions. I don't think we've had enough conversation about all the real tradeoffs.

I don't get the median thing. You can't come up with confidence values with a median, you can with a mean. How confident can you actually be with the median? I much prefer the mean over the median. I really don't understand why they insist on a median. We need to account for variance over time. As long as the mean stays zero then there should be allowed variance around that mean. Zero is not realistic, groundwater levels are going to change. I'd like to see that taken into consideration.

What changes, if any, would you make to: The proposed permissible total withdrawal for

subareas rule language? Please include specific language that you would like to see in rule, if possible.

The PTW is totally made up. I don't give the model any credit. I would rather ignore that and keep making reductions until we achieve the goal. I don't think they actually have the information to actually know how much reductions will result in long-term stability. They're putting a lot of trust in the model. I wish they put as much trust in the community as they did in their model. They don't really seem to care at all what we say even though most of us have a lot of knowledge and experience managing this system. They feel pretty comfortable ignoring us. The PTW is really just a suggestion of what the Department thinks is needed. The PTW would make more sense to me as a range of numbers rather than a specific number to allow for that variation or fluctuation over time and to also account for inherent uncertainties. Rather than one number I recommend that the PTW be a range of use that the Department thinks would result in stable conditions, but stable needs to allow for some variation over time too. We're going to have good years and bad years, good decades and bad decades. There are a lot of factors affecting groundwater levels that I really don't think they're fully accounting for. There needs to be a process to evaluate and reevaluate the PTW. I would like to see the PTW determined on a 6 year basis rather than just having one number in rule.

What changes, if any, would you make to: The determination of initial allocation for groundwater rights rule language? Please include specific language that you would like to see in rule, if possible.

I'm fine with the initial allocation of 2.7 acre feet.

What changes, if any, would you make to: The proposed reduction schedule rule language? Please include specific language that you would like to see in rule, if possible.

First reduction should be 10% reduction max – they need to see what this burn did to us. My water went up to the surface. They need to implement the reductions in smaller increments over a longer period of time. The Department needs to minimize making huge, devastating, irreversible impacts. If you turn wells off, they probably aren't coming back online.

I don't think there is the economic, technical, or legal basis to limit reductions in order to protect springs. We don't know enough about the flow paths to actually understand what would impact springs. We don't have the baseline information or legal ability or economic ability to use springs as the limiting factor or indicators for how we're doing. They are important and we need to invest in learning more and figure out how to manage them, but this seems like too broad of a brush stroke, especially if there's no plan to even measure springs. We need to be able to fine tune reductions and look at how that is affecting static water levels. Really we should just start with the static groundwater levels and manage to those. Reductions need to be based on how the static groundwater levels are responding. They should try it at 10% reduction.

What changes, if any, would you make to: The proposed adaptive management rule language? Please include specific language that you would like to see in rule, if possible.

I would like to give the Department credit for finally thinking about and talking about an adaptive management approach. I think this is a step in the right direction and I appreciate that they're doing this. This is a positive development in the RAC process and I think the emphasis should be on adaptive management and how we do it over time to minimize negative impacts and achieve a realistic goal.

There should be a designated committee in Harney County that works with the state to collect and understand data over a 6 year period. This group should consult with the Department about

ways to implement the rules. If I had a choice, I would make a formal committee for groundwater management. Ongoing buy-in would be critical.

Monitoring has to be in association with someone designated from the community. There needs to be someone or a group alongside the Department to build trust and confidence in measurements. By having someone from the community join someone from the state in making the measurements – that will go a long way towards building trust. The state doesn't have any trust at all.

Every well with data should be considered, not just wells determined by the Department. At a meeting they told us all the data would be considered. This should be clear in the rules.

What changes, if any, would you make to: The proposed reduction schedule changes in the adaptive management rule language? Please include specific language that you would like to see in rule, if possible.

I have no confidence in the "envelope" determined by the model. They should rely on static groundwater level measurements. They need to use adaptive management and go really slow. Any other changes to Critical Groundwater Area rule language? Please include specific language that you would like to see in rule, if possible.

What changes, if any, would you make to: The proposed classification for new uses rule language? Please include specific language that you would like to see in rule, if possible.

What changes, if any, would you make to: Other Classification rule language? Please include specific language that you would like to see in rule, if possible.

What changes, if any, would you make to: Other Serious Water Management Problem Area (SWMPA) rule language? Please include specific language that you would like to see in rule, if possible.

I have come to the conclusion that there's no rationale for forcing everyone to buy \$4500 metering systems for every POD and then be managing on a seven subarea scale. You don't need us to spend that money on every point of diversion, you just need to know what the general numbers are. I've always advocated for OpenET or electrical bill approach to get an area wide view of what's going on. My view is that they are actually moving towards charging farmers for water use by the gallon – I'm convinced that's what is happening. At the international level they are trying to find a way to generate income/charge for use. The only rationale for wanting every POD to have a meter is that they intend to charge. That scares me. That's the same dialogue at the World Economic Forum – that's the hot dialogue right now in international forums.

Outside of the rules, what are other important elements of adaptive management? And what commitments are needed from OWRD or others on those?

Other Comments

In the 90s they quit managing the forest. The forest grew without active management meaning there was less water available for groundwater recharge. The forest got so out of control there was hardly any water in the basin. Last year 210,000 acres burned. That is 210,000 acres of trees that aren't holding back or consuming water. We had a lot of snow and early spring. For the next 15-20 years I think this is going to have a significant impact on groundwater recharge. Time will tell what forest management will look like and if we'll just go back to mismanaged forests. No harvest rules meant to protect the spotted owl meant that there was less water available for groundwater recharge and also contributed to the mega fires. I think the Department and USGS completely underestimated the degree to which the forest affects groundwater in the basin. This is a complex social-ecological system. We need to recognize it is

no longer the same system. Everything is on a cycle. There is still a lot we don't fully understand about these cycles and we have to remain adaptive.

They really haven't talked much about the deeper versus the shallower system. I don't know that native vegetation will really be all that affected by most of the declines because the most of the wells aren't drawing from the shallower groundwater where the plants are. Plus, we get surface water that recharges the shallow system for much of the basin most of the year. I really don't think that the groundwater is affecting native vegetation in the lowlands to the extent they suggest.

This needs to be a never-ending project. We need to make adjustments continually. The Department actually needs to treat us like partners in figuring this out.

Roger Sheleys's Feedback on the Proposed Management Scenario (From 2/9/25)

What changes, if any, would you make to: The number of subareas? (Proposal: 7 subareas)

The 15 subareas was fine. With the 7 subareas there are areas that have no problems right now combined with areas that have major problems. I really don't like that about the 7 subarea. We should be using the basin-wide priority system, but I don't agree with the model results that show that the one management area approach results in the least amount of allowed pumping. I don't think the model is being used appropriately. The model is not validated and even the data used did not have appropriate levels of statistics for any confidence. We must abandon the use of the models for clear scientific violations.

I bought property with water rights based on the priority system. I've invested all of my life savings in the farm based on the priority of the water date. I bought water rights that I thought were safe. I don't have any problems at all where I'm at and I'm maybe going to be squeezed into a problem area. I still really can't tell which area I'm in now. Senior users should be protected. I don't agree with the idea of singling out senior users. There are problems with all of the different proposals. 15 made sense to me from a management standpoint but 7 areas lumps too much area together. One subarea made sense to me because it would follow prior appropriation and be consistent with the rules under which we purchased the property and its associated water rights.

What changes, if any, would you make to: The stability success metric? (Proposal: Median/50th percentile of wells)

I really think we should be managing well by well versus managing it as a unit. My incentive to reduce water use is much lower because I'm tied to the actions of other people and the outcomes of their actions. This is a perfect example of the well documented "Tragedy of the Commons". The management unit they should be looking at is well by well just as the SWMPA metering are going to require. I might have two wells close to each other with one well that hasn't changed and one well that has gone dry. That can't be accounted for in the model or subarea concepts or the metric. We have contracts with the state for water rights, that's how this should be managed. My well doesn't have problems and I don't think it should be curtailed because someone else's well in the basin is having problems. Part of the reason I don't have problems is that I manage my water use very carefully. I minimize water use and am careful to over water. I have converted my pivots from MESA to LESA. Regardless, we should be managing our water well by well as defined by our current water rights.

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using mean because they have a way to determine the confidence in the number and we should use the mean and standard deviation as well.

What changes, if any, would you make to: The phasing timeline? (Proposal: Reductions are phased in every 6 years for 24 years).

This feels too fast. The 6-year interval is too fast. We should have 10-12 year intervals or longer. It's really difficult to tell in 6-year increments. I prefer a little slower approach where you reduce things and then you see if you can get an impact or outcome and just keep doing it over time. It's a never-ending iterative process but you're always aiming for balancing recharge and discharge over time. It's never-ending. Need to be slow and cautious. Need to continually look at what you did and what the response is and whether its heading in the right direction.

What changes, if any, would you make to: The timeline to achieve stability goal? (Proposal: 30 years to achieve the goal)

This is too fast. I think it needs to be 50 years.

How would you incorporate or address discharge to streams and springs? (Proposal: Permissible total withdrawals are constrained in each subarea to maintain more than 50-70% of discharge to streams and springs from a 2022 baseline).

Each of these are important considerations. We have been monitoring groundwater levels. We haven't been monitoring these other parameters. To add parameters on the front end that we don't know much about is presumptive. If we want to collect data and try to understand it more while we're looking at groundwater level trends, it might make sense to add criteria later. Unless your goal is to get rid of agriculture then you shouldn't use these new parameters. If they're important, continue to improve our understanding, find other ways to manage for them, and over time maybe it will make sense to add management criteria. For the first 10 years we need to

monitor impacts. We need to start a monitoring program and add parameters over time if we need to. We need to understand these criteria before adding them.

How would you incorporate or address changes in natural evapotranspiration? (Proposal: permissible total withdrawals are constrained in each subarea to maintain more than 60% of native vegetation maintains access to groundwater from a 2018 baseline).

The majority of native plants do not need access to ground water and its shown they rarely us it if it's not a riparian area.

How would you incorporate or address changes in dry domestic wells? (Proposal: Permissible total withdrawals are constrained in each subarea so that less than 170% of domestic wells lose access to water at their current depth from a 2018 baseline).

We should keep offering help to domestic well users (I am one too). People like MS. Moon may need a safe water storage system.

How would you incorporate or address changes in agricultural production? (Proposal: 24yrs of phasing, 30 years to achieve stability, and using subareas are designed to help reduce impacts to farms and associated small businesses; But agricultural production would be reduced by ~38% over 24 years under this scenario).

There should be reductions in groundwater use but we shouldn't be regulating people off. We should be talking about implementing a program that deals with reducing water usage by priority and not regulating people off or on. More of a mandatory conservation effort. Maybe we could reduce some amount by priority. For instance, water rights between 2010-2020 would have to reduce by 1afy, water rights between 2000-2010 would reduce by 0.5 afy, water rights between 1990-2000 would reduce by 0.25 afy, and rights older than that wouldn't need to reduce. I think there's a way to propose proportional cuts by priority. On or off is too extreme and permanent. How would you incorporate or address economic impacts associated with lost agricultural

production from proposed reductions? (Proposal: There are economic impacts for all groundwater uses, losses in agricultural production result in a losses to farm revenue [~38%] and tax revenue [still being assessed]).

I'm still not sure that the Department is actually considering and accounting for economic impacts. This reminds me of the spotted owl and how it ruined entire communities and economies and over time they found out that maybe they didn't actually know everything. There were permanent, irreversible impacts on peoples' lives. I don't think the Department is actually thinking holistically about this issue. They aren't considering the whole social and ecological system, they're just thinking about groundwater levels. I'd like to see them take a more holistic perspective. I'd like to actually hear their concern about how these decisions might destroy our community and economy. I'd like them to acknowledge that how we manage our uplands has an affect on our overall water budget. I know they aren't going to manage it, but it would be nice to know that they are trying to grapple with the complexity of this issue rather than just hiding behind their model.

How would you incorporate or address subarea specific considerations? For example, the sequencing of actions in various subareas or important considerations for different subareas (Proposal: All subareas have 24 years to implement reductions and 30 years to achieve stable conditions and the permissible total withdrawals are constrained by different factors depending

on what has the highest impact [impacts to domestic wells, discharge to springs and streams, or impacts to native vegetation]).

I don't know. This is tough. I bought my place for the water rights and thought I would be secure in those rights, but now maybe I'm going to be lumped in with a problem areas. I followed all the rules and don't have a problem at my place. I just don't think it's fair to maybe cut someone off because a model is saying that would help solve the problem. If my well is fine then that should matter. I don't know that it's fair that someone should be regulated off because someone on the other side of the basin is having problems.

What changes, if any, would you make to: The adaptive management plan? (Every 6 years, adjust based on groundwater levels only)

I appreciate that they are including adaptive management. I feel like the Department listened and is finally being responsive. The proposed timing is too fast though.

Outside of the rules, what are other important elements of adaptive management? And what commitments are needed from OWRD or others on those?

Since 200,000 acres of forest burned, I'm pretty optimistic about the water table. It's not a good way to manage forests or water obviously. Forests definitely have an impact on our water balance though. Our forests need to be properly managed and thinned. I believe that we will recover the water table just from the forest fires. The reason we're losing our water is forest mismanagement. This is why I don't want us to cut back too far too fast. I don't want to cut people off until we see what the response of the fire is. I think we're going to get more surface water and groundwater as a result of the fires. I am an ecosystem person and I know the relationship between uplands management and downstream water. I don't want the state to act too quickly so that we can't observe the results of this massive ecological change.

I honestly believe that in order to be fair we need to come up with a groundwater rights buyout program for the affected people. The state made a promise that water is available and people followed the rules and invested a lot of money. We need to make farmers and the community whole. The CREP program isn't quite enough money. This needs to be the focus. I'm worried about the broader community and economic impacts of reducing agriculture. This is the next spotted owl and I want to make sure we do this right and don't arbitrarily and irreversibly

devastate the community or economy. The persistent people who live out here keep suffering losses. We don't value rural people and rural communities or economies. We just keep making it harder for people to live in rural places and make a living off of natural resources. But we've all got to make a living, and we've all got to eat. We're all doing our part, but some of us are punished for where we choose to live or how we make a living.

What other feedback would you like to give us right now on the proposed management scenario?

I would like to see the Department be more cooperative. Most of us are willing to do lots of stuff and take some hits and reduce the amount of water we use. I'm willing to reduce my water use, I just need help. The voluntary approach hasn't been utilized and should be a priority.

MEINZ Kelly A * WRD

From: Brenda Smith <director@highdesertpartnership.org>
Sent: Wednesday, August 13, 2025 11:54 AM
To: WRD_DL_rule-coordinator
Subject: Harney County Div 512 Rules Public Comment Submission
Attachments: Ross Ketscher Div. 512 Public Comments submit.pdf

Some people who received this message don't often get email from director@highdesertpartnership.org. [Learn why this is important](#)

Dear OWRD,
I am submitting public comments for Ross Ketscher, who asked me to submit as he does not have a computer.
Thank you,
Brenda

Brenda Smith, Ph.D.
Executive Director
director@highdesertpartnership.org
541 589-4220
PO Box 252 Burns, OR 97720



Return public comments by August 7, 2025 via email or mail to the Water Resources Department

PROPOSED HARNEY BASIN GROUNDWATER POLICIES – WRITTEN COMMENT FORM

This written comment form can be used to help you formulate effective written public comments for the Division 512 Harney Basin Program Rules being proposed by the Oregon Water Resources Department, which will be used to manage and regulate groundwater use in the Harney Basin. The questions provided in this form address various aspects of the rules. Each question includes space to write your answer and some questions include options for you to consider. Reach out to Harmony Burright if you want help talking through or recording your comments (541-846-8863 / harmony@saltandfresh.solutions).

Public comments and related materials must be received no later than **August 7, 2025 at 5pm:**

By Email: WRD_DL_rule-coordinator@water.oregon.gov

By Mail: Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Your Name (required):	Ross R. Ketscher
Your Email (optional):	Ketscher@live.com
Your Phone (optional):	541-426-0511
Note: All personally identifiable information may be made public. Please do not include this information if you do not want it included in the public record. A first name and last initial must be included to be considered.	

Please check all interests that apply to you:

☒	I have at least one well that supplies groundwater to my home for domestic purposes.
☒	I have at least one well that that supplies groundwater to my livestock.
☒	I have at least one well that supplies groundwater to a non-farm business (e.g., store).
☒	I irrigate/grow crops with groundwater in the Harney Basin.
☐	I have a groundwater fed spring on my property that is important to me.
☒	I value groundwater contributions to the environment (e.g., springs and native vegetation).
☐	I value fish and wildlife in the basin, including those that benefit from groundwater.
☒	I use agricultural products that are produced with groundwater.
☒	I value the economic contributions of agricultural operations that use groundwater.

Question 1. Please tell us about yourself and describe why groundwater is important to you. If you use groundwater, describe how you use it.

See attachment

Answer to Question 1

I was born and raised on a cattle and farming operation in California. We moved to Oregon in 1972. That same year I started college (University of California at Davis - UCD) In 1976 I graduated in Ag Economics and moved back to the ranch in Wallowa County. We purchased the ranch in Harney County in the Spring of 1994.

We ranch in the Silver Creek Drainage & also run cattle on the West Warm Springs allotment (BLM). We have meadow ground irrigated by Silver Creek (Moon Reservoir). Along with our surface flood acreage we have a pivot that irrigates approximately 220 acres. We have one irrigation well and four smaller wells for livestock & domestic use in the Double O Valley.

On our allotment we have four livestock wells on deeded ground. They are all solar pumps. As one can see, ground water is very important to our operation.

Ross Ketscher

Question 3. The Water Resources Department proposes to designate the area in the map outlined in black as a **Critical Groundwater Area**, which would give them the authority to regulate or curtail/reduce groundwater use. Do you have any feedback on the boundaries or the basis for designating a Critical Groundwater Area described in the **Division 10 report**? (See 609-512-0041 in the proposed rules)

yes, I am opposed to the designated boundaries for critical water use. Our ranch is located in the Silver Creek area, below moon Reservoir. Our water table has shown little or no reduction in our static water level. We think it is wrong or illegal to classify our area with weaver springs or any other area that has shown critical reduction in water.

Question 4. The map on the previous page shows the seven proposed **subareas** that the Department will use to regulate groundwater use (with different levels of regulation for each area). Based on your knowledge of the basin, are there any changes you would suggest to the boundaries? Draw them on the map and describe the reason below. (See 609-512-0041 in the proposed rules)

The current map of designated areas seems adequate.

Question 5. Please describe **groundwater conditions** where you are and what changes in groundwater levels or other groundwater changes you have observed in the last decade. If you have not observed any changes, please note that. You are also welcome to note any questions you have.

We have not observed any changes to our water levels. They have been measured yearly.

Question 6. If you have been or expect to be **impacted by changing groundwater conditions**, please describe how you have been impacted.

Since our water level has not change we have not been impacted, yet. Future changes, primarily a reduction could it would greatly impact our production.

Question 9. The proposed initial allocation for municipal or quasi-municipal groundwater rights is 110% of water equal to 110% of the greatest single year in the previous five-year period. What feedback do you have on this proposal? (See 690-512-0060 in the proposed rules)

no comment

Question 10. The proposed permissible total withdrawal (PTW) for each of the seven subareas is described below. This is the amount of water that "represents the amount of water that the Water Resources Department has determined can achieve the target groundwater level trend by 2058. The Department may not reduce groundwater pumping to a value less than the permissible total withdrawal." Highlight your feedback about the level of reductions for each area below. A memo produced by the Department explores a different allocation between the Lower Blitzen-Voltage area and the Northeast-Crane area. What additional feedback do you have on these proposed levels of groundwater use (PTW) and reductions? (See 690-512-0050 in the proposed rules)

Weaver Springs	Lower Blitzen-Voltage	Northeast-Crane	Silver Creek	Silvies	Dog Mountain	Upper Blitzen
PTW: 4,800 afy	PTW: 8,300 afy	PTW: 35,000 afy	PTW: 15,200 afy	PTW: 21,200 afy	PTW: 4,200 afy	PTW: 100 afy
75% reduction from 2018 use	39-40% reduction from 2018 use	34% reduction from 2018 use	27-28% reduction from 2018 use	15-16% reduction from 2018 use	9-10% reduction from 2018 use	0% reduction from 2018 use
Too much?	Too much?	Too much?	Too much?	Too much?	Too much?	Too much?
Too little?	Too little?	Too little?	Too little?	Too little?	Too little?	Too little?
Just right?	Just right?	Just right?	Just right?	Just right?	Just right?	Just right?
I don't know	I don't know	I don't know	I don't know	I don't know	I don't know	I don't know

I think the proposed reduction of 27-28% reduction in the Silver Creek area is far too great. There has been no significant findings to warrant such a reduction. I think a 5% reduction would be more acceptable over a 10 year period.

Question 13. By 2028 all groundwater rights holders will be required to install a flowmeter to measure groundwater use and will be required to report groundwater use on an annual basis. A flowmeter must be installed on this timeframe in order to continue to legally use groundwater under existing rights. What feedback do you have on this requirement? Will you seek any assistance to meet this requirement? (See 690-512-0110 in the proposed rules)

possibly some financial assistance

Question 14. Under the proposed rules the only new uses that will be allowed are those uses that do not require water rights (i.e., permit exempt uses), such as domestic and stockwater wells, and non-consumptive geothermal uses. What feedback do you have on the proposed new uses? (See 690-512-0030 in the proposed rules)

I am agreeable to this.

Question 15. Please describe what personal impacts you expect these rules might have on you (either positive or negative).

all impact on me would be negative. we must realize we could be harming more than an individual but the economy of a whole county.

Question 16. Please describe what basin impacts you expect these rules might have on the broader basin or community (either positive or negative). (See the Fiscal Impact Statement).

Hannay Counties economy is based largely on Agriculture. Any change could drastically harm the entire county. We are talking main street business.



LOCALLY GROWN

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**OREGON
FARM
BUREAU**

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GROWING STRONG

August 13, 2025

Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301-1271
RE: Harney (Division 512) Rulemaking

Submitted electronically to WRD_DL_rule-coordinator@water.oregon.gov

Dear Mr. Mainz:

Oregon Farm Bureau (OFB) is the state's most inclusive agriculture organization, proudly representing over 6,500 family farms and ranches that produce more than 220 agricultural commodities. From hops and hazelnuts to cattle, cranberries, and timber with operations spanning from just a few acres to thousands, our members utilize all farming methods including organic, conventional, regenerative, biotech, and even no-tech. We are proud to submit these comments in support of our members in Harney and Grant Counties. Additionally, with the expectation that this regulatory exercise could be replicated or serve as a template in other basins in the future, we offer these comments on behalf of our entire state's membership as well.

It is well-documented that the problems stemming from the state's unfortunate and misguided systemic overallocation of groundwater in the Harney Basin have been years in the making. The corresponding body of work conducted by the Oregon Water Resources Department (OWRD) in collaboration with the U.S. Geological Survey and the subsequent outreach to affected water users is appreciated and acknowledges the severity and scale of the current issue and proposed regulatory actions. Mitigating to the fullest extent possible the burden that Harney Basin water users are being asked to carry is foundational to the proposed path forward encapsulated in the current Division 512 Rulemaking.

To better understand the local impact of the proposed rule requires a brief analysis of Harney County's agricultural economy in the context of its total economy. The U.S. Bureau of Economic Analysis (BEA) in the U.S. Department of Commerce reports that the total

Gross Domestic Product (GDP) of Harney County in 2023 was \$459 million.¹ Meanwhile, according to the 2023 Food and Agriculture Industries Economic Impact Study (EIS), the total economic output and impact by Harney County’s agricultural producers measured \$140 million, or over 30 percent of BEA’s estimated GDP.² Further, the agricultural sector in Harney County accounted for 1,020 total jobs and \$61 million in wages, for an average wage of \$59,804 which is well above the county’s median household income of \$48,338.³ Make no mistake about it, the agricultural sector plays a major role in the overall economic health of Harney County and is a central aspect of this proposed rule that cannot be overlooked, minimized, or ignored. Ultimately, we believe the 160 jobs and \$22 million estimated by OWRD to be lost over the 30-year life of the proposed rule as a result of the implementation of the proposed rule to be conservative and overly optimistic.

Below are three principal areas of concern and/or emphasis for OFB in the context of OWRD’s proposed Division 512 Rulemaking.

1. Embrace and Encourage Locally Driven, Voluntary, Incentive-Based Solutions

Long-term success in the Harney Basin Critical Groundwater Area (CGWA) will depend on the active engagement and conceptual buy-in from local stakeholders. OFB encourages OWRD to prioritize voluntary, incentive-based measures—such as cooperative conservation, rotational fallowing, and water right leasing—before relying on corrective control orders and contested case enforcement. Furthermore, local producer-driven approaches—such as those that seek to utilize OWRD’s Voluntary Agreement mechanism—can achieve meaningful reductions while protecting community trust and honoring property rights while simultaneously working toward a mutual goal. If local water users choose to pursue voluntary solutions that seek to achieve the same goals of OWRD, the agency should wholly support their effort. By integrating such tools into the Division 512 framework, OWRD can foster solutions that are both durable and broadly supported.

2. Mitigate Adverse Economic Impacts and Compensate for Loss

The scheduled reductions to reach “permissible total withdrawals” in each subarea, particularly the accelerated curtailment for Weaver Springs, present serious challenges for agricultural producers, local businesses, and public services dependent on a strong farm economy. As noted, agriculture is the backbone of Harney County’s economy, and sharp reductions in water availability—especially those front-loaded into early implementation years—will result in loss of production, job displacement, and reduced economic activity, likely in excess of OWRD’s estimates. OFB urges the Department to adopt complementary measures such as phased implementation adjustments, financial transition assistance, and

¹ <https://fred.stlouisfed.org/series/GDPALL41025>

² <https://feedingtheeconomy.com/county-level-data/>

³ https://data.census.gov/profile/Harney_County,_Oregon?g=050XX00US41025

compensation where lawful rights are impaired. This is particularly important when water use curtailment is mandatory rather than voluntary.

3. Adaptive Management Must be Anchored in Unbiased Scientific Evidence

We appreciate that the adaptive management framework recognizes the need to adjust reductions at checkpoints based on measured groundwater levels. However, OFB emphasizes that such determinations must be grounded in peer-reviewed, locally verified data that accurately reflect seasonal and hydrologic variability. Modeled “groundwater level change envelopes” should not override field-verified data, and any scheduled reductions should be reversible when on-the-ground measurements indicate recovery or stabilization. There is a virtually endless supply of combinations between real-world variables that exceed the capacity of even the most advanced models. As such, when there is conflict between modeled and real-world data, OWRD should defer to the real-world data. Additionally, sunset provisions should be built into restrictions that are not validated by continued unbiased scientific evidence.

Beyond the key areas of emphasis and/or concern outlined above, OFB also emphasizes that any reductions in water use—whether implemented through state-mandated schedules or voluntarily through locally-driven agreements—must not be used as a basis for the initiation of forfeiture proceedings or determining future forfeiture or abandonment of water rights. Protecting the legal security of water rights is essential to maintaining investment confidence in agricultural operations. Further, while OFB supports accurate and transparent water measurement and reporting, such requirements must be implemented in a manner that is cost-effective, provides adequate technical and financial assistance, and safeguards producer data from misuse. We recognize the importance of reliable flow metering and annual reporting for informed management decisions, but these tools must be used to support, not penalize, lawful right holders who are working in good faith to meet basin sustainability goals.

Finally, we suggest that when a contiguous parcel of land within the Harney Basin lies across two or more subareas, curtailment requirements for that parcel should be applied according to the provisions of the subarea with the least restrictive reduction schedule.

Thank you for the opportunity to convey our opinions on this critical issue and your thoughtful consideration of our comments.

Sincerely,



Ryan J. Krabill
Oregon Farm Bureau

MEINZ Kelly A * WRD

From: Sabrina Maki <makis@acwinc.net>
Sent: Wednesday, August 13, 2025 11:41 AM
To: WRD_DL_rule-coordinator
Cc: HUNTINGTON Geoff * GOV; FERRARI Chandra Alene * GOV; Rep Owens; Sen McLane; bill.hart@harneycountyor.gov; rob.frank@harneycountyor.gov; patty.dorroh@harneycountyor.gov; ericquaemptswrc@gmail.com; Woody Wolfe; joemollwrc@gmail.com; janleewrc@gmail.com; juliesmithermanwrc@gmail.com; kathykiharawrc@gmail.com; GALL Ivan K * WRD; WOODCOCK Douglas E * WRD; RANCIER Racquel R * WRD; janneumanwrc@gmail.com; Andy Root
Subject: Comments on Proposed Division 512 Rules
Attachments: Comments on Div 512 Rules - Root-Maki.pdf

Attached are comments on Division 512 Rules. Thank you for your time and appreciate the opportunity to comment.

Sincerely,

Andy Root
Sabrina Maki

August 13, 2025

Kelly Mainz
Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271
WRD_DL_rule-coordinator@water.oregon.gov

Subject: Comments on Proposed Division 512 Rules

Dear Mr. Mainz,

Our family is landowners and irrigators in the Basin. We have been in attendance at many of the RAC meetings the previous two years. And while there has been progress made during the RAC process, such as phased reductions and the proposed use of adaptive management over a thirty-year period there are also aspects of the proposed rules that we do not support. This has been a very frustrating and emotional process and it has not felt like our voices are being heard. The loud and well funded voices of conservation groups that do not care about our community have appeared to have greater sway during the RAC process. Many questions posed by members of the RAC and the community remain unanswered? Leaving us confused and frustrated as to how we got to the current proposal? And wondering where OWRD's accountability is? "Accountable" is an adjective meaning responsible or answerable. Why are the Harney County stakeholders being held to account for the Department's actions to overappropriate the basin? Those of us who grew up in this county learned from a young age how to be accountable and to take responsibility for our actions. You left the gate open, you gathered the cows that got out. We cannot go back and change what has happened but the Commission can proceed with caution, understanding that the Department has nothing to lose, while the stakeholders and community have everything to lose.

The groundwater depletion challenges in Harney County have developed over decades, exacerbated by many years of severe droughts. Expecting this complex issue to be resolved in a short period, without considering incremental and equitable solutions, is impractical and counterproductive. Other Western states are implementing gradual, collaborative reductions to water usage, ensuring that communities can adapt without catastrophic economic consequences. Rather than imposing abrupt and unfair restrictions, we urge the Department

and Commission to explore alternative management strategies. We are setting a precedent in the State of Oregon. We do not need to rush into rules that could have a cascading and catastrophic effect across the state of Oregon, and especially in Harney County.

There were previous proposals submitted by the Department, specifically; "Scenario B", during the RAC process, this scenario was modeled, data driven & achieved stability with less reductions but has been replaced by a much more aggressive proposal; the current draft rules. The current proposal will hit the water right holders the hardest. I think one thing that has failed to be recognized by many is that water rights are an investment. The investment was made on the premise that a water right could be developed and utilized. Water right holders were issued permits by the Department to legally develop and further their investments. These unreasonable regulations will destroy the value of these investments. The current proposed cuts are based on data and modeling that include years of drought and in my opinion, do not accurately reflect what is needed for a reasonably stable aquifer. **And any risk of the current proposal being wrong is borne by the farmers, ranchers and ultimately the community.** Meaning, if the agency is wrong they won't be able to correct those mistakes until family businesses already go bankrupt and our community goes beyond repair. If we want to err on the side of precaution, that precaution needs to be granted to those who've invested everything they have into their farms.

That being said, we do understand and agree that reductions in certain areas will likely be needed to stabilize groundwater levels, but do not believe that the conditions yet exist for this level of regulatory action, if the Department sticks to its own policies for groundwater allocation. We appreciate the proposed timeline to reach stability and the adaptive management approach but disagree with the level at which we will be regulated. Why is Harney County being held to a different standard of stabilization from the rest of the state? This has felt very personal. We have prepared, signed onto and submitted additional written comments specific to the Northeast Crane Subarea. We also strongly support the community alternative petition that will be submitted by Representative Owens in the September meeting and ask that the commission please consider this more reasonable and responsible approach to water management in the Harney Basin.

We feel strongly that Oregon has an opportunity to adopt a more balanced, logical, and long-term approach to water resource management-one that acknowledges past mistakes, protects livelihoods, and ensures sustainability. Our family is in its 5th generation in Harney County. This is our way of life. We want sustainable water management. Our family made the pivot from loggers to farmers after seeing our State's senseless forest management policies eradicate our beautiful high desert forests and decimate the economy in our community. We plead with the Commission and the Department to listen to stakeholders and collaboratively develop solutions that reflect the realities of our agricultural economy while protecting our natural resource endowment. Thank you for your time and consideration.

Sincerely,



Andy Root , ACW Inc.



Sabrina Maki, ACW Inc.

August 13, 2025

VIA EMAIL

Kelly Mainz
Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271
WRD_DL_rule-coordinator@water.oregon.gov

Subject: Comments on Proposed Division 512 Rules

Dear Mr. Mainz,

We, the undersigned individuals and entities, many of whom live or do business in the Northeast-Crane Subarea, respectfully submit the following comments on the proposed Division 512 rules.

We appreciate and generally support the Oregon Water Resources Department's ("Department's") proposed inclusion of subarea-specific permissible total withdrawals ("PTWs"), phased reductions in groundwater use over a 24-year period (2028-2052), and proposed use of adaptive management checkpoints over a thirty-year period to determine whether adjustments may be needed. However, we cannot support the proposed rules in their entirety for reasons stated below.

We request that the Department change the proposed rules to make them consistent with existing policies and better account for the serious economic impacts on our community.

Specifically, we offer the following comments:

- We understand the methodology the Department used to arrive at the proposed PTW of 35,000 acre-feet per year for the Northeast-Crane subarea and would strongly oppose any further reduction.
 - In an internal Memorandum from Ben Scandella to Jason Spriet, dated May 30, 2025 (three days after the Department published notice of the proposed Div. 512 rules), the Department indicated that an unnamed Rules Advisory Committee ("RAC") member "proposed an alternate set of PTW values that the Department could test with the model." The Department's memo presents this alternate scenario, which would reduce pumpage in the Northeast-Crane subarea by 45% instead of 34%, as the "RAC Alternate." OWRD vaguely discussed this potential alternative with the RAC at the last meeting.
- Proposed OAR 690-512-0060(2) should expressly prohibit an Initial Allotment for:
 - any acres within the authorized place of use of an existing, certificated groundwater right, that were not irrigated during at least one irrigation season between the years 2020 and 2024; and

- any undeveloped water use permits or portions thereof for which the applicable deadlines for completion of construction and application of water to beneficial use have passed and for which the permit holder has not filed a claim of beneficial use.
- Proposed OAR 690-512-0060 should confirm that prior to initiating the Harney Basin Critical Groundwater Area contested case proceedings, the Department will initiate cancellation proceedings for any certificated rights, permits, or portions thereof, that are ineligible for an Initial Allotment for reasons described above.
- We are concerned that the Department proposed a last-minute extension of the southern boundary of the Northeast-Crane subarea beyond Windy Point, without providing notice to the RAC and explaining the reasons for the proposed change. Between April 2023 and May 2025, the Department held 15 RAC meetings and had ample opportunity to engage with RAC members concerning this subarea boundary. The USGS study drew the east-west boundary line between the “Northern Region” and “Southern Region” through Windy Point. We are unaware of any hydrogeological basis or administrative justification for extending the Northeast-Crane subarea boundary beyond Windy Point.
- As drafted, the proposed rules would apply a different standard for determining the allowable rate of decline for groundwater levels than the Department applies in other parts of the state. To ensure consistency and fairness in the way the Department manages groundwater resources statewide, the Department should incorporate the definition of “Reasonably Stable Groundwater Levels” from OAR 690-008-0001(9)(average rate of decline of less than 0.6 feet per year and total decline of no more than 25 feet) into the proposed Division 512 rules and use it as the standard for initiating regulatory action in place of the proposed target groundwater level trend of “a median groundwater level decline rate of no more than 0 feet per year over a five-year period...” See proposed OAR 690-512-0041(1).
- The Department should revise the proposed rules to allow groundwater levels to reach a state of dynamic equilibrium between “Reasonably Stable Groundwater Levels” and “Excessively Declining Water Levels” (between 25 and 50 feet of decline), as defined in OAR 690-008, in subareas where the median groundwater level decline has already exceeded 25 feet. Adjust the permissible total withdrawal to reflect that goal. Confirm that the Department will not regulate groundwater uses in subareas where the median groundwater level decline has not yet exceeded 25 feet.
- Proposed OAR 690-512-0070(3) provides that “The schedule for reductions will be based on the relative priority dates of the water rights within each subarea, with the most junior water rights being curtailed first.” This does not go far enough. The rules should also confirm that the Department will not regulate individual water rights based on static water level permit conditions in a manner that is contrary to the prior appropriation doctrine.
- We consider a maximum total reduction for each subarea to be a critical component of the proposed rules. The current proposed definition of “Permissible Total Withdrawal” confirms that the “Department may not reduce groundwater pumping through regulatory orders to a

value less than the permissible total withdrawal.” See proposed OAR 690-512-0010(5). We support this provision and the certainty it provides.

- The Department should revise the proposed rules to allow irrigators with water rights that allow 1/80th cubic foot per second (“cfs”) to pump up to a maximum rate of 1/60th cfs per acre, provided that they do not exceed the maximum duty specified in their water rights and a maximum duty of 2.5 acre-feet per acre per year as provided in proposed OAR 690-512-0060(2)(a). In this basin, a maximum rate of 1/80th cfs per acre (which is the standard rate for most groundwater rights for irrigation) is insufficient to make beneficial use given evapotranspiration losses. If the Department regulates to 1/80th cfs irrigators will struggle to make economic beneficial use of groundwater. This issue has been previously raised and also presents a barrier to accessing federal funding to assist with upgrades to irrigation infrastructure that could result in water savings.
- The Department should revise the proposed rules to provide a pathway for seasonal water rights, such as irrigation rights, to be converted to year-round uses, including but not limited to quasi-municipal, commercial, nursery, or industrial uses – whether through direct transfer or through a “bucket for bucket” offset program. Given the proposed reductions in groundwater use in the Harney Basin, we will need maximum flexibility to repurpose existing water rights to meet the economic needs of our community.
- The proposed rules should expressly allow the Department to accept and approve groundwater permit applications for expanded group domestic use within the proposed Harney Basin Critical Groundwater Area consistent with Section 20 of Senate Bill 1154 (2025).
- The proposed rules should encourage voluntary reduction and reallocation of groundwater uses through the development of voluntary agreements among groundwater users. Among other things, the rules should authorize the parties to a voluntary agreement to take the following actions, so long as their combined water use does not exceed their combined maximum rates and duties:
 - Change the place of use, point(s) of appropriation, character of use, and season of use of groundwater rights, as authorized in a voluntary agreement, without going through the regular transfer application process;
 - Make excess water (in terms of both rate and duty) available to other groundwater users. For example, if an irrigator needs 2 acre-feet per acre in a given year, allow that irrigator to make the excess 0.5 acre-feet per acre available to other groundwater users in the same subarea; and
 - Spread excess water (in terms of both rate and duty) over a larger number of acres than would otherwise be allowed under the terms of a groundwater right for irrigation.

- Proposed OAR 690-512-0080 indicates the Department will use “representative wells with sufficient data as determined by the Department” to determine the median annual high groundwater level for each subarea, calculate the median groundwater level decline rate, and evaluate groundwater level changes. The proposed rules should be revised to provide a process by which the Department will consult with local experts and consider local knowledge in determining which wells are “representative wells with sufficient data.” Local knowledge would include but not be limited to input from local well drillers, pump contractors, registered geologists, certified water rights examiners and groundwater users. Static groundwater levels can vary dramatically from one well to another depending on a number of factors, including well depth, casing and seal depths, and other factors relating to well construction and local hydrogeology. Local knowledge and expertise will be of utmost importance and will build trust and credibility in the data.
- Proposed OAR 690-512-0041 and -0080 provide limited opportunities for public input. The Department should provide for regular, meaningful interaction with local stakeholders through the establishment of a community implementation collaborative that meets with the Department at least once per year to review available data, discuss trends, provide input regarding representative wells, and to establish trust and a good working relationship between Department staff and the regulated community.

We understand and agree that reductions will likely be needed to stabilize groundwater levels in this subarea, but do not believe that the conditions yet exist for regulatory action if the Department adheres to its own policies for groundwater allocation. We appreciate the proposed timeframe to reach stability and the adaptive management approach but disagree with the level at which groundwater should be stabilized and encourage the Department to apply existing standards used in other basins.

All of us are also domestic well users and care about our neighbors on domestic wells. We support continuation of the Domestic Well Relief Fund for Harney County. We would like to work with the Department to identify groundwater levels where groundwater supplies for domestic wells can be ensured in perpetuity. The Department’s data and the USGS study shows that the most significant declines are at depth and the shallow system is showing less declines. We would like to see the Department seriously consider a more sophisticated management approach that recognizes the difference between the shallow groundwater system and the deeper groundwater system. The hydrogeologic complexity is not adequately captured in the Department’s proposed approach.

According to ORS 536.310(1) and ORS 537.525(2), the Department is required by law to protect existing water rights. ORS 537.525 clearly states a preference for voluntary joint action with groundwater users prior to relying on the police power of the state. We urge the Department to honor previous commitments for collaboration and partnership as well as existing statutory requirements by first meaningfully pursuing joint action with groundwater users in the proposed Northeast-Crane subarea and other subareas prior to initiating regulatory action. We are committed to maintaining our way of life and sustainably managing groundwater resources for future generations.

We recognize that the Department has concerning data about parts of the Northeast-Crane subarea and has identified areas of decline that need to be addressed before they reach critical conditions. But the Department’s proposed reductions in groundwater use are excessive. According

to the Department's draft Groundwater Report for the Harney Basin Critical Groundwater Area Rulemaking (June 17, 2024), the Northern Region – an area larger than and encompassing most of the proposed Northeast-Crane subarea – is overdrawn by only 2,700 acre-feet per year when mean annual lowland recharge is compared to the 2017-2018 mean groundwater pumpage (p. 14).

The Department's proposal to reduce groundwater pumping in the Northeast-Crane subarea by more than 2,700 acre-feet accounts for groundwater discharging naturally to streams, springs and native vegetation and effectively gives those interests – which do not have water rights – a seat at the table. The draft groundwater report acknowledges that the definition of "overdraw" in OAR 690-008-0001 "does not consider the natural discharge component of the water budget." (p. 12). And yet the draft report takes natural discharge into account to estimate a basin-wide "yearly groundwater deficit" of 110,000 acre-feet.

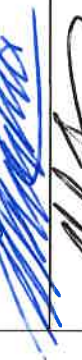
As currently drafted, the proposed rules have the potential to decimate our local economy, bankrupt local businesses, disrupt families, and destroy the social fabric and culture of our community. We recommend an approach that is more tailored to the reality and needs of each subarea. The proposed changes would adhere to existing law and policy and minimize economic impacts as required by law while preserving public welfare, safety, and health and ensuring adequate and safe supplies of groundwater for human consumption while also conserving maximum supplies of groundwater for agricultural and all other beneficial uses consistent with ORS 537.525. We appreciate the opportunity to comment and look forward to partnering with the Department on building a sustainable groundwater future for the Northeast-Crane subarea.

(Signatures on Following Pages)

Signed by:

First and Last Name	Representing/Affiliation
	Battle Creek Bank
	ACN, Inc.
 Louie Molt	Louie's Car Care Service LLC
	irrigator
JANE Shelley	Land Owner
Joseph Cleaves	Land Owner and Irrigator
Emilie Glascock	Land Owner
Kevin Thomas	Land owner
	Land owner
	Land owner
	Land owner resident
Jesse Vandestreet	Landowner
Ron Wedel	Landowner
Tared Wedel	Landowner

Signed by:

First and Last Name	Representing/Affiliation
 Ken W Bantz	Harvey Rancher
 Tony HACKETT	HARVEY County Well Driller
 MARK OWEN	irrigator
 Scott McMANUS	ACW Rocko Ready mix
 Anthony ELLIS	ACW Rental
 Byron E. Osborn	Land Owner
 Brady ELLIS	Land owner
 TED MARSHALL	BUSINESS OWNER
 Charles L. Stevens	Land Owner
 Craig NEHER	Ed Staub & Sons

Signed by:

First and Last Name	Representing/Affiliation
<i>Scott B. Black</i>	<i>Irrigator / Business Owner</i>
<i>Sandy Young</i>	
<i>Eric Young</i>	<i>Land Owner Irrigator</i>
<i>Cheryl Storkbeck</i>	<i>Resident of Burns</i>
<i>Dana Marshall</i>	<i>Land owner & irrigator</i>
<i>Sergiy Marshall</i>	<i>Land Owner & flood irrigation</i>

Signed by:

First and Last Name	Representing/Affiliation
Christopher Robbins	Robbins Equipment - Burns, Inc.
	Self
Don Duf	Self
	Harvey Electric Cooperative, Inc.

MEINZ Kelly A * WRD

From: Sabrina Maki <makis@acwinc.net>
Sent: Wednesday, August 13, 2025 11:52 AM
To: WRD_DL_rule-coordinator
Cc: HUNTINGTON Geoff * GOV; FERRARI Chandra Alene * GOV; Rep Owens; Sen McLane; bill.hart@harneycountyor.gov; rob.frank@harneycountyor.gov; patty.dorroh@harneycountyor.gov; ericquaemptswrc@gmail.com; Woody Wolfe; joemollwrc@gmail.com; janleewrc@gmail.com; juliesmithermanwrc@gmail.com; kathykiharawrc@gmail.com; GALL Ivan K * WRD; WOODCOCK Douglas E * WRD; RANCIER Racquel R * WRD; janneumanwrc@gmail.com; Andy Root
Subject: Northeast-Crane Subarea , Public Comments on Proposed Division 512 Rules
Attachments: NE - Crane Subarea Comments on Div 512 Rules.pdf

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Attached are comments on Division 512 rules, specific to the Northeast-Crane Subarea. Thank you for your time and appreciate the opportunity to comment.

July 23, 2025

**Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271**

Subject: Silvies Subarea Public Comments on Proposed Division 512 Rules

Dear Mr. Mainz,

Please accept these comments on behalf of the below signed individuals. Many of these individuals live in the Silvies Subarea or support businesses within the Silvies Subarea. We collectively request that the Department follow its existing policies and makes a greater effort to limit the economic impacts of proposed groundwater reductions in this area. Specifically, we make the following requests for the Division 512 rules:

- Either exclude the Silvies Subarea from the Critical Groundwater Area designation, or include the Silvies area in a Critical Groundwater Area designation for the purpose of protecting existing groundwater users from conditions that would lead to this area being “overdrawn.”
- Include the definition of “reasonably stable” and “overdrawn” from OAR 690-008-0001 in the Division 512 rules and apply it in a management context.
- Prioritize voluntary reductions in groundwater use through the development of a voluntary agreement in this Subarea rather than through regulatory action. Encourage and incentivize voluntary groundwater reductions of 10-15% through the rules.
- Set a threshold by which regulatory action would be triggered when a median of wells in this Subarea exceed “reasonably stable” conditions (e.g., exceed 25 ft or 0.6 ft/yr of decline). Do not pursue regulation until the thresholds have been met.
- Allow groundwater levels to stabilize at or around “reasonably stable” conditions (e.g., around 25 feet of decline). Adjust the permissible total withdrawal as necessary to reflect these thresholds.
- Allow cities to grow into their water rights while encouraging conservation.
- Provide a pathway for offset water to be used to secure a new quasi municipal water right for this area if it becomes a preferred method for delivering water to households.
- Specify the process by which the Department will consider local knowledge when making a determination of what constitutes “representative” wells for analysis. Actively partner with groundwater users to monitor groundwater levels and groundwater use and rebuild credibility and trust in Department data and science.

Groundwater users believe that groundwater in this Subarea is reasonably stable and that the conditions do not exist for regulatory action if the Department adheres to its own policies for groundwater allocation. As currently drafted, the current rules have the potential to decimate our local economy, bankrupt local businesses, disrupt families, and destroy the social fabric and culture of our community. We recommend an approach that is more tailored to the reality and

needs of each Subarea, that encourages and incentivizes conservation, and that reduces economic impacts.

According to ORS 537.525 and ORS 536.220 the Department is required by law to protect existing water rights. ORS 536.525 clearly states a preference for voluntary joint action with groundwater users prior to relying on the police power of the state. We urge the Department to honor previous commitments and existing statutory requirements and first meaningfully pursue voluntary joint action with groundwater users in the Silvies Subarea prior to pursuing punitive regulatory action. We are committed to maintaining our way of life and sustainably managing groundwater resources for current and future generations and believe that is possible in this Subarea.

For most of the rulemaking process the Department was proposing no reductions in the Silvies area. The Department changed its approach relatively late in the rulemaking process and is now requiring that the entire basin reach “durably stable” conditions (0 ft/yr of decline) within 30 years. The Department is currently proposing a 15% regulatory reduction from current estimated pumpage in the Silvies Subarea despite the fact that groundwater conditions meet the definition of “reasonably stable.” This level of reduction is not warranted for this Subarea based on existing policies and existing data.

Groundwater levels in the Silvies Subarea are reasonably stable as per the definition in OAR 690-008-0001. The Department’s own data shows that declines throughout this area have been minimal. The Groundwater Level Trends analysis performed in 2024 show that the median overall decline is -2.6 ft and the median rate of decline is -0.3 ft/yr. Notably, these trends are well within the range of what is considered reasonably stable by the Department. Data recently collected by groundwater users in the area are showing that groundwater levels in portions of the basin are stable depending on the timeframe used for analysis and some wells have even risen in recent years. No available data show that this area has met the criteria for designation as a critical groundwater area. There are no wells that have met the Department’s threshold for declining excessively or excessively declined.

We recognize that the Department has concerning data about parts of the Northeast-Crane area and has identified areas of decline that need to be addressed before they reach critical conditions. We also understand that the Silvies Subarea is a recharge area for the Northeast-Crane area. That being said, if the basin is treated as “one groundwater reservoir” as the Department suggests, the whole basin is not overdrawn by the Department’s own definition because estimated pumpage is less than recharge. If the area is treated separately, which we believe it should be, the groundwater study shows that this “region” is overdrawn by only -2,700 afy when measured against current pumpage. Fortunately, this is far less than the -96,454 afy of overuse that would occur if all groundwater rights had been fully developed. We commend the Department for focusing attention and effort on our basin before things could worsen, but disagree with the severity of the Department’s proposed approach.

Groundwater users have been responsibly using water within the terms and conditions of their permits for decades. The Department previously made a determination in this area that groundwater is available, within the capacity of the resource, and that groundwater use was in the public interest as required by ORS 537.621. We urge the Department and Commission to adhere to existing statutes and rules rather than pursuing unprecedented groundwater reductions through regulations that lack a defensible legal and technical basis.

While we do not agree with inclusion of this Subarea in the Critical Groundwater Area boundary, if it is included in the Critical Groundwater Area, then existing groundwater users should be protected and the permissible total withdrawal should be set at an updated estimate of current pumpage. We do not agree that reducing groundwater use via regulation is warranted. Within this area we believe that voluntary reductions are possible and beneficial and should be the preferred approach rather than regulation. Many groundwater users within this area have proactively implemented water conservation measures and have invested in measures to responsibly and sustainably use groundwater in this Subarea. Conservation should continue to be encouraged and supported within this Subarea rather than pitting groundwater users against one another or creating an atmosphere of uncertainty that will stifle innovation. If groundwater levels are no longer considered to be “reasonably stable” then the rules should specify the proposed regulatory actions that could be taken once that threshold is met. This backstop will incentivize joint action to prevent groundwater conditions from reaching that point.

Within this Subarea, we are not aware of homes or stockwater wells that have lost access to groundwater due to declining groundwater levels, except for very shallow wells or wells with well construction issues. The City of Burns and Hines have not reported any concerns about groundwater levels for municipal supplies. Both cities should be allowed to continue to grow into their water rights while implementing conservation practices to make the best use of groundwater resources. Within this Subarea there should also be a clear pathway in the rules for bringing new water rights online where offset water can be identified, as was included in the current Division 512 rules. The Silvies Subarea is where additional economic development is most likely to occur in the basin and the State should look for creative ways to support this development while ensuring sustainable groundwater management.

These proposed changes would adhere to existing law and policy and minimize economic impacts as required by law while preserving public welfare, safety, and health and ensuring adequate and safe supplies of groundwater for human consumption while also conserving maximum supplies of groundwater for agricultural and all other beneficial uses consistent with ORS 537.525. We appreciate the opportunity to comment and look forward to partnering with the Department on building a sustainable groundwater future for the Silvies Subarea.

Signed by:

First and Last Name	Representing/Affiliation
<i>Ernst B. Beckman</i>	<i>Irrigator/Business owner</i>
<i>Martin A. Urgan</i>	<i>Urgan Cattle Company</i>
<i>Adam Bomper</i>	<i>Land owner</i>
<i>Mardelle Stewart</i>	<i>Land Owner Irrigator</i>
<i>Karin A. Goss</i>	<i>City of Hous Resident</i>
<i>Carl Molt</i>	<i>Farmer Irrigator</i>
<i>Carl Louie Molt</i>	<i>Louie's Cattle Service LLC</i>
<i>Sandy Young</i>	<i>Land Landowner Irrigator</i>
<i>Ernie Young</i>	<i>Land Owner Irrigator</i>
<i>Cheryl Starbuck</i>	<i>Resident of Burns</i>
<i>Quinn Wense</i>	<i>Land owner & irrigator</i>
<i>Leanne Marshall</i>	<i>Land owner & flood irrigation</i>
<i>Sabrina Maki</i>	<i>ACW, Inc.</i>

Signature Page

MEINZ Kelly A * WRD

From: Sabrina Maki <makis@acwinc.net>
Sent: Wednesday, August 13, 2025 11:46 AM
To: WRD_DL_rule-coordinator
Cc: HUNTINGTON Geoff * GOV; FERRARI Chandra Alene * GOV; Rep Owens; Sen McLane; bill.hart@harneycountyor.gov; rob.frank@harneycountyor.gov; patty.dorroh@harneycountyor.gov; ericquaemptswrc@gmail.com; Woody Wolfe; joemollwrc@gmail.com; janleewrc@gmail.com; juliesmithermanwrc@gmail.com; kathykiharawrc@gmail.com; GALL Ivan K * WRD; WOODCOCK Douglas E * WRD; RANCIER Racquel R * WRD; janneumanwrc@gmail.com; Andy Root
Subject: Silvies Subarea Public Comments on Proposed Division 512 Rules
Attachments: Silvies Subarea - Comments on Div 512 Rules.pdf

Some people who received this message don't often get email from makis@acwinc.net. [Learn why this is important](#)

Attached are comments on Division 512 rules, specific to the Silvies Subarea. Thank you for your time and appreciate the opportunity to comment.

From: Sara Pritt <winds4sw@gmail.com>
Sent: Saturday, August 9, 2025 9:38 PM
To: WRD_DL_rule-coordinator
Subject: Please Adopt Strong Rules to Stabilize Groundwater Levels in the Harney Basin

Dear Kelly Mainz,

Dear Oregon Water Resources Department,

I am writing about the rules the Oregon Water Resources Department (OWRD) recently proposed to address groundwater declines in the Harney Basin.

I support stabilizing groundwater levels in the Harney Basin, which would provide the basin with a more sustainable future and help prevent additional impacts to groundwater dependent ecosystems such as springs, streams, wetlands, and native vegetation. It would also reduce the number of existing domestic wells that would be dried up due to irrigation pumping.

I offer the following additional comments:

1. I place a high value on the springs, streams, and other groundwater dependent ecosystems in the Harney Basin, and all of the fish, wildlife, and plants that rely on these ecosystems.
2. These groundwater dependent ecosystems have already been significantly degraded from the over-pumping of groundwater. Please ensure that these systems are protected in the Division 512 rules for the Harney Basin.
3. I support the requirement in the Proposed Rules for water use measurement and reporting on all non-exempt groundwater rights in the basin.
4. OWRD should not adopt rules that would dry up additional existing domestic wells, especially when it has no viable program in place to help these residents who will lose their drinking water.
5. Please consider strengthening the Proposed Rules by adopting a tighter schedule for imposing the lower pumping amounts ("Permissible Total Withdrawals"). I encourage a shorter timeline than the proposed 30 years to achieve stable groundwater levels in light of the major declines that have already occurred, and the significant impacts to groundwater dependent ecosystems and domestic wells that this has already caused.

Thank you for your kind attention and consideration of my comments.

Sincerely,
Sara Pritt
343 W 16th Ave
Eugene, OR 97401

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

PROPOSED HARNEY BASIN GROUNDWATER POLICIES – WRITTEN COMMENT FORM

This written comment form can be used to help you formulate effective written public comments for the Division 512 Harney Basin Program Rules being proposed by the Oregon Water Resources Department, which will be used to manage and regulate groundwater use in the Harney Basin. The questions provided in this form address various aspects of the rules. Each question includes space to write your answer and some questions include options for you to consider. Reach out to Harmony Burright if you want help talking through or recording your comments (541-846-8863 / harmony@saltandfresh.solutions).

Public comments and related materials must be received no later than **August 7, 2025 at 5pm:**

By Email: WRD_DL_rule-coordinator@water.oregon.gov

By Mail: Kelly Meinz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Your Name (required): Scott W. Houck
Your Email (optional): houck.scott2@yahoo.com
Your Phone (optional): 541-589-4250
Note: All personally identifiable information may be made public. Please do not include this information if you do not want it included in the public record. A first name and last initial must be included to be considered.

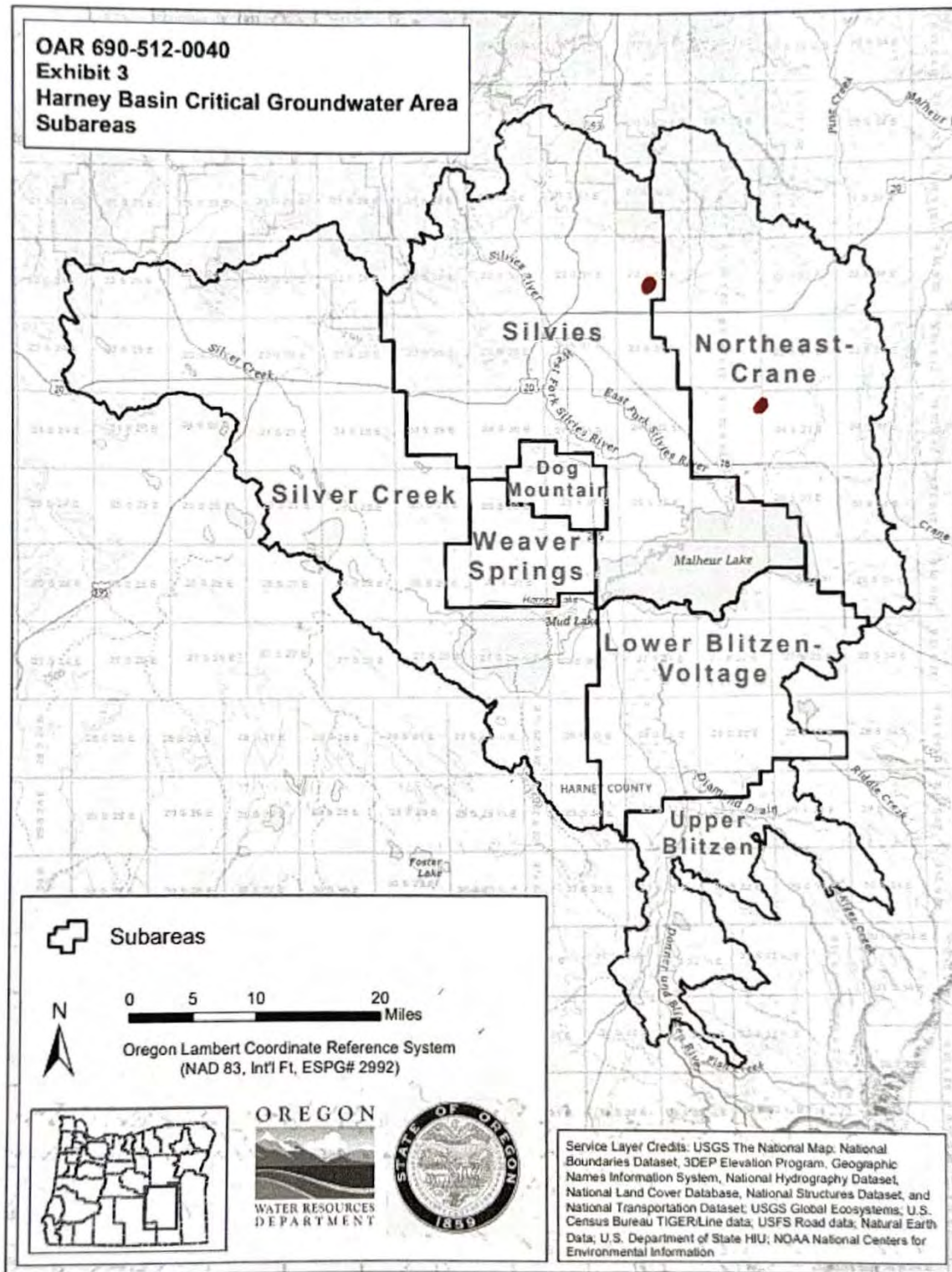
Please check all interests that apply to you:

☒	I have at least one well that supplies groundwater to my home for domestic purposes.
☒	I have at least one well that that supplies groundwater to my livestock.
☐	I have at least one well that supplies groundwater to a non-farm business (e.g., store).
☒	I irrigate/grow crops with groundwater in the Harney Basin.
☐	I have a groundwater fed spring on my property that is important to me.
☒	I value groundwater contributions to the environment (e.g., springs and native vegetation).
☒	I value fish and wildlife in the basin, including those that benefit from groundwater.
☒	I use agricultural products that are produced with groundwater.
☒	I value the economic contributions of agricultural operations that use groundwater.

Question 1. Please tell us about yourself and describe why groundwater is important to you. If you use groundwater, describe how you use it.

RANCHER - ELECTRICITY, OUR LIFE, LIVESTOCK, CROPS
GARDEN RELIES ON GROUND WATER

Question 2. If you use groundwater in the Harney Basin, mark with a color dot on the map provided where you use groundwater (this can be a rough approximation).



Question 3. The Water Resources Department proposes to designate the area in the map outlined in black as a **Critical Groundwater Area**, which would give them the authority to regulate or curtail/reduce groundwater use. Do you have any feedback on the boundaries or the basis for designating a Critical Groundwater Area described in the **Division 10 report**? (See 609-512-0041 in the proposed rules)

N/C

Question 4. The map on the previous page shows the seven proposed **subareas** that the Department will use to regulate groundwater use (with different levels of regulation for each area). Based on your knowledge of the basin, are there any changes you would suggest to the boundaries? Draw them on the map and describe the reason below. (See 609-512-0041 in the proposed rules)

N/C

Question 5. Please describe **groundwater conditions** where you are and what changes in groundwater levels or other groundwater changes you have observed in the last decade. If you have not observed any changes, please note that. You are also welcome to note any questions you have.

I HAVE NOT HAD ANY ISSUES IN THE LAST TEN YEARS. THE ONLY WELL WE HAVE HAD DRY UP WAS ABOUT 30 YEAR AGO ABOUT SIX MILES SOUTH OF HYW 20 ON NEWTON ROAD

Question 6. If you have been or expect to be **impacted by changing groundwater conditions**, please describe how you have been impacted.

I expect to be impacted because I believe a lot of the water usage that depleted the water in the weaver springs area has been transferred to the N.E. CRANE unit that is right next door to some of my property

Question 7. The Water Resources Department proposes to achieve the groundwater management goal of durably stable groundwater levels (0 feet per year of decline) by the year 2058 for the entire basin by curtailing groundwater use in 6-year intervals. Do you have feedback on the groundwater level goal and target groundwater level trend? (See 609-512-0041 in the proposed rules)

X	I support the groundwater management goal and target groundwater level trend as proposed.
	I support the target groundwater level trend, but I would like to see more time allowed to achieve the goal. Year achieved:
	I support the target groundwater level trend, but I would like to see the goal achieved in less time on a quicker timeline. Year achieved:
	I think minor declines are acceptable and should be allowed. Acceptable amount of decline (in total feet or feet per year):
	I would like to see groundwater levels come back up or recover. Desired amount of recovery (in feet):
	I would like to be able to see groundwater levels be allowed to fluctuate between certain levels (+/- within a certain "band" of acceptable declines)

I THINK MORE GROUND WATER LEVEL MEASUREMENTS NEED TO BE TAKEN AND OBSERVED TO SEE HOW LEVELS ARE AFFECTED IN THE FIRST 10 YEARS THEN ADJUST USAGE ACORDINGLY

Question 8. The proposed initial allocation (duty) for groundwater irrigation rights is 2.5 acre feet of water per acre for acres that were irrigated (wetted acres) sometime between 2020-2024. What feedback do you have on this proposal? (See 690-512-0060 in the proposed rules)

X	I support the initial allocation of 2.5 acre feet for groundwater irrigation rights.
	I think the initial allocation should be greater than 2.5 acre feet. Proposed amount:
	I think the initial allocation should be less than 2.5 acre feet. Proposed amount:
	I support that wetted acres should be calculated based on use between 2020-2024.
	I think wetted acres should be calculated based on a different time period. Suggested time period:

I FEEL IF AN IRRIGATOR FEELS THEY COULD BE BENEFITTED BY SWITCHING TO LESS WATER INTENSIVE CROPS THEY SHOULD HAVE THE OPTION TO USE THAT GIVEN AMOUNT OF WATER OVER MORE ACREGE.

Question 9. The proposed initial allocation for municipal or quasi-municipal groundwater rights is 110% of water equal to 110% of the greatest single year in the previous five-year period. What feedback do you have on this proposal? (See 690-512-0060 in the proposed rules)

N/C

Question 10. The proposed permissible total withdrawal (PTW) for each of the seven subareas is described below. This is the amount of water that “represents the amount of water that the Water Resources Department has determined can achieve the target groundwater level trend by 2058. The Department may not reduce groundwater pumping to a value less than the permissible total withdrawal.” Highlight your feedback about the level of reductions for each area below. A memo produced by the Department explores a different allocation between the Lower Blitzen-Voltage area and the Northeast-Crane area. What additional feedback do you have on these proposed levels of groundwater use (PTW) and reductions? (See 690-512-0050 in the proposed rules)

Weaver Springs	Lower Blitzen-Voltage	Northeast-Crane	Silver Creek	Silvies	Dog Mountain	Upper Blitzen
PTW: 4,800 afy	PTW: 8,300 afy	PTW: 35,000 afy	PTW: 15,200 afy	PTW: 21,200 afy	PTW: 4,200 afy	PTW: 100 afy
75% reduction from 2018 use	39-40% reduction from 2018 use	34% reduction from 2018 use	27-28% reduction from 2018 use	15-16% reduction from 2018 use	9-10% reduction from 2018 use	0% reduction from 2018 use
Too much?	Too much?	Too much?	Too much?	Too much?	Too much?	Too much?
Too little?	Too little?	Too little?	Too little?	Too little?	Too little?	Too little?
Just right?	Just right?	Just right?	Just right?	Just right?	Just right?	Just right?
I don't know	I don't know	I don't know	I don't know	I don't know	I don't know	I don't know

I Feel All OF This Should Be Flexible
AFTER OBSERVING RESULTS AFTER THE FIRST
TEN YEARS OF ACTION

Question 11. The reductions in each subarea will be phased in over time following a proposed reduction schedule, with the largest percent of reductions made initially and later reductions phased in over 6 year intervals based on existing groundwater level trends to ensure that groundwater levels are on track to achieve the groundwater management goal. Reductions will be based on priority date using the initial allocation as a starting point. What feedback do you have on the proposed reduction schedule? (See OAR 690-512-0070 in the proposed rules).

	2028	2034	2040	2046	2052	2058
Other Subareas	40% of total reductions	30% of total reductions	15% of total reductions	10% of total reductions	5% of total reductions	Stability achieved
Weaver Springs	75% of total reductions	25% of total reductions	--	--	--	--

☒	I support the proposed reduction schedule (percent reductions and implementation timeframe).
☐	I would like to see higher reductions implemented in the near-term.
☐	I would like to see lower reductions implemented in the near-term.
☐	I would like to see 20% reductions implemented at each step.
☐	I would like to see all reductions implemented immediately.
☐	I would like to see a shorter implementation timeframe (achieve stability sooner).
☐	I would like to see a longer implementation timeframe (longer period to achieve stability).
☒	If groundwater levels have not been declining in a subarea, I would like to see a grace period during the first 6-year period where no reductions are implemented.

Question 12. The Department is proposing to follow an adaptive management approach for implementing reductions informed by groundwater level trends. If groundwater level trends are "on track" then no adjustments would be made. This approach allows the Department to make changes to the reductions to achieve the goal. Reductions could be adjusted up or down depending on how groundwater levels change over the previous 6 years. What feedback do you have on the adaptive management approach? (See 690-512-0080 in the proposed rules)

I would APPROVE OF THAT APPROACH

Question 13. By 2028 all groundwater rights holders will be required to install a flowmeter to measure groundwater use and will be required to report groundwater use on an annual basis. A flowmeter must be installed on this timeframe in order to continue to legally use groundwater under existing rights. What feedback do you have on this requirement? Will you seek any assistance to meet this requirement? (See 690-512-0110 in the proposed rules)

IF ASSISTANCE IS AVAILABLE
I WOULD PROBABLY USE IT.

Question 14. Under the proposed rules the only new uses that will be allowed are those uses that do not require water rights (i.e., permit exempt uses), such as domestic and stockwater wells, and non-consumptive geothermal uses. What feedback do you have on the proposed new uses? (See 690-512-0030 in the proposed rules)

I THINK MAKE SOME NEW USES SHOULD
BE LOOKED AT ON A CASE BY CASE BASIS ACCORDING
TO HOW THE USE MIGHT BENEFIT THE
COMMUNITY AS A WHOLE. SUCH AS LOCAL FARM
PRODUCE - THERMAL SWIMMING - AQUA CULTURE
FOR FOOD OR RECREATIONAL FISHING ETC.

Question 15. Please describe what personal impacts you expect these rules might have on you (either positive or negative).

COULD PREVENT ME FROM HAVING FUTURE
WATER LOSS PROBLEMS IN STOCK WELLS
AND DOMESTIC & IRR. WELL.

Question 16. Please describe what basin impacts you expect these rules might have on the broader basin or community (either positive or negative). (See the Fiscal Impact Statement).

THE ACTIONS THAT ARE BEING TAKEN
NOW WOULD HAVE BEEN MUCH LESS
PAINFUL IF ACTION WOULD HAVE BEEN
TAKEN 30 YEARS AGO WHEN PRAW DOWNS
WERE FIRST BEING NOTICED. BUT BETTER
LATE THEN NEVER

Question 17. Describe actions that you would like the Department to consider that could mitigate or minimize anticipated impacts to you or the basin. This could include support for proposed policies or changes to the proposed policies.

Be Flexible

Question 18. When you look into the future, what is most important to you? What do you hope to see for yourself and for the basin? What are you most concerned about?

STABILIZED WATER LEVELS

Question 19. What else is important for you to communicate to the Department?

THE OTHER AGENCIES THAT CAN HELP
MITIGATE THE FINANCIAL IMPACT
NEED TO BE GIVEN TIME TO IMPLEMENT
PROGRAMS TO HELP

Question 20. Do you have any other feedback on the proposed rules or groundwater management?

NO

For questions about the proposed rules, please contact Kelly Mainz at the Water Resources Department (WRD_DL_rule-coordinator@water.oregon.gov or 971-718-7087).

For assistance with developing effective written comments, please reach out to Harmony Burright with the High Desert Partnership who can help (541-846-8863 or harmony@saltandfresh.solutions).

July 23, 2025

**Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271**

Subject: Silvies Subarea Public Comments on Proposed Division 512 Rules

Dear Mr. Mainz,

Please accept these comments on behalf of the below signed individuals. Many of these individuals live in the Silvies Subarea or support businesses within the Silvies Subarea. We collectively request that the Department follow its existing policies and makes a greater effort to limit the economic impacts of proposed groundwater reductions in this area. Specifically, we make the following requests for the Division 512 rules:

- Either exclude the Silvies Subarea from the Critical Groundwater Area designation, or include the Silvies area in a Critical Groundwater Area designation for the purpose of protecting existing groundwater users from conditions that would lead to this area being “overdrawn.”
- Include the definition of “reasonably stable” and “overdrawn” from OAR 690-008-0001 in the Division 512 rules and apply it in a management context.
- Prioritize voluntary reductions in groundwater use through the development of a voluntary agreement in this Subarea rather than through regulatory action. Encourage and incentivize voluntary groundwater reductions of 10-15% through the rules.
- Set a threshold by which regulatory action would be triggered when a median of wells in this Subarea exceed “reasonably stable” conditions (e.g., exceed 25 ft or 0.6 ft/yr of decline). Do not pursue regulation until the thresholds have been met.
- Allow groundwater levels to stabilize at or around “reasonably stable” conditions (e.g., around 25 feet of decline). Adjust the permissible total withdrawal as necessary to reflect these thresholds.
- Allow cities to grow into their water rights while encouraging conservation.
- Provide a pathway for offset water to be used to secure a new quasi municipal water right for this area if it becomes a preferred method for delivering water to households.
- Specify the process by which the Department will consider local knowledge when making a determination of what constitutes “representative” wells for analysis. Actively partner with groundwater users to monitor groundwater levels and groundwater use and rebuild credibility and trust in Department data and science.

Groundwater users believe that groundwater in this Subarea is reasonably stable and that the conditions do not exist for regulatory action if the Department adheres to its own policies for groundwater allocation. As currently drafted, the current rules have the potential to decimate our local economy, bankrupt local businesses, disrupt families, and destroy the social fabric and culture of our community. We recommend an approach that is more tailored to the reality and

needs of each Subarea, that encourages and incentivizes conservation, and that reduces economic impacts.

According to ORS 537.525 and ORS 536.220 the Department is required by law to protect existing water rights. ORS 536.525 clearly states a preference for voluntary joint action with groundwater users prior to relying on the police power of the state. We urge the Department to honor previous commitments and existing statutory requirements and first meaningfully pursue voluntary joint action with groundwater users in the Silvies Subarea prior to pursuing punitive regulatory action. We are committed to maintaining our way of life and sustainably managing groundwater resources for current and future generations and believe that is possible in this Subarea.

For most of the rulemaking process the Department was proposing no reductions in the Silvies area. The Department changed its approach relatively late in the rulemaking process and is now requiring that the entire basin reach “durably stable” conditions (0 ft/yr of decline) within 30 years. The Department is currently proposing a 15% regulatory reduction from current estimated pumpage in the Silvies Subarea despite the fact that groundwater conditions meet the definition of “reasonably stable.” This level of reduction is not warranted for this Subarea based on existing policies and existing data.

Groundwater levels in the Silvies Subarea are reasonably stable as per the definition in OAR 690-008-0001. The Department’s own data shows that declines throughout this area have been minimal. The Groundwater Level Trends analysis performed in 2024 show that the median overall decline is -2.6 ft and the median rate of decline is -0.3 ft/yr. Notably, these trends are well within the range of what is considered reasonably stable by the Department. Data recently collected by groundwater users in the area are showing that groundwater levels in portions of the basin are stable depending on the timeframe used for analysis and some wells have even risen in recent years. No available data show that this area has met the criteria for designation as a critical groundwater area. There are no wells that have met the Department’s threshold for declining excessively or excessively declined.

We recognize that the Department has concerning data about parts of the Northeast-Crane area and has identified areas of decline that need to be addressed before they reach critical conditions. We also understand that the Silvies Subarea is a recharge area for the Northeast-Crane area. That being said, if the basin is treated as “one groundwater reservoir” as the Department suggests, the whole basin is not overdrawn by the Department’s own definition because estimated pumpage is less than recharge. If the area is treated separately, which we believe it should be, the groundwater study shows that this “region” is overdrawn by only -2,700 afy when measured against current pumpage. Fortunately, this is far less than the -96,454 afy of overuse that would occur if all groundwater rights had been fully developed. We commend the Department for focusing attention and effort on our basin before things could worsen, but disagree with the severity of the Department’s proposed approach.

Groundwater users have been responsibly using water within the terms and conditions of their permits for decades. The Department previously made a determination in this area that groundwater is available, within the capacity of the resource, and that groundwater use was in the public interest as required by ORS 537.621. We urge the Department and Commission to adhere to existing statutes and rules rather than pursuing unprecedented groundwater reductions through regulations that lack a defensible legal and technical basis.

While we do not agree with inclusion of this Subarea in the Critical Groundwater Area boundary, if it is included in the Critical Groundwater Area, then existing groundwater users should be protected and the permissible total withdrawal should be set at an updated estimate of current pumpage. We do not agree that reducing groundwater use via regulation is warranted. Within this area we believe that voluntary reductions are possible and beneficial and should be the preferred approach rather than regulation. Many groundwater users within this area have proactively implemented water conservation measures and have invested in measures to responsibly and sustainably use groundwater in this Subarea. Conservation should continue to be encouraged and supported within this Subarea rather than pitting groundwater users against one another or creating an atmosphere of uncertainty that will stifle innovation. If groundwater levels are no longer considered to be "reasonably stable" then the rules should specify the proposed regulatory actions that could be taken once that threshold is met. This backstop will incentivize joint action to prevent groundwater conditions from reaching that point.

Within this Subarea, we are not aware of homes or stockwater wells that have lost access to groundwater due to declining groundwater levels, except for very shallow wells or wells with well construction issues. The City of Burns and Hines have not reported any concerns about groundwater levels for municipal supplies. Both cities should be allowed to continue to grow into their water rights while implementing conservation practices to make the best use of groundwater resources. Within this Subarea there should also be a clear pathway in the rules for bringing new water rights online where offset water can be identified, as was included in the current Division 512 rules. The Silvies Subarea is where additional economic development is most likely to occur in the basin and the State should look for creative ways to support this development while ensuring sustainable groundwater management.

These proposed changes would adhere to existing law and policy and minimize economic impacts as required by law while preserving public welfare, safety, and health and ensuring adequate and safe supplies of groundwater for human consumption while also conserving maximum supplies of groundwater for agricultural and all other beneficial uses consistent with ORS 537.525. We appreciate the opportunity to comment and look forward to partnering with the Department on building a sustainable groundwater future for the Silvies Subarea.

Signed by:

First and Last Name	Representing/Affiliation
Jessley Richardson	Irrigator in Silvies Subarea
Nath Bly	Irrigator Silvies Subarea

Signature Page

Signed by:

First and Last Name	Representing/Affiliation
Lesley Richman	Self - Silvies Subarea Irrigator
Shane L O'Leary	Self/Irrigator Silvies Subarea Irrigator
Crystal A O'Leary	Self/Irrigator Silvies Subarea
Matt Bailey	Self/Irrigator Silvies Sub area
Kathy Hornmacker	Clearwater Irrigation Business (Local)
Seth Hornmacker	Manager of Clearwater (Irrigation Business)
Daniel F Brown	Self MD Butte Involve
Cig Nehr	Ed Staub & Son's Petroleum - Burns Manager
Jeff	Robbins Equipment - Burns Inc.
Scott & Apperine	Harney Electric Cooperative, Inc.
Scott Scott	BURNS POINT 5
Sala Muga	ACW, Inc.
Coast Blue	Two Black River Real Estate
Steven Doverspike	Hatchkiss Farms LLC
Donald Dopsk Donald Doverspike	President Hatchkiss Co Inc

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Signed by:

First and Last Name	Representing/Affiliation
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Birdie Singh	Farmer
Parker Singh	Farmer
Ashley Singh	Farmer / Rancher
Phillip A. Singh	Rancher / Irrigator
Lorissa J. Singh	Farmer / Irrigator

Signature Page

MEINZ Kelly A * WRD

From: Simmone Landau <slandau@yturrirose.com>
Sent: Wednesday, August 13, 2025 4:00 PM
To: WRD_DL_rule-coordinator
Cc: Harmony Burrignt; Dan Kryger; Denise Kryger at Crystal Crane; Brian DiFonzo; Susie Dietz; HUNTINGTON Geoff * GOV; FERRARI Chandra Alene * GOV; Rep Owens; Sen McLane
Subject: Crane Hot Springs Chapter 690 Division 512 Proposed Rules Comment
Attachments: Letter re Public Comment.pdf

Some people who received this message don't often get email from slandau@yturrirose.com. [Learn why this is important](#)

Hello,

Please accept the attached document as Crane Hot Springs' comments for the proposed Chapter 690 Division 512 Harney Basin Groundwater Rules.

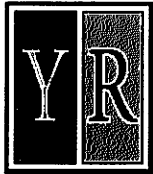
Please feel free to reach out with any follow-up.

Thank you,
Simmone

Simmone Landau

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YTURRI ROSE LLP

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August 13, 2025

Kelly Mainz
Oregon Water Resources Department
725 Summer St. NE
Suite A
Salem, OR 97301

RE: *Review Water Rights Issues*
Our File No.: 141024.0

Dear Mr. Mainz,

Our firm represents Crane Hot Springs, an exclusively privately funded and developed geothermal recreational resort located in the Greater Harney Valley Groundwater Area of Concern. Crane Hot Springs is a key contributor to the region's tourism economy and a valued cultural amenity to Eastern Oregon. Crane Hot Springs is dedicated to its role as a steward of the land and the waters within it.

The proposed division 512 rule making, as currently drafted, risks restricting Crane Hot Springs' operations and limiting the benefits geothermal resources can provide to the citizens of Eastern Oregon. Please accept the following commentary on the proposed rule-making on behalf of our client Crane Hot Springs, which are intended to highlight the statutory framework over geothermal development, identify technical concerns and recommend courses to better protect resources and economic progress.

I. Policy.

Crane Hot Springs is evidence of the untapped potential for geothermal resources. The geothermal activity and potential for development of resources is well documented in Harney County, and Crane Hot Springs is merely one example of the potential for development. The people of the State of Oregon have a direct and primary interest in the development of geothermal resources. ORS 522.015(1)(a). It is the policy of the Legislative Assembly to provide for the development, management and production of geothermal resources in a manner that minimizes state involvement, enhances resource recovery, prevents waste, maximizes economic development and protects correlative rights of the resource owners. ORS 522.015 (d). The proposed Division 512 Rules impose state involvement, curtail economic development, and infringe upon the water rights of

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resource owners. Further exploration, research, and investigation into the potential for geothermal development is required before there can be any meaningful analysis on the impact of these proposed rules.

II. Coordinate Between Water and Geothermal Regulation.

Where there is an intersection of water rights protected under ORS Chapter 537 and geothermal resources under ORS Chapter 522, special consideration is given by the State Geologist and the Water Resources Director, and regulatory responsibility is determined on a case-by case basis after consulting with the impacted owner. ORS 522.025(3); 537.090(3). The intersection of water and geothermal resources is such a recognized occurrence, that the State Geologist is instructed to consider specified goals:

1. Achieving the most beneficial use of the water and heat resources;
2. Allowing all existing users of the resources to continue to use those resources to the greatest extent possible; and
3. Ensuring that the public interest in efficient use of water and heat resources is protected. ORS 522.255.

III. Classifications.

This unique intersection of public interests should be carefully considered in the Harney Basin prior to implementation of new rules that will likely curtail the development of geothermal resources. The proposed rules currently provide that the Groundwater Classification Boundary defined in OAR 690-512-0020(4) is classified for statutorily exempt groundwater uses as specified in ORS 537.545 and nonconsumptive geothermal uses. As written, Crane Hot Springs would not qualify for a classified use, despite the obvious economic benefit to the community, the importance of identifying geothermal assets, and comparatively small water usage, because recreational use is likely be considered a consumptive use. With further investigation and discussion, there is opportunity for new rules to steward and develop the natural resources available in Harney County while minimizing the economic impacts of curtailed water usage.

IV. Technical Concerns.

Crane Hot Springs is located in the Northeast Crane subarea. This area is characterized by highly variable hydrogeology with significant differences between shallow and deep wells. Oregon Water Resource Department's ("OWRD") Groundwater Report for the Division 512 rules recognize that groundwater in the Harney Basin occurs within several distinct, yet hydraulically connected areas distinguished by local geology. These distinct areas can produce substantial amounts of water to wells in some areas but little water in other areas depending on the underlying rocks and sediments, and the local rate and magnitude of groundwater recharge and discharge. Despite the clear delineation of those scientifically discrete areas, the proposed rules adopt the term "groundwater reservoir," which does not appear in the USGS study report, and allows generalized regulatory control over distinct areas with distinguishable aquifers. The proposed regulations should take into account the differing capacities and recharge rates of those hydrologically distinct features.

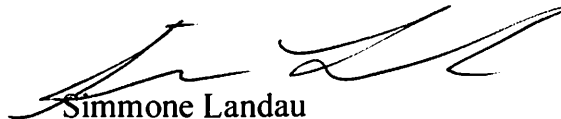
V. Path Forward.

Although the proposed Division 2010 Report and Division 512 Rules attempt to address a compelling concern, namely the depletion of the natural water resources in the Harney Basin, the proposed solution does not take into account important cultural and economic factors that are going to be impacted, such as the impacts on geothermal resources and the precise science available for analysis. In short, there is a lot more work to do before reaching an acceptable solution that respects both the cultural interests and the unique natural resources to be found in Harney County. We urge you to consider a comprehensive analysis of Harney County Resources. This would serve as a starting point for a holistic approach to regulations that may result in solutions equally favorable to both the people and the environment of Harney County.

Crane Hot Springs is ready and willing to work with OWRD to develop rules that protect groundwater and support geothermal development. We urge OWRD to engage with our client and pursue investigation of these additional factors before rules are finalized.

Very truly yours,

YTURRI ROSE LLP



Simone Landau

SL/BDD/scd

MEINZ Kelly A * WRD

From: Stephanie Bowen <sbowen@hec.coop>
Sent: Wednesday, August 13, 2025 2:01 PM
To: WRD_DL_rule-coordinator
Subject: Division 512 Rules Public Comments Submitted
Attachments: Windy Point Subarea Public Comments_FINAL_08.13.25.pdf

Some people who received this message don't often get email from sbowen@hec.coop. [Learn why this is important](#)

Please consider these public comments as submitted from groundwater users near Windy Point.

Respectfully,



Stephanie Bowen

Office Manager

Harney Electric Cooperative, Inc.

PO Box 587 – 277 Lottery Lane

Hines, OR 97738

email: sbowen@hec.coop

phone: 541-573-2061

web: www.hec.coop

August 13, 2025

VIA EMAIL

Kelly Mainz

Rulemaking Coordinator

Oregon Water Resources Department

725 Summer St. N.E. Suite A

Salem, OR 97301-1271

WRD_DL_rule-coordinator@water.oregon.gov

Subject: Comments on Proposed Division 512 Rules

Dear Mr. Mainz,

We, the undersigned individuals irrigating in the NE Crane Subarea previously delineated as Windy Point between the towns of Crane and Princeton, respectfully submit the following comments on the proposed Division 512 rules.

We realize the value of the Oregon Water Resources Department's ("OWRD's") involvement as we recognize that there has been concerning data collected about parts of the NE Crane subarea and the Harney Basin as a whole. We generally support the proposed segmentation of subarea-specified permissible total withdrawals and the incremental groundwater reduction and re-evaluation using adaptive management thresholds over the course of thirty years.

However, we cannot support the proposed rules, and we request that OWRD revise their approach so that excessively harmful economic and community damage is prevented. Additionally, existing policies should be managed, and a collaborative approach should be supported to avoid future litigation and enforcement issues and thereby help stabilize groundwater in a timelier manner.

Statewide Regulation of Reasonably Stable Groundwater

The Department should incorporate the definition of "Reasonably Stable Groundwater Levels" from OAR 690-008-001(9)(average rate of decline of less than 0.6 feet per year and total decline of no more than 25 feet) into the proposed Division 512 rules. This should be the standard for initiating regulatory action instead of the proposed OAR 690-512-0041(1) (decline rate of no more than zero feet per year over a five-year period.) There should not be a different standard for determining the allowable rate of decline for groundwater levels than other parts of the state. This is a minimum standard of fairness, equity and consistency required to manage resources statewide.

OWRD should not regulate groundwater use in areas where the median groundwater level decline has not yet exceeded 25 feet. In areas that have exceeded 25 feet of decline, OWRD should allow groundwater levels to reach a state of dynamic equilibrium between “reasonably stable ground water levels” and “excessively declining water levels” (between 25 and 50 feet of decline where the total permissible withdrawal is adjusted to reflect that goal.)

Groundwater depletion in parts of the NE Crane sub-area has been a well-known issue for decades. Windy Point irrigators face possible curtailment on water rights legally issued to us based on problematic areas that should have had water parameters enforced much earlier than now. The groundwater conditions were made worse by the continuance of water permit issuance in problematic areas and OWRD’s failure to enforce permit parameters that would have naturally decreased water usage as needed. The water user should have been required to discontinue use or reduce the rate of withdrawal if wells experienced any of the following events:

- Annual water level measurements reveal an average water-level decline of three or more feet per year for five consecutive years; or
- Annual water-level measurements reveal a water-level decline of 15 or more feet in fewer than five consecutive years; or
- Annual water-level measurements reveal a water-level decline of 25 or more feet; or
- Hydraulic interference leads to a decline of 25 or more feet in any neighboring well with senior priority.

We believe the whole reduction through curtailment timeline should be pushed back three-six years based on the following actions/events/OWRD enforcements:

- OWRD Letters were sent and then suspended in the attempt to manage water usage based on permit conditions. These enforcement activities should be addressed first before additional regulations are imposed.
- Fire/Flood – environmental changes should be factored into any long-term plan. The additional water coming into the basin based after fire season in 2024 will obviously have an effect that may take a few years to show up as recharge.
- After a ten-year drought 2023-2025 experienced more precipitation and increased snowpack and run-off. In January of 2025, Snow Mountain and Rock Springs had 377% and 370% of normal snow water equivalent respectively. The additional water coming into the basin will obviously have an effect that may take a few years to show up as recharge.
- The ten-year drought should not be the “last word” affecting the OWRD studies/science.

- Weaver Springs pumpage has been decreasing substantially without curtailment and enforcement. Harney Electric Cooperative estimates that usage has gone down by approximately 40 pivots since its peak ten years ago. OWRD should continue to monitor the Weaver Springs subarea, compare model scenarios to actual, and provide resources to users in this critical water area before addressing the entire Harney Basin where declines have not met the 25' decline threshold.
- In summer of 2024, Idaho attempted to curtail water usage and describes their aggressive approach as “not their finest hour.” Now they are working on a collaborative long-term approach to managing irrigation instead of regulatory action.
- Voluntary agreements are coming together and need time to demonstrate water use reductions. High Desert Partnership should be given the opportunity to collaborate with stakeholders to bring water stability to Harney County in a more efficient and effective timeline.

Delaying curtailment would also give OWRD time to collect better data and conduct more hydrogeologic studies to improve subarea boundaries and set up more appropriate reduction proposals with their models.

Boundary Relocation and Inadequacy of Hydrogeological Data

OWRD has presented the Windy Point area with many proposed boundary lines which has kept this community from knowing how and when to engage with the rulemaking process. Neither the USGS Northern/Southern demarcation at the geological feature known as Windy Point, nor the last-minute extension of the southern boundary of the NE Crane subarea beyond Windy Point seem to be hydrogeologically or administratively justifiable. Near the beginning of the rule-making process, Windy Point was one of fifteen subareas with a northern boundary at tax lot 25S33D000008200 and was segmented based on groundwater level trends, hydraulic gradient and subsurface materials.

We have read through the studies that mention water age determination, groundwater flow and hydrogeologic cross sections and the well logs in the Crane and Virginia Valley descriptions. On page 93 of SIL 2021-53:

“Several miles south of Crane, the Drinkwater Basalt (part of the high-transmissivity High Lava Plains basalt HU which caps Crane Butte) is down-dropped beneath the Harney Basin lowlands by north-trending faults and is buried by basin fill deposits. Although no geochemical identification from well cuttings has been made, some of the high-yield wells likely produce from the Drinkwater Basalt.”

The study also mentions that:

“Historically, groundwater levels in the basin fill deposits near and to the east of Crane may occasionally have been high enough to allow some flow of groundwater eastward through the Crane Creek Gap south of the Crane Creek Mountains. Presently, however, groundwater flows westward from the gap into the Harney Basin.”

As identified in OWRD’s initial fifteen subarea segmentation, Windy Point does not experience the same water issues as Crane, Lawen, Crane Creek Gap and Crane-Buchanan. Water bearing zones in our area are made up of pumice or rock whereas the northern end of the valley the water is found mostly in sand. Data is included from a couple of wells in our area, such as HARN 1420 identified on page 95, but not referred to in the discussion of Crane on page 93 or Virginia Valley on page 97. The groundwater levels seem to have stopped being measured in the 80s, but seemed relatively stable at that time. We seem to be right at the boundary of the Northern and Southern USGS-defined regions and we don’t believe there is enough data to show that the water is pre-modern as it is identified in the discussion of groundwater in Crane. There seems to be a great deal of mystery about the thickness of the basalt and whether groundwater in Windy Point (and slightly north of the geological feature of Windy Point) could be experiencing recharge from the Steens Mountains similarly to Virginia Valley and heading east through the gap toward Pelican Point (Tax Lot 14S34E000001400) and not heading north up to Crane.

Two miles north of Windy Point and all the way south to the edge of the Greater Harney Basin we have heard of no water shortage issues like pivots sucking air or wells going dry. Any well work can be attributed to older constructed holes from the 50s-70s where cable rigs were unable to drill through water bearing zones fully because of lack of funds/knowledge.

All that to say, we believe that more hydrogeologic studies need to be done and more data needs to be collected in the sub area previously delineated as Windy Point before these users are included in the NE Crane subarea and more importantly, before regulation and adaptive management is applied as there may be a possibility that groundwater is escaping the basin and heading east. We have had discussions with local landowners that springs to the east have been experiencing increased water year over year. If our area is experiencing recharge from Steens Mountain snowpack, there is a chance that the declines we have seen in the area may start to rebound with the last few wetter years we’ve had. However, if Windy Point is included in the NE Crane subarea, the adaptive management checkpoints may not adequately demonstrate the recharge. Stabilizing levels in Windy Point would be included and averaged downward with critical area wells not experiencing Steens Mountain recharge. These checkpoints may cause increased or continued curtailment, without the consideration that water may be escaping to the east. Even if

groundwater made it all the way north to Crane, it may be that it then escapes east through the Crane Creek Gap, not westerly into the Harney Basin.

We reached out to OWRD after the proposed rulemaking was released to help us understand why Windy Point was combined with NE Crane subarea at the last minute. All the studies were sent over as well as a summary of Windy Point groundwater declines and the assertion that “model scenarios have shown that groundwater pumping in one part of the Harney basin does have the *potential* to affect groundwater levels in other parts of the basin.” Follow-up questions have gone unanswered that may have been reflected in these comments had we obtained a better understanding of the interchange of the Harney Basin and Malheur River Basin in our area. **We need the department to understand that Windy Point has different characteristics than NE Crane in almost every category: hydrogeological, geochemical, risk tolerance, community cooperation, and (as the department recognized when the fifteen sub-areas were originally formed) based on differing groundwater level trends, hydraulic gradient and subsurface materials.**

Proposed OAR 690-512-0080 indicates that OWRD will use “representative wells with sufficient data as determined by the Department” to record the median annual high groundwater level for each subarea, calculate the median groundwater level decline rate, and evaluate groundwater level changes. The approach should be modified to consider a process by which OWRD will consult with local experts in determining which wells are “representative wells with sufficient data.” Groundwater users, certified water rights examiners, registered geologists, pump contractors and local well drillers have beneficial information about static groundwater levels which can vary dramatically from one well to another depending on several factors, including well depth, casing and seal depths, and other variables relating to well construction and local hydrogeology. **Credible and trusted data must be the basis for moving forward with any confidence.**

We understand that seven sub areas are easier to administrate than fifteen. But we don’t believe being included in the NE Crane subarea is the proper treatment. **Ease should not supersede precision when the stakes are this high.**

(For these reasons, we also do not support the further reduction of the NE Crane subarea and the resulting curtailment that will affect Windy Point users as proposed by the alternate set of PTW values tested with the model in the internal memorandum from Ben Scandella to Jason Spriet, dated May 30, 2025 where pumpage reduction in NE Crane was increased to 45% instead of 34%. If the RAC alternative discussed in the referenced memo is used, Windy Point users should be moved to the Lower Blitzen Voltage subarea from the NE Crane sub area or revert back to its own subarea.)

We believe that this previously identified OWRD northern boundary (under the fifteen subarea determination) was more appropriate for grouping users together with similar hydrogeological, geographic and community attributes. According to OWRD the reduction to seven subareas was made for administrative purposes alone, so OWRD should be open to feedback and re-evaluation for the greatest chance of long-term success.

Voluntary Agreements and Collaboration

Proposed OAR 690-512-0041 and -0080 provide limited opportunities for public input. OWRD should commit to consistent, two-way interaction with local stakeholders through the establishment of a collaborative process that meets with OWRD at regular intervals to evaluate available data, discuss developments, contribute information regarding additional representative wells, and to discourage litigation through an established working relationship between OWRD staff and the community and/or subareas with voluntary agreements.

The irrigators in the Windy Point area should have the flexibility to engage in voluntary agreements with neighboring water users and would be hard-pressed to have a voice in any collaboration in the large subarea that makes up NE Crane. Irrigators south of Crane and East of the Malheur Lake have a lot in common and we already cooperate. Windy Point irrigators are about the same size (no large irrigators with more “say” due to additional money/resources). When the rain is coming or a part is needed or equipment is broken down or if someone is sick or injured, folks in this community are quick to help one another out. 30+ miles across the valley where hydrogeology and subsurface materials are vastly different, the communities are different as well.

The irrigators in our vicinity are more risk averse and conservative. They didn’t develop additional land when water was known to be an issue as was done over and over again in other areas of the NE Crane sub-area and Weaver Springs. We understand that reductions will likely be needed to stabilize groundwater levels in this subarea as some of our wells have shown some decline, but we have not yet met the conditions for regulatory action if OWRD adheres to its own policies.

This concern is amplified during the review process that is scheduled to take place every six years. Critical areas on NE Crane have been known to be problematic for decades so it is unlikely that curtailment will resolve those issues before the levels are re-evaluated and additional curtailment is proposed or even accelerated. However, we believe that we can be a part of the solution in stabilizing the groundwater in our aquifer without devastating the area socially and economically.

Voluntary agreements should be utilized to give subareas the flexibility to find the highest and best use of water in targeted areas. Wetted acres could be calculated based up to the period of enforcement of the proposed policy or individually determined by voluntary agreements in subareas with give and take negotiations with their neighbors. For instance, if the irrigator has a water source that is still permitted, with adequate water and has the capital to invest, then they could be allowed to do so up until the time curtailment is enforced if permitted by trade-off in the voluntary agreement. Another example is that the voluntary agreement may allow senior water users to retain whatever af they have in their permits and junior water right holders could be asked to reduce to 2.5 acre feet.

OWRD's legal requirement to protect existing water rights is described in ORS 536.310(1) and ORS 537.525(2). **Voluntary joint action with groundwater users is the clear preference before resorting to the state mandates and enforcement.** Please note Idaho's unwillingness to follow through on their curtailment order. Governor Brad Little recognized that while Idaho has a big problem, farmers, not government mandates, are the solution. He signed the Protecting Idaho Water Sovereignty Act which charted a path forward on a new agreement driven by Idaho farmers, not the government. We urge OWRD to honor previous commitments to engage in meaningful, two-way collaboration with groundwater users. We ask that OWRD adhere to existing statutory requirements by first enforcing existing permit parameters and then applying statewide standards to any Harney Basin proposed solution. Lastly, we recommend that OWRD partner with subareas with voluntary agreements and other state agencies long after this rulemaking process to "stand up" any collaborative action before considering regulatory action.

Maintaining a vibrant, healthy community is most important for those of us who live and work here. We are faced with enough geographic challenges living in one of the most sparsely populated areas in the nation. We want to continue as a going concern, but we also want to see our neighbors succeed, domestic users' wells continue to provide drinking water and the hospital and schools to retain their tax base. What we hope to see is collaboration like the Malheur Refuge Comprehensive Conservation Plan that is recognized nationally and has been a ten-year Oregon success story that government departments point to and take pride in. Looking at the basin in thirty years and seeing that we came together to fix it would be a much better story than OWRD's over adjudication for twenty plus years and then a rulemaking process and curtailment that ended in catastrophic economic collapse in Harney County.

Windy Point Subarea Division 512 Public Comments Sign-On Letter

Signed by:

First and Last Name	Representing/Affiliation
Just. Bow Justin Bowen	Bowen Arrow LLC
John Opie	Opie Trust
Betty Opie	Opie Trust
Kerry Opie	Bar Heart Ranch
Ross Opie	" "
Luke Bailey	Agri - Managers
Jodal Titus	Titus Ranch
Kirk Titus	Titus Ranch
Jake Potter	
Shelly Potter	
Math Thompson	Thompson Ranch Inc.
Shirley M. Thompson	Thompson Ranch Inc.
Stephanie Bowen	Bowen Arrow LLC

August 12, 2025
Kelly Mainz - Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Subject: Comments on Division 512 Rules

Dear Mr. Mainz,

Thank you for the opportunity to provide comments on the proposed Division 512 rules. My name is Steve Rickman and I am a groundwater irrigator and a retired small business owner in the Harney Basin for over 30 years. (electrical contractor and irrigation and domestic pump installer for 20 years). I live and farm in the Silvies subarea. I have been involved in groundwater conversations for 10 years. I served on the Groundwater Study Advisory Committee and supported and was involved with the Community Based Water Planning Collaborative. I also most recently served on the RAC for the Division 512 rules. I really struggled to follow the Department's reasoning and logic with the proposed rules and it rarely seemed that the Department considered and incorporated input from any of the RAC members, or the CBWPC's plan. I have a lot of knowledge and experience in this basin and these rules just don't make sense to me. Some of the available data and science was not considered for the 512 rules, and I think that was intentional.

I would like to ask the Department to consider the following points for the Division 512 Rules:

1. Include the Silvies area in the Critical Groundwater Area and limit additional groundwater rights that would cause us to not be reasonably stable. Set PTW at current usage and incentivize voluntary conservation and reduction. Be willing to make adjustments (be adaptable.)
2. Include the definition of reasonable stable from ORS 690-008-0001 in the Division 512 Rules and apply it in the management context.
3. Increase and use all available aspects of recharge data to improve our understanding of the system. (eg; underground rivers from uplands- juniper and conifer density.)
4. Request the Department to consider local knowledge when determining representative wells and actively engage with irrigators to monitor levels and usage.

I am sending along comments that I have already sent to the Department during the RAC process. Much of my feedback was not addressed in the process since there really wasn't time for RAC members to discuss and deliberate amongst ourselves. The Department was not proposing regulations for the Silvies subarea early in the process. It wasn't until the last few months that the Department proposed a regulatory reduction of 15% for this area. I expected that the Department might set targets for voluntary reduction rather than pursue regulation. I was not expecting and am disappointed to see the Department pursue regulation in the Silvies subarea. The Silvies subarea is reasonably stable and the Northern Region is only overdrawn by 2,700 acre feet according to the Department. My wells have not shown declines and I am not

concerned about declines in my area. For the Silvies River subarea the Department should work with groundwater users on voluntary approaches to conserve and use water more efficiently.

The Department should prioritize voluntary and cooperative approaches, as it has been promising to do, for the Silvies, Silver Creek, Lower Blitzen Voltage Subareas and focus its regulatory resources on Weaver Springs, where the problem is well documented. The whole basin, but especially the Northeast-Crane area is highly variable and more work should be done to develop a management strategy that takes that variability into account. There are declines in that area, but it should be given time to adjust given that most of the area isn't critical yet. It doesn't really seem that the Department used much of the findings of the groundwater study except what they needed to support their regulatory approach. I was hopeful that we would be able to really look at the science together to make the best decisions possible for the basin, but the Department apparently decided that they know what's best and haven't really strayed from their idea of what should happen.

These rules don't make sense to me and as a RAC member I do not support them. Do not regulate the Silvies subarea, work with us to sustainably manage the water rights that have been allocated.

Input/Feedback from Steve Rickman (5/9/25)

I came away from that last meeting feeling really confused. You go along and think you understand and then you're like "what?" -- I thought this is what they said back there and now we're headed in a different direction. I tried to digest it some since the meeting but I have a lot of questions that still haven't been answered.

What changes, if any, would you make to: **The CGWA boundary rule language? Please include specific language that you would like to see in rule, if possible.**

Does it really make sense to put the whole basin in the same critical groundwater area versus isolating a couple of hotspots and seeing what you can do? I recommend that we really focus on the areas where there are the most significant declines first, get a few years under our belt and see what happens. There is still a lot of uncertainty, which the Department really doesn't acknowledge. They don't yet know for sure that this approach is going to work, which is why I support an adaptive management approach. It doesn't make sense for it to be one area that is a critical groundwater area. They should make them separate critical groundwater areas if the geology and water levels are different. It makes sense that the Department wants to give itself the authority to regulate the whole basin, but they should maintain the flexibility to manage these areas separately and not lump them all together with the problem areas. Each area should have its own designation, which allows flexibility to see how that area is doing and lift the critical groundwater area if it's doing fine. It makes sense to have the designation in case you need it, but then you need the ability to remove the designation for an area if things are fine.

The rules should make all these separate areas and then say how and when the critical groundwater area gets lifted if things are fine.

What changes, if any, would you make to: **The subarea rule language? Please include specific language that you would like to see in rule, if possible.**

One of the things that I never can quite get a handle on is the subbasins. We talked about these to do the modeling and learn about how the basin works, but now they've just settled on them as the areas. It seems like the boundaries are always moving every time we get back together and it's happening without a whole lot of discussion.

Some of the subareas they've set up don't make sense. For instance, the Lower Blitzen --just look at the geology of the area. I've had a lot of conversations with geologists and well drillers and there is a huge crack running through the middle of that area.

I know my area here more than other areas. I think I'm in the Silvies area now? I'm not sure. They lumped everything from Butte Canyon to Sage Hen together. This area has three really different flows of water coming into it. You've got the west side which is going to come out of the Sage Hen country, the middle piece which is the river and the foothills, and then Rattlesnake/Buchanan that's another flow. I'm right in the middle of the Silvies. Our water levels where I am move up and down year to year...in the dry years it goes down a little, but otherwise it's pretty consistent. Sage Hen sits on the other side of the ridge and that water isn't going to flow around that ridge. They keep telling us that the groundwater is all connected. They tell us everything travels towards the lake, which I agree with, but the stuff that comes out of the Silvies River comes through the center of the basin and there's no way that the groundwater flow coming out of that river area is going to flow east to Buchanan- it's going to move south to the lake. Our underground flow here isn't going to go all the way to Buchanan and change/fix anything. They've got some water problems out there in Buchanan. Since Silvies has been lumped in with Rattlesnake and Sage Hen, which have problems, we're going to be managed as if we have a problem when we don't.

What changes, if any, would you make to: **The target groundwater level trend and the date to achieve the target groundwater level trend rule language? Please include specific language that you would like to see in rule, if possible.**

The goal isn't that bad. With this in mind we need to stay adaptable. We need to keep looking at the data together and making adjustments. At 10 years what have we seen? Are we on track? What are the impacts? Are they worth it? Are we willing to adapt? Don't get stuck following an arbitrary system. It's important to actually look at the results and look at the benefits and impacts. If things get stable then stay put for awhile and see what happens. Don't make cuts if they don't need to be made. There needs to be some reassurance that the Department isn't going to keep cutting back just because they can. This needs to be clear in the rules. If an area is doing fine then there needs to be a way for the area to get out of the critical groundwater areas. It needs to be clear that if we're reaching the goal they won't keep cutting back because

those people won't be coming back on line if they get cut. This needs to be very slow and deliberate and purposeful.

One thing I'll say though is that I don't like the 0 feet of decline as the goal because groundwater levels fluctuate - groundwater goes up and down due to the weather and other factors. Mother nature is changing every year-what is a good cycle for us to look at? I would recommend a 10 year cycle, and if the groundwater is more or less stable during that time, then we're on track. We'll have some good years and bad years - groundwater levels need to be able to fluctuate. Just a hard number, 0 feet of decline, doesn't really account for the fact that these levels naturally change. There are some areas with problems and they're a long haul to fix, but some of the other areas that aren't having problems, why are they taking such a beating? Need to have a way to account for those fluctuations. I would prefer something like dynamic equilibrium or dynamically stable. That would need to have a definition. We're having good years where I'm at...we're actually on the increase right now where I'm at.

What changes, if any, would you make to: **The proposed permissible total withdrawal for subareas rule language? Please include specific language that you would like to see in rule, if possible.**

Since the area I'm in has been lumped with Rattlesnake and Sage Hen, we're going to suffer for that. Silvies is now proposed to take a 15% cut, which is too high. Even if we took a huge hit we wouldn't fix Buchanan and Sage Hen. There are wells on the margin of that area that shouldn't be lumped in with the Silvies recharge area. There are deep cracks/faults that affect the flow of water that the Department doesn't even seem to be curious about because it is inconvenient for them to think about. They keep playing with the numbers without any real conversation with us. They traded some of Weaver Springs and Dog Mountain and drew a line. Weaver Springs takes a bigger hit and Dog Mountain doesn't take as much of a hit. It doesn't make a whole lot of sense to me.

What changes, if any, would you make to: **The determination of initial allocation for groundwater rights rule language? Please include specific language that you would like to see in rule, if possible.**

I have a hard time with them just cutting back every right, especially in areas where we're not seeing an issue or problem. I'm okay with this being a restriction on use, but not a permanent cut to the water right. For instance, as long as we're a critical groundwater area this is the amount of water you are allowed to use, but if the critical area gets lifted then you can use what's on your water right. I'm worried about what these types of cuts will mean long-term. What will be the next thing? Can they do that across the board? Can they do that to surface water? I really recommend making this determination by subarea-if there's a subarea that's doing fine then do they really need to do this? Don't actually go in and change the underlying water right-limit the USE of that water right but don't actually change the paper water right.

What changes, if any, would you make to: **The proposed reduction schedule rule language?** Please include specific language that you would like to see in rule, if possible.

I feel like they keep changing the goal post on us. This reduction schedule seems too much too fast. We need to take some smaller actions and then see what's happening.

What changes, if any, would you make to: **The proposed adaptive management rule language?** Please include specific language that you would like to see in rule, if possible.

The Department needs to remain adaptable and work with us as partners. They need to make sure that the actions are responding to the conditions and be communicating with us all along the way.

The public and people of Harney County should have a bigger role in adaptive management. We want to participate. We want to know what's going on. We want to know what and why. We deserve to be involved. We want to see the data and help make sure it's representative. We want to understand the decisions being made and what information those decisions are based on. They need to bring that information back to the people of Harney County and actually have a conversation about what they're seeing and what they're doing. Don't just disappear for however many years and then reemerge and tell us what's happening. There needs to be an ongoing conversation. The Department just shows up and surprises everybody, they don't keep people in the loop. They need to have more process and more participation and more transparency- They need to keep getting the public informed and engaged going along.

What changes, if any, would you make to: **The proposed reduction schedule changes in the adaptive management rule language?** Please include specific language that you would like to see in rule, if possible.

Any other changes to Critical Groundwater Area rule language? Please include specific language that you would like to see in rule, if possible.

What changes, if any, would you make to: **The proposed classification for new uses rule language?** Please include specific language that you would like to see in rule, if possible.

We need to allow for new uses of water, but it shouldn't increase the overall amount of water being used. It's important that our community can continue to grow and adapt. I don't really know if the rules allow for that right now.

What changes, if any, would you make to: **Other Classification rule language?** Please include specific language that you would like to see in rule, if possible.

What changes, if any, would you make to: **Other Serious Water Management Problem Area (SWMPA) rule language?** Please include specific language that you would like to see in rule, if possible.

The very first thing they need to do is to get a meter on every point of appropriation and we need at least a year or two years of records on how much is being used. I support everyone getting a meter on their well ASAP. At the end of every year you know how much groundwater was used -the sooner we know, the better. It would be okay prioritizing this by subarea to some degree with the problem areas on a shorter timeline to get meters on, but everyone needs a meter. You have to know how much water is actually coming out of the ground. This is key to overall management. I don't have confidence in some of the Department's numbers right now with the model. I don't think this is what will be shown down the road. The results in a few years aren't going to reflect what they project.

Outside of the rules, what are other important elements of adaptive management? And what commitments are needed from OWRD or others on those?

Other Comments

The non-agriculture public are starting to see what's happening here and I think you're going to see that catch on in the next 6 months. The businesses are going to start to pay attention. They're starting to pick up on what this might be. "If some of these cuts go through, what is that gonna do to my business? Am I gonna take a 20% hit?" People are starting to think about these impacts and what it means to them and the broader community. We've been talking to some of these guys that we deal with everyday. This isn't just a groundwater issue, this isn't an ag issue, this is an everybody issue. There hasn't been enough outreach to everyone that's gonna take a hit. The Department should have made much more of an effort to sit down with business leaders in this community. That was a missed opportunity. The Department keeps focusing on water users and doesn't really seem to care about the fact that if these cuts go through, it's the whole community that's going to suffer.

This whole thing has to be economically feasible. We all agree there are problems in some places. We've been 50 years getting here...you can't fix this overnight. Let's make this economically feasible for the community. This community has seen the spotted owl, the sage hen, the wolf, we've had the fires, and now the floods... we've taken a beating. We're starting to see some of the holes in some of the other natural resources management decisions that they've made in the past. They sacrificed our economy and the decisions they made didn't even have the benefits that they thought. We have seen the science and policy decisions play out and it hasn't gone how the scientists promised it was gonna go down. People tell us how this is going to get fixed and then they stick to the decisions even as people and our community suffer and even as the environmental benefits aren't really even there. We're the ones still here 30-40 years later and the things that they said were going to happen didn't end up happening. We can't let that happen again with groundwater.

Good morning all,

I've been thinking about my question from yesterday's GWAC meeting regarding how the proposed rule changes could affect municipal planning.

After some reflection, I'd like to share a few additional thoughts. Overall, I like the idea of using 110% of the highest annual water use over the past five years to determine the next six-year allotment for the municipality. Below are some suggestions that could improve the 110% process from my perspective.

My first suggestion for improvement is to ensure predictability in future allotments. I recommend that future allotment processes do not reduce a municipality's initial allotment. This would give municipalities certainty about their minimum water supply going forward. Setting a low-level limit might encourage municipalities to adopt conservation measures as a way to expand their water supply for future development, without the risk of losing water due to conservation.

Additionally, it establishes a baseline for the minimum amount of water a municipality can rely on for long-term water planning. This assurance that the annual allotment won't fall below the initial volume significantly enhances the stability of longer-term planning processes like WMCP & WSMP.

This approach could also play a crucial role in preventing the inflation of water use to avoid losing annual volume - AKA 'use it or lose it'.

Another idea is to integrate municipalities' planning documents into the process of allocating water volumes. This could happen during the initial allotment or in subsequent allotments. Municipalities could submit economic development plans to justify additional water allocations, which could be linked to water efficiency requirements to ensure any extra water is used for beneficial purposes.

Thanks for your time. I would be happy to discuss any of these ideas or suggestions further if anyone is interested.

Thanks,
Steven

Steven Patten

PW Engineering Tech | City of Milton-Freewater, OR

Phone: 541-938-8274

Email: steven.patten@milton-freewater-or.gov

PROPOSED HARNEY BASIN GROUNDWATER POLICIES – WRITTEN COMMENT FORM

Your Name (required): Sue Arbuthnot

Your Email (optional): sue@hareinthegate.com

Your Phone (optional): 503 287-3731

Please check all interests that apply to you:

YES - I have at least one well that supplies groundwater to my home for domestic purposes.

YES - I value groundwater contributions to the environment (e.g., springs and native vegetation).

YES - I value fish and wildlife in the basin, including those that benefit from groundwater.

YES - I value the economic contributions of agricultural operations that use groundwater.

Question 1. Please tell us about yourself and describe why groundwater is important to you. If you use groundwater, describe how you use it.

I have lived full-time or part-time in rural Burns for 33 years (together with my husband for the last 26) on a property that we rent about 11 miles from Burns, enroute to Crane. In addition to this being our home for at least half-time use, it is also our working office space for our small business, which is largely conducted in Harney County. We would not be able to continue our work here, nor would we have access to a highly valued way of life, if we did not have access to water.

Even though we do not own the property, we treat it as our own, maintaining the house and grounds with care in order to achieve the lifestyle we prize here in Harney County. These activities rely directly on adequate water, beyond just our own basic needs for living.

We contribute to our community in various ways—professionally, through the use of vendors and suppliers and by hosting colleagues and visitors here in the county for various projects. Additionally, we are registered Harney County voters, we pay property taxes on a separate rural property we own, we occasionally volunteer, we often socialize locally, and we support many local shops and businesses year-round. We recreate often in the county

but can do so only because we have a convenient home base—again, due to access to our domestic water supply.

We would choose to live here full-time if we believed we were secure in having access to water over the coming years; however, this is sadly not the case, due to the over-allocation for pivot irrigation beyond the scientific projection of the resource's limits.

Question 2. If you use groundwater in the Harney Basin, mark with a color dot on the map provided where you use groundwater (this can be a rough approximation).

Our location lies within the Silvies subarea (residence is on Hwy 78, 11.2 miles from Burns at the corner of Hutchensen Ln.)

Question 3. The Water Resources Department proposes to designate the area in the map outlined in black as a Critical Groundwater Area, which would give them the authority to regulate or curtail/reduce groundwater use. Do you have any feedback on the boundaries or the basis for designating a Critical Groundwater Area described in the Division 10 report? (See 609-512-0041 in the proposed rules)

N/A

Question 4. The map on the previous page shows the seven proposed subareas that the Department will use to regulate groundwater use (with different levels of regulation for each area). Based on your knowledge of the basin, are there any changes you would suggest to the boundaries? Draw them on the map and describe the reason below. (See 609-512-0041 in the proposed rules)

N/A

Question 5. Please describe groundwater conditions where you are and what changes in groundwater levels or other groundwater changes you have observed in the last decade. If you have not observed any changes, please note that. You are also welcome to note any questions you have.

—When I first arrived on the property, the domestic well maintained a static line of 18-20 feet. At the last time of measurement, about eight years ago, the static line had dropped to 55 feet. At minimum, this equates to a 35-foot drop—most of which we believe occurred in

the last 20 years or so. Also, the water quality has declined, with a chronic, intense sulphur smell and a noticeably increased sediment ratio. We believe this decline in water level and quality is concurrent with the addition of numerous pivots in the Harney Basin, during the time of severe over-allocation of permits prior to (and after) the moratorium.

Question 6. If you have been or expect to be impacted by changing groundwater conditions, please describe how you have been impacted.

—We had to drop the pump about eight years ago from around 50' to around 70', because it had begun to suck sediment into the system. (My apologies for the approximate data; we don't have access at the moment to the invoice but could acquire it if need be.)

We live with the constant concern that the water will continue to drop, creating an unlivable situation, unless a new well is drilled. We had hoped to purchase the property from the current owner, but due to the near certainty of a new well needed in what we fear would be the next 5-10 years, we became leery of this additional burden. Adding to this is the very real concern about the potential decline in property value, compounding the risk to us if we did purchase the land.

Question 7. The Water Resources Department proposes to achieve the groundwater management goal of durably stable groundwater levels (0 feet per year of decline) by the year 2058 for the entire basin by curtailing groundwater use in 6-year intervals. Do you have feedback on the groundwater level goal and target groundwater level trend? (See 609-512-0041 in the proposed rules)

YES - I support the groundwater management goal and target groundwater level trend as proposed.

YES - I support the target groundwater level trend, but I would like to see the goal achieved in less time.

NOTE: *I apologize, but I don't feel qualified to answer most the questions below sufficiently. I'll finish here with just a final comment.*

Question 18. When you look into the future, what is most important to you? What do you hope to see for yourself and for the basin? What are you most concerned about?

First, we want to thank OWRD and all the committee members and volunteers who have given much time and deep consideration as this important process has moved forward. This will no doubt be a time of difficult transition—as all change in a resource-dependent community, by definition, is—but one that can begin to address a long-term and increasingly dire problem.

Farms and ranches, rural residences, municipal dwellers, and large and small businesses all depend on a healthy, reliable water resource; visitors to the county likewise need sufficient water to support our local economy through recreation. A robust supply of groundwater also bolsters a diverse web of diverse plant and animal life critical to the overall health of the region. While we may not see the return of historic hydrological stability through this mitigation process, we hope it will stem the decline we've lately experienced, especially in a time of advancing climate change.

Looking ahead, we hope we'll see a well-considered and thorough process committed to conserving our precious and diminishing water resource via a balanced and equitable process that considers the economic, social, and ecological values in the Harney Basin. We believe the combination of scientific rigor and historic local empirical knowledge will offer the most effective tools toward lasting solutions.

We understand the hardship that a number of agricultural operations will face with upcoming proposed reductions. We do realize that most agricultural enterprises are family-owned, and, as community members, their concerns are of natural interest to us. We hope to see the development of and support for innovative solutions—help with establishing dryland crop alternatives, if possible—to offset losses, especially to the smaller farms and ranches in the basin.

However, for those larger, out-of-county irrigators whose objective is to transpose a vast percentage of our scarce water into an exported “crop,” we believe it is well past time for reductions in over-usage. This has sadly become a matter of urgency, and we only wish it could now be implemented more swiftly.

Positive results will necessarily derive from both sacrifice and mutual support. We have seen tremendous advances in the collaborative planning and implementation of conservation projects here in the last decade or so, even across historic barriers of highly divergent viewpoints. These efforts have been hard-won, but they illustrate the need to forge solutions based on a sense of co-ownership, rather than viewed as the result of yet another regulatory regimen enforced from outside the region.

We would ask that you continue the diligent work of including Harney County residents of all stripes, as well as those in the “community of interest” beyond our area, in finalizing and

implementing plans. An inclusive, ecologically sound, and yet deeply humanitarian approach will assist even those most reluctant to see the need for change. Although potentially a painful period of course-correction, we think this could still be an exciting opportunity for Harney County, with OWRD's support, to once again take the lead in innovative, place-based conservation.

We deeply appreciate your ongoing work, and we look forward to hearing about next steps. Thank you.

40710 N. Diamond Lane
Diamond, Oregon
July 25, 2025

Received
AUG 01 2025
OWRD

Oregon Water Resources Department
725 Summer Street N.E., Suite A
Salem, OR 97301-1271

Dear Kelly Meinz:

While I have a well that supplies ground water for domestic purposes and wells that supply groundwater for livestock, I am writing concerning the wells that use groundwater to raise alfalfa hay for our livestock in the cold winter months.

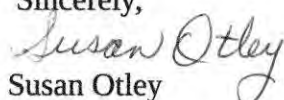
Looking at the map of the Critical Groundwater Area, I see our irrigated alfalfa hay ground laying in the most southern tip of the Northeast-Crane Subarea of the Harney Basin Critical Groundwater Area. Our wells have tested to have a stable static water level. We are a sliver of land near two boundaries of the Northeast-Crane Subarea: Lower Blitzen-Voltage to the southwest and to the east not in a Critical Groundwater area. I feel we should not be with the larger portion of the subarea to the north, that does have issues, in the Northeast-Crane Subarea.

We are a family operation. I have a son and family on the ranch as well as two grandsons (one with his family, which includes two great grandchildren). I see this to continue to be family operated for many future years.

We are still making payments on the purchase of this hay ground. If we should lose the right to irrigate, the value of the property would drop drastically and we would still have to make our payments. We also would have to purchase alfalfa hay for our livestock. There is a house on the property plus other improvements which is approximately forty miles from Burns, Oregon. We have a grandson that lives there and does the work required as well as employees and other family members that are on site to assist with the haying process three times a year. These jobs would disappear.

I do realize there is a groundwater issue and should be dealt with. Anyone that has a permit to drill a new irrigation well and has not done so should not be able to drill a new well as stated in 690-512-0041. Also one in a Critical Groundwater location should not be allowed to transfer their right to an area in proximity to another irrigator. Locations should be more site specific as OWRD should not be terminating water usage to irrigators who have stable ground water levels like we do.

My main point is that I feel our property should not be included in the Northeast-Crane Subarea as we and three others are a narrow shoot of land in the south end of the Northeast-Crane Subarea plus are divided by a land form known as Windy Point. Also as stated before our wells have a stable water level.

Sincerely,

Susan Otley

Susan Otley
40710 N. Diamond Ln.
Diamond, OR 97722

PORTLAND OR RPDC 972

30 JUL 2025 PM 5 L



1775 ★ 2025

FREEDOM
FOREVER

Kelly Meinz
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

97301-125572

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Susan Otley 2/2

PROPOSED HARNEY BASIN GROUNDWATER POLICIES – WRITTEN COMMENT FORM

This written comment form can be used to help you formulate effective written public comments for the Division 512 Harney Basin Program Rules being proposed by the Oregon Water Resources Department, which will be used to manage and regulate groundwater use in the Harney Basin. The questions provided in this form address various aspects of the rules. Each question includes space to write your answer and some questions include options for you to consider. Reach out to Harmony Burrig if you want help talking through or recording your comments (541-846-8863 / harmony@saltandfresh.solutions).

Public comments and related materials must be received no later than **August 7, 2025 at 5pm:**

By Email: WRD_DL_rule-coordinator@water.oregon.gov

By Mail: Kelly Meinz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Your Name (required): Susan M Ramsay
Your Email (optional): SUEM@RAMSAYCANDL.COM
Your Phone (optional): 541-493-2076 / 541-589-4834
Note: All personally identifiable information may be made public. Please do not include this information if you do not want it included in the public record. A first name and last initial must be included to be considered.

Please check all interests that apply to you:

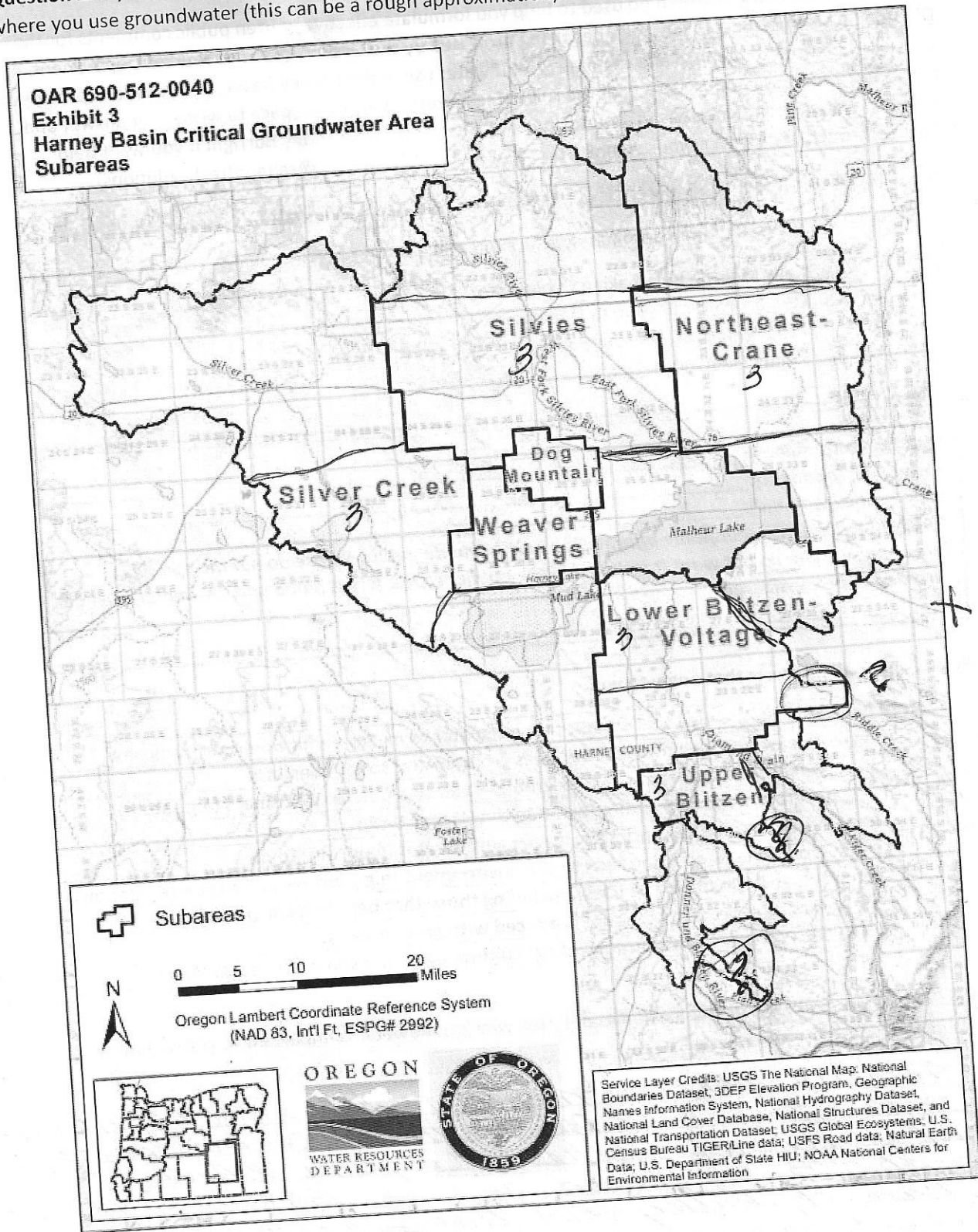
☒	I have at least one well that supplies groundwater to my home for domestic purposes.
☒	I have at least one well that that supplies groundwater to my livestock.
☐	I have at least one well that supplies groundwater to a non-farm business (e.g., store).
☒	I irrigate/grow crops with groundwater in the Harney Basin.
☐	I have a groundwater fed spring on my property that is important to me.
☒	I value groundwater contributions to the environment (e.g., springs and native vegetation).
☒	I value fish and wildlife in the basin, including those that benefit from groundwater.
☒	I use agricultural products that are produced with groundwater.
☒	I value the economic contributions of agricultural operations that use groundwater.

Question 1. Please tell us about yourself and describe why groundwater is important to you. If you use groundwater, describe how you use it.

I am a widow in my 70's who is determined to maintain and operate my 7000 acre ranch I inherited when my husband passed away in Feb 2023. We moved here in 1998 from Salt Lake and have operated and owned several businesses in Burns, OR

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

Question 2. If you use groundwater in the Harney Basin, mark with a color dot on the map provided where you use groundwater (this can be a rough approximation).



Question 3. The Water Resources Department proposes to designate the area in the map outlined in black as a Critical Groundwater Area, which would give them the authority to regulate or curtail/reduce groundwater use. Do you have any feedback on the boundaries or the basis for designating a Critical Groundwater Area described in the Division 10 report? (See 609-512-0041 in the proposed rules)

The subareas are too large. We need to better match the topography that better match where we draw our water from. Take the 5 large subareas and turn them into 15 subareas and leave Weaver Springs and Dog Mountain as they are.

Question 4. The map on the previous page shows the seven proposed subareas that the Department will use to regulate groundwater use (with different levels of regulation for each area). Based on your knowledge of the basin, are there any changes you would suggest to the boundaries? Draw them on the map and describe the reason below. (See 609-512-0041 in the proposed rules)

Form 15 appointed committees by our County Court, each with 3 representatives for a total of 45 people. Require a minimum of monthly meetings with recorded and approved minutes. They will stay in touch with water users and monitor water usage.

Question 5. Please describe groundwater conditions where you are and what changes in groundwater levels or other groundwater changes you have observed in the last decade. If you have not observed any changes, please note that. You are also welcome to note any questions you have.

The Puckett family of water right flows from Weaver Springs to Crane/Pinecreek and then to Sadhouse Lane.

My ground water levels are and remain at static level of 80'

Question 6. If you have been or expect to be impacted by changing groundwater conditions, please describe how you have been impacted.

No! I expect our long term weather pattern to continue to provide with improved snow pack and additional rain fall.

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

Question 7. The Water Resources Department proposes to achieve the groundwater management goal of durably stable groundwater levels (0 feet per year of decline) by the year 2058 for the entire basin by curtailing groundwater use in 6-year intervals. Do you have feedback on the groundwater level goal and target groundwater level trend? (See 609-512-0041 in the proposed rules)

☐	I support the groundwater management goal and target groundwater level trend as proposed.
☐	I support the target groundwater level trend, but I would like to see more time allowed to achieve the goal. Year achieved:
☐	I support the target groundwater level trend, but I would like to see the goal achieved in less time on a quicker timeline. Year achieved:
☐	I think minor declines are acceptable and should be allowed. Acceptable amount of decline (in total feet or feet per year):
☐	I would like to see groundwater levels come back up or recover. Desired amount of recovery (in feet):
☒	I would like to be able to see groundwater levels be allowed to fluctuate between certain levels (+/- within a certain "band" of acceptable declines)

Question 8. The proposed initial allocation (duty) for groundwater irrigation rights is 2.5 acre feet of water per acre for acres that were irrigated (wetted acres) sometime between 2020-2024. What feedback do you have on this proposal? (See 690-512-0060 in the proposed rules)

none of these!

☐	I support the initial allocation of 2.5 acre feet for groundwater irrigation rights.
☐	I think the initial allocation should be greater than 2.5 acre feet. Proposed amount:
☐	I think the initial allocation should be less than 2.5 acre feet. Proposed amount:
☐	I support that wetted acres should be calculated based on use between 2020-2024.
☐	I think wetted acres should be calculated based on a different time period. Suggested time period:

I suggest you leave the allocated 3.0 acre feet be left alone. OWRD can not predict future crops that could be grown in the next 50 years let alone the next 6 years

Question 9. The proposed initial allocation for municipal or quasi-municipal groundwater rights is 110% of water equal to 110% of the greatest single year in the previous five-year period. What feedback do you have on this proposal? (See 690-512-0060 in the proposed rules)

You will destroy our County, including Burns, Hines, Crane and Blitzen, from any further economic development.
The impact will be immediate as the proposal applies thru the County!

Question 10. The proposed permissible total withdrawal (PTW) for each of the seven subareas is described below. This is the amount of water that "represents the amount of water that the Water Resources Department has determined can achieve the target groundwater level trend by 2058. The Department may not reduce groundwater pumping to a value less than the permissible total withdrawal." Highlight your feedback about the level of reductions for each area below. A memo produced by the Department explores a different allocation between the Lower Blitzen-Voltage area and the Northeast-Crane area. What additional feedback do you have on these proposed levels of groundwater use (PTW) and reductions? (See 690-512-0050 in the proposed rules)

Weaver Springs	Lower Blitzen-Voltage	Northeast-Crane	Silver Creek	Silvies	Dog Mountain	Upper Blitzen
PTW: 4,800 afy	PTW: 8,300 afy	PTW: 35,000 afy	PTW: 15,200 afy	PTW: 21,200 afy	PTW: 4,200 afy	PTW: 100 afy
75% reduction from 2018 use	39-40% reduction from 2018 use	34% reduction from 2018 use	27-28% reduction from 2018 use	15-16% reduction from 2018 use	9-10% reduction from 2018 use	0% reduction from 2018 use
Too much?	Too much?	Too much?	Too much?	Too much?	Too much?	Too much?
Too little?	Too little?	Too little?	Too little?	Too little?	Too little?	Too little?
Just right?	Just right?	Just right?	Just right?	Just right?	Just right?	Just right?
I don't know	I don't know	I don't know	I don't know	I don't know	I don't know	I don't know

Our County will experience a major change in the wet and moisture
(i.e. Switch back to La Nina to El Niño)

Question 11. The reductions in each subarea will be phased in over time following a **proposed reduction schedule**, with the largest percent of reductions made initially and later reductions phased in over 6 year intervals based on existing groundwater level trends to ensure that groundwater levels are on track to achieve the groundwater management goal. Reductions will be based on priority date using the initial allocation as a starting point. What feedback do you have on the proposed reduction schedule? (See OAR 690-512-0070 in the proposed rules).

	2028	2034	2040	2046	2052	2058
Other Subareas	40% of total reductions	30% of total reductions	15% of total reductions	10% of total reductions	5% of total reductions	Stability achieved
Weaver Springs	75% of total reductions	25% of total reductions	--	--	--	--

☐	I support the proposed reduction schedule (percent reductions and implementation timeframe).
☐	I would like to see higher reductions implemented in the near-term.
☐	I would like to see lower reductions implemented in the near-term.
☐	I would like to see 20% reductions implemented at each step.
☐	I would like to see all reductions implemented immediately.
☐	I would like to see a shorter implementation timeframe (achieve stability sooner).
☐	I would like to see a longer implementation timeframe (longer period to achieve stability).
☒	If groundwater levels have not been declining in a subarea, I would like to see a grace period during the first 6-year period where no reductions are implemented.

DWRD has made a proposal to resolve an issue that was created by DWRD in the first place. If your data is flawed, and it is, you are trying to play GOD.

Question 12. The Department is proposing to follow an **adaptive management approach** for implementing reductions informed by groundwater level trends. If groundwater level trends are "on track" then no adjustments would be made. This approach allows the Department to make changes to the reductions to achieve the goal. Reductions could be adjusted up or down depending on how groundwater levels change over the previous 6 years. What feedback do you have on the adaptive management approach? (See 690-512-0080 in the proposed rules)

As directors of this agency change so can the proposed plan be changed. You can not predict who will be in charge under a new governor's agenda. Stand back and let us resolve the issue.

Question 13. By 2028 all groundwater rights holders will be required to install a flowmeter to measure groundwater use and will be required to report groundwater use on an annual basis. A flowmeter must be installed on this timeframe in order to continue to legally use groundwater under existing rights. What feedback do you have on this requirement? Will you seek any assistance to meet this requirement? (See 690-512-0110 in the proposed rules)

Because I pump for 4 pivots & 3 wheel lines from a single well I do not have a flow meter
I do use an acceptable formula for calculating water use based on my ~~own~~ pumps electrical usage

Question 14. Under the proposed rules the only new uses that will be allowed are those uses that do not require water rights (i.e., permit exempt uses), such as domestic and stockwater wells, and non-consumptive geothermal uses. What feedback do you have on the proposed new uses? (See 690-512-0030 in the proposed rules)

These types of users will have little to no impact on water levels.
Leave them alone!

Question 15. Please describe what personal impacts you expect these rules might have on you (either positive or negative).

Problem with: Lending operating line w/banks
: new loans to update pivots
: Lending crop production that pays the bills
: Angerful children to stay in this County or leave
: devalue real property values as some won't stick around to see how the ends

Question 16. Please describe what basin impacts you expect these rules might have on the broader basin or community (either positive or negative). (See the Fiscal Impact Statement).

See question 9: Devastate economic development of any size
discourage existing business all water here or water plotting till each empty state front or the lease

Question 17. Describe actions that you would like the Department to consider that could mitigate or minimize anticipated impacts to you or the basin. This could include support for proposed policies or changes to the proposed policies.

Allow & Secure grants to install more than one water infusion station to take excess energy, puritize the water and force it into the aquifer

Question 18. When you look into the future, what is most important to you? What do you hope to see for yourself and for the basin? What are you most concerned about?

A majority of the farming & ranching community have been here for generations. This whole exercise in ADOT outreach has had both health and financial implications that have shook this community to its core

Question 19. What else is important for you to communicate to the Department?

That 'over news' should be thrown out back not the rest who play by the rules and always have

Question 20. Do you have any other feedback on the proposed rules or groundwater management?

I am attaching a separate file on the impact of seismic activity in eastern asia, eastern Europe & Russia. This and our USA activity in Alaska, Hawaii and California could very well be changing the dynamics of the our great Basin.

For questions about the proposed rules, please contact Kelly Mainz at the Water Resources Department (WRD_DL_rule-coordinator@water.oregon.gov or 971-718-7087).

For assistance with developing effective written comments, please reach out to Harmony Burright with the High Desert Partnership who can help (541-846-8863 or harmony@saltandfresh.solutions).

Harney Basin Groundwater Policies (Div. 512 Rules)

As a longtime resident of Harney County, on city water, I am so grateful to see loss of groundwater being addressed. It's been alarming to see the expansion of pivot use. Many knew, when many pivots started appearing here 30-plus years ago, that soon enough we'd all be in trouble. Despite lots of letters to the editor, grant-writing for surveys; meetings and phone calls, neither state nor county officials moved to prevent the disaster.

Instead it appears pivot users/growers were allowed to self-regulate. The bill for pivot users/growers deciding to go that route is past due. Alfalfa growers made good money via the use of pivots. It's well past time to end this misplaced industry in this aquifer-dependent, closed basin high desert.

Pivot users should pay for their neighbors' costs of having to flush their wells or dig deeper ones. Those names and numbers can be easily obtained, though some domestic and stock tank well users have since moved away. The latter would need to be found and reimbursed. Instead of doing a graduated-over-time limit, it's time to eliminate most of the existing pivots, revert to the number of pivots in use 35 years ago, and return to flood irrigation in the "cutoff" style for any who can through use of snow melt & geography.

This isn't farm land. As it gets windier, hotter and drier it will barely be rangeland.

Allowing any pivots to continue to the 2058 year is unnecessary. Most of the pivot owners/growers have been in business for over 30 years and are due for retirement. No one would bequeath pivot operations to their offspring since that would set them up to be sued, by municipal, domestic and stock well owners, for knowingly depleting the aquifer. If pivot owners from here are younger, they went into the business despite the threatened condition of the aquifer. Pivot owners who came here to farm would have learned about cones of depression and the need for deeper wells as they sought property. They decided to buy here and make their money from a dying industry, maybe knowing they'd move on when their own wells went dry.

Restoring springs and wetlands used by wildlife should be paramount for the Water Resources Department to accomplish as the page away from pivots is turned.

Thank you for your work and the opportunity to comment.

Terry K.

PROPOSED HARNEY BASIN GROUNDWATER POLICIES – WRITTEN COMMENT FORM

This written comment form can be used to help you formulate effective written public comments for the Division 512 Harney Basin Program Rules being proposed by the Oregon Water Resources Department, which will be used to manage and regulate groundwater use in the Harney Basin. The questions provided in this form address various aspects of the rules. Each question includes space to write your answer and some questions include options for you to consider. Reach out to Harmony Burright if you want help talking through or recording your comments (541-846-8863 / harmony@saltandfresh.solutions).

Public comments and related materials must be received no later than **August 7, 2025 at 5pm:**

By Email: WRD_DL_rule-coordinator@water.oregon.gov

By Mail: Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Your Name (required): Tom R. Davis
Your Email (optional): _____
Your Phone (optional): (541) 589-0906
Note: All personally identifiable information may be made public. Please do not include this information if you do not want it included in the public record. A first name and last initial must be included to be considered.

Please check all interests that apply to you:

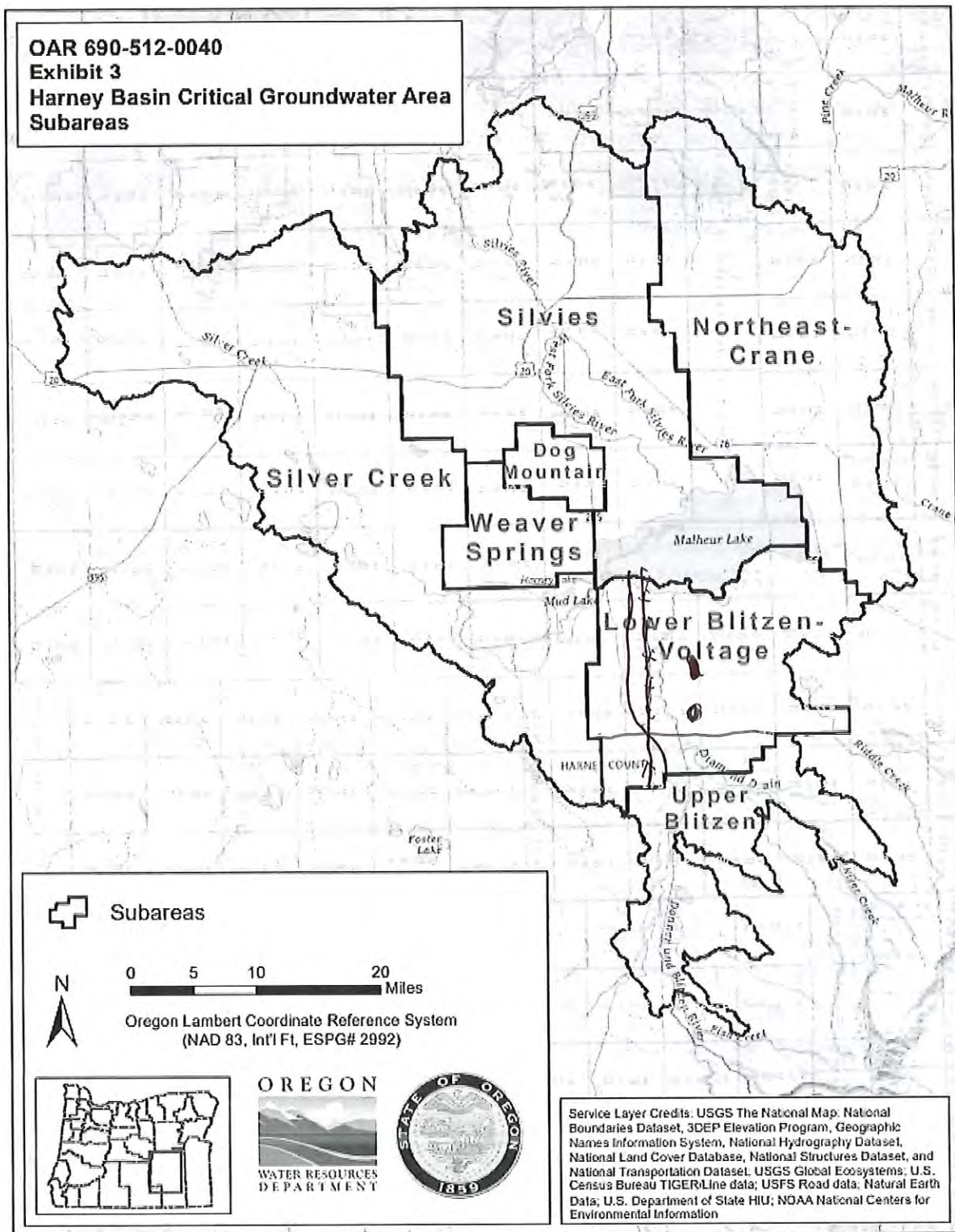
☒	I have at least one well that supplies groundwater to my home for domestic purposes.
☒	I have at least one well that that supplies groundwater to my livestock.
☐	I have at least one well that supplies groundwater to a non-farm business (e.g., store).
☒	I irrigate/grow crops with groundwater in the Harney Basin.
☐	I have a groundwater fed spring on my property that is important to me.
☒	I value groundwater contributions to the environment (e.g., springs and native vegetation).
☒	I value fish and wildlife in the basin, including those that benefit from groundwater.
☒	I use agricultural products that are produced with groundwater.
☒	I value the economic contributions of agricultural operations that use groundwater.

Question 1. Please tell us about yourself and describe why groundwater is important to you. If you use groundwater, describe how you use it.

I have been raised for all of my life here in Harney County, been on a farm all of my life. I depend on groundwater to grow crops & livestock with out water, Harney County can't exist. Agriculture is the number one business in Harney County.

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

Question 2. If you use groundwater in the Harney Basin, mark with a color dot on the map provided where you use groundwater (this can be a rough approximation).



Question 3. The Water Resources Department proposes to designate the area in the map outlined in black as a **Critical Groundwater Area**, which would give them the authority to regulate or curtail/reduce groundwater use. Do you have any feedback on the boundaries or the basis for designating a Critical Groundwater Area described in the **Division 10 report**? (See 609-512-0041 in the proposed rules)

I am in the lower Blitzen, we have the most water that does not go any further than the lower Blitzen and we are staying for the last 67 years of our static water level. Also our lower Blitzen west boundary should go no further west than Highway 205 and the south boundary should stop at the south end of T.S. 27 - & North of T.S. 28.

Question 4. The map on the previous page shows the seven proposed **subareas** that the Department will use to regulate groundwater use (with different levels of regulation for each area). Based on your knowledge of the basin, are there any changes you would suggest to the boundaries? Draw them on the map and describe the reason below. (See 609-512-0041 in the proposed rules)

N&S it could go a lot further east because that is where the rest of our water goes. NO water goes north. The water out the west side of Highway 205 is a whole other source of water going a different way.

Question 5. Please describe **groundwater conditions** where you are and what changes in groundwater levels or other groundwater changes you have observed in the last decade. If you have not observed any changes, please note that. You are also welcome to note any questions you have.

There has been a very 2' decline over the last 2-3 years due to drought conditions. In the last 5 years so, in my 70 years of knowledge we need to stop any new wells and keep the current water rights available for use.

Question 6. If you have been or expect to be **impacted by changing groundwater conditions**, please describe how you have been impacted.

I cannot raise my crops on less than 2.5 acre ft.

Question 7. The Water Resources Department proposes to achieve the **groundwater management goal** of durably stable groundwater levels (0 feet per year of decline) by the year 2058 for the entire basin by curtailing groundwater use in 6-year intervals. Do you have feedback on the groundwater level goal and target groundwater level trend? (See 609-512-0041 in the proposed rules)

☐	I support the groundwater management goal and target groundwater level trend as proposed.
☐	I support the target groundwater level trend, but I would like to see more time allowed to achieve the goal. Year achieved:
☐	I support the target groundwater level trend, but I would like to see the goal achieved in less time on a quicker timeline. Year achieved:
☒	I think minor declines are acceptable and should be allowed. Acceptable amount of decline (in total feet or feet per year):
☐	I would like to see groundwater levels come back up or recover. Desired amount of recovery (in feet):
☒	I would like to be able to see groundwater levels be allowed to fluctuate between certain levels (+/- within a certain "band" of acceptable declines)

I have a hard time believing you are capable of managing our Ground Water. You are making it decline in water while letting other people around me drill new wells and giving other extensions.

Question 8. The proposed **initial allocation** (duty) for groundwater irrigation rights is 2.5 acre feet of water per acre for acres that were irrigated (wetted acres) sometime between 2020-2024. What feedback do you have on this proposal? (See 690-512-0060 in the proposed rules)

☒	I support the initial allocation of 2.5 acre feet for groundwater irrigation rights.
☒	I think the initial allocation should be greater than 2.5 acre feet. Proposed amount: 3 acre FT
☒	I think the initial allocation should be less than 2.5 acre feet. Proposed amount:
☐	I support that wetted acres should be calculated based on use between 2020-2024.
☐	I think wetted acres should be calculated based on a different time period. Suggested time period:

Received
AUG 08 2025
OWRD

Question 9. The proposed initial allocation for municipal or quasi-municipal groundwater rights is 110% of water equal to 110% of the greatest single year in the previous five-year period. What feedback do you have on this proposal? (See 690-512-0060 in the proposed rules)

We need not to mess with what was already promised to us, our permit say we get up to 3 acre ft. per year.

Question 10. The proposed permissible total withdrawal (PTW) for each of the seven subareas is described below. This is the amount of water that "represents the amount of water that the Water Resources Department has determined can achieve the target groundwater level trend by 2058. The Department may not reduce groundwater pumping to a value less than the permissible total withdrawal." Highlight your feedback about the level of reductions for each area below. A memo produced by the Department explores a different allocation between the Lower Blitzen-Voltage area and the Northeast-Crane area. What additional feedback do you have on these proposed levels of groundwater use (PTW) and reductions? (See 690-512-0050 in the proposed rules)

Weaver Springs	Lower Blitzen-Voltage	Northeast-Crane	Silver Creek	Silvies	Dog Mountain	Upper Blitzen
PTW: 4,800 afy	PTW: 8,300 afy	PTW: 35,000 afy	PTW: 15,200 afy	PTW: 21,200 afy	PTW: 4,200 afy	PTW: 100 afy
75% reduction from 2018 use	39-40% reduction from 2018 use	34% reduction from 2018 use	27-28% reduction from 2018 use	15-16% reduction from 2018 use	9-10% reduction from 2018 use	0% reduction from 2018 use
Too much?	Too much?	Too much?	Too much?	Too much?	Too much?	Too much?
Too little?	Too little?	Too little?	Too little?	Too little?	Too little?	Too little?
Just right?	Just right?	Just right?	Just right?	Just right?	Just right?	Just right?
I don't know	I don't know	I don't know	I don't know	I don't know	I don't know	I don't know

Should be no reduction in Lower Blitzen as we are staying stable in our area.

Crane should have been cut off from drilling any new wells from 1982 on they were running out of water then.

Question 11. The reductions in each subarea will be phased in over time following a proposed reduction schedule, with the largest percent of reductions made initially and later reductions phased in over 6 year intervals based on existing groundwater level trends to ensure that groundwater levels are on track to achieve the groundwater management goal. Reductions will be based on priority date using the initial allocation as a starting point. What feedback do you have on the proposed reduction schedule? (See OAR 690-512-0070 in the proposed rules).

	2028	2034	2040	2046	2052	2058
Other Subareas	40% of total reductions	30% of total reductions	15% of total reductions	10% of total reductions	5% of total reductions	Stability achieved
Weaver Springs	75% of total reductions	25% of total reductions	--	--	--	--

☐	I support the proposed reduction schedule (percent reductions and implementation timeframe).
☐	I would like to see higher reductions implemented in the near-term.
☐	I would like to see lower reductions implemented in the near-term.
☐	I would like to see 20% reductions implemented at each step.
☐	I would like to see all reductions implemented immediately.
☐	I would like to see a shorter implementation timeframe (achieve stability sooner).
☐	I would like to see a longer implementation timeframe (longer period to achieve stability).
☒	If groundwater levels have not been declining in a subarea, I would like to see a grace period during the first 6-year period where no reductions are implemented.

☐	
☐	
☐	
☐	
☐	
☐	

Question 12. The Department is proposing to follow an adaptive management approach for implementing reductions informed by groundwater level trends. If groundwater level trends are “on track” then no adjustments would be made. This approach allows the Department to make changes to the reductions to achieve the goal. Reductions could be adjusted up or down depending on how groundwater levels change over the previous 6 years. What feedback do you have on the adaptive management approach? (See 690-512-0080 in the proposed rules)

I feel right now we are not affected so clean it along. Our water is not a bucket it is flowing streams

Received

AUG 08 2025

OWRD

Tom Davis 6/8

Question 13. By 2028 all groundwater rights holders will be required to install a flowmeter to measure groundwater use and will be required to report groundwater use on an annual basis. A flowmeter must be installed on this timeframe in order to continue to legally use groundwater under existing rights. What feedback do you have on this requirement? Will you seek any assistance to meet this requirement? (See 690-512-0110 in the proposed rules)

I support this 100%

Question 14. Under the proposed rules the only new uses that will be allowed are those uses that do not require water rights (i.e., permit exempt uses), such as domestic and stockwater wells, and non-consumptive geothermal uses. What feedback do you have on the proposed new uses? (See 690-512-0030 in the proposed rules)

as long as its for domestic or stockwater
of any is support a 20% But they need to
drill at least as deep as the surrounding around them

Question 15. Please describe what personal impacts you expect these rules might have on you (either positive or negative).

all negative it will bankrupt the junior
water users and is totally unnecessary
The water permit should be proven on use
before they get to date of approval on the final
permit

Question 16. Please describe what basin impacts you expect these rules might have on the broader basin or community (either positive or negative). (See the Fiscal Impact Statement).

It will put our community in jeopardy of bankruptcy

Question 17. Describe actions that you would like the Department to consider that could mitigate or minimize anticipated impacts to you or the basin. This could include support for proposed policies or changes to the proposed policies.

*I have lived here for 70 years
and would like for the department to
listen what we know*

Question 18. When you look into the future, what is most important to you? What do you hope to see for yourself and for the basin? What are you most concerned about?

*I hope built a legal opportunity for my
grandkids to continue with a future for them
but they might not want to pass it
on to them.*

Question 19. What else is important for you to communicate to the Department?

Believe in us as we put our faith in you

Question 20. Do you have any other feedback on the proposed rules or groundwater management?

For questions about the proposed rules, please contact Kelly Mainz at the Water Resources Department (WRD_DL_rule-coordinator@water.oregon.gov or 971-718-7087).

For assistance with developing effective written comments, please reach out to Harmony Burright with the High Desert Partnership who can help (541-846-8863 or harmony@saltandfresh.solutions).

August 6, 2025

**Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271**

Subject: US Fish and Wildlife Service Comments on Proposed Division 512 Rules

Dear Mr. Mainz,

The U.S. Fish and Wildlife Service appreciates the opportunity to serve on the rulemaking advisory committee and offers the following comments regarding the proposed Division 512 rules.

Established in 1908, the Malheur National Wildlife Refuge encompasses 187,757 acres of vital wildlife habitat and is recognized as a local, state, and national treasure. Each year, we welcome approximately 32,000 visitors who come to experience the diverse flora and fauna that reside on the Refuge or pass through along their migratory routes. Several groundwater-fed springs are essential to our operations, including Sodhouse Springs in the Lower Blitzen-Voltage Area, Double O Springs in the Silver Creek Subarea, and other springs located within the management areas. The Refuge also partners with numerous surface water irrigators and manages more than 40,000 acres of flood-irrigated wet meadows and other wetlands. In addition, our headquarters relies on groundwater to meet domestic needs and irrigate grounds that draw visitors for the opportunity to enjoy rare bird observations.

While most Refuge water rights are for surface water, we do hold certain groundwater rights. Groundwater in the Harney Basin has not yet been adjudicated; therefore, the Service does not have recognized federal reserved groundwater rights. However, the Refuge possesses multiple state-appropriated groundwater rights for springs, spring-fed ponds, and wells. These include, but are not limited to, springs within the Double O Springs Complex, Sodhouse Spring Pond and other partially spring-fed ponds, and domestic wells supporting facilities and infrastructure. Our groundwater interests are multifaceted: sustaining water supply for headquarters operations, protecting flows to our spring complexes, supporting the viability of local agriculture, and maintaining the balance between social, economic, and environmental needs in the basin.

Monitoring of spring discharge and groundwater levels is critical to ensuring the Division 512 rules protect Refuge water rights and resources. Historic spring discharge data exists for several locations, including Double O Springs, Page Springs, and Sodhouse Springs. We plan to revisit and enhance our monitoring strategy at Double O Springs to improve accuracy and meet permit requirements. While staffing limitations constrain our ability to lead extensive new monitoring efforts, we are committed to collaborating with basin partners to monitor conditions moving forward.

Within the Silver Creek and Weaver Springs Subareas, we are interested in working with local groundwater users to better understand relationships among spring discharge, surface water diversions, drought, pumpage, and other factors. Our goal is to maintain flows that meet ecological and economic needs.

In the Lower Blitzen-Voltage Area, Sodhouse Springs has ceased flowing in recent years. We have also noted changes in both the quantity and quality of groundwater from headquarters wells. We seek to work proactively to ensure a sustainable, high-quality water supply for headquarters operations and landscaping, and to restore spring flows where possible. Some of our rights in these areas may already be impacted by other pumping, and we wish to partner with OWRD and basin stakeholders to investigate causes and develop solutions.

While Division 512 limits new groundwater applications, it still allows transfers that could move existing rights closer to the Refuge, potentially harming our water resources. We oppose new transfers into the Lower Blitzen-Voltage or Silver Creek Subareas if they could affect Refuge wells, springs, or associated rights. For example, the recent OWRD decision to transfer water rights associated with pivots from Weaver Springs to properties near Sodhouse Springs and Refuge headquarters could negatively affect our groundwater supply and potentially injure Refuge water rights. We would welcome the opportunity to collaborate with groundwater users to monitor any resulting impacts.

Although we do not take a position on specific groundwater reduction targets, we strongly urge collective stewardship of the basin's groundwater-fed springs, given their ecological importance. We encourage active partnerships among groundwater users, the state, and the Service to monitor, protect, and where possible restore these resources. We support adaptive management approaches that integrate new data and promote more efficient water use to reduce overall groundwater consumption.

We look forward to working closely with basin partners to ensure that the Refuge's interests and needs remain an integral part of any future groundwater management strategies.

Sincerely,

Jess Wenick

Project Leader
Malheur National Wildlife Refuge
U.S. Fish and Wildlife Service

HARTT Laura A * WRD

From: Christopher Hall <chris@waterleague.org>
Sent: Tuesday, August 12, 2025 9:38 PM
To: WRD_DL_rule-coordinator; MEINZ Kelly A * WRD; HARTT Laura A * WRD; SEYMOUR Tim R * WRD; SPRIET Jason D * WRD
Cc: Jerry Allen
Subject: Water League's Comments on the 690-512 Proposed Administrative Rules
Attachments: Water League_Comments on Div 512 August 12_2025.pdf

Dear Kelly,

Please see attached to this email Water League's Comments on the 690-512 Proposed Administrative Rules.

You may also find [a copy of Water League's comments at this link](#).

Please confirm receipt of our Comments.

Thank you,

Christopher Hall
Executive Director
Water League
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*Engaging the public
in water stewardship.*

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August 12, 2025

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Water League submits our comments on the Chapter 690 Division 512 Notice of Proposed Rulemaking Amending and adopting Division 512 rules concerning groundwater management in the Malheur Lake administrative basin. These comments are in addition to our oral testimony presented on Tuesday, August 5, 2025.

As always, we appreciate the opportunity to share our thoughts.

Thank you,

A handwritten signature in black ink, appearing to read "Chris Hall", written over a light blue horizontal line.

Christopher Hall
Executive Director

Comments on the Chapter 690 Division 512 Malheur Lake Basin Administrative Rules

By Christopher Hall, Water League – August 12, 2025

Abstract summary:

The Oregon Water Resources Department's Chapter 690 Division 512 rules mark a long overdue shift in groundwater management, outlining how officials shall discharge their fiduciary duty to protect groundwater for present and future generations and ecosystems. The rules align with Oregon's constitutional and statutory obligations to manage water in the public trust.

In the Harney Basin, unsustainable over-pumping depletes deep ancient groundwater reserves that are not being renewed at human timescales, and it harms shallow recharge zones where domestic wells, springs, and groundwater-dependent ecosystems are located. Unsustainable over-pumping threatens both the public health, safety, and welfare, and flora and fauna in the present and future. The habitability for all creatures declines as over-pumping evaporates water away from the Harney Basin.

The Division 512 rules propose a 35% reduction in water use over 30 years to curb groundwater mining. In so doing, the state recognizes that continued over-extraction is contrary to the public interest. By designating the Harney Basin as a Critical Groundwater Area (CGWA), these rules establish a legal framework for equitable and sustainable groundwater management by balancing intergenerational equity and ecological integrity with short-term extractive interests.

Note:

Water League assiduously avoids recommending to OWRD hydrologists how to run their models, conduct their studies and research, and determine solutions to complex scientific and engineering problems related to resolving the problem of excessively declining groundwater levels.

Throughout the Division 512 Rules Advisory Committee (RAC) meeting process, some RAC members and members of the public stated that they did not understand much of the complex details presented, while others questioned the merits of the hydrologic research and proposed alternatives to complex hydrological methodologies without the professional qualifications necessary to do so. The incomprehension and skepticism resulted in tripling the number of RAC

meetings, adding more than a year to the process,¹ and prompting a dozen informal Discussion Groups run by Oregon Consensus and the High Desert Partnership. These accommodations were made to explain the scientific research, groundwater models, and complexities of the Division 512 rulemaking policies so that RAC members and the public could “provide input/advice and help [the] Department consider various perspectives.”² Water League contends that there is a difference between possessing a sufficient understanding of the material to participate in the rulemaking process and possessing the expertise to (re)direct hydrologists in the execution of their professional duties.

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- I. Introduction
- II. Public Sentiment and the Greater Public Interest
- III. Review of the Existing Division 512 Rules adopted in 2016
- IV. Ensuring Beneficial Use by Limiting Harm
- V. The Greater Harney Valley Groundwater Area of Concern
- VI. Fiscal Impacts and Economics
- VII. Discussion Groups
- VIII. Comments on the Notice of Proposed Rulemaking Criteria
- IX. Itemized Comments on the Proposed Draft Rules for OAR 690-512
- X. Conclusion

*“If the WRD is not given clear authority to stop issuing permits in these cases, not many years from now there will no doubt be many people who will have made large investments in water resource development and come to rely on water that with increasing frequency very well may not be available. **This will most likely bring on tremendous conflicts involving environmentalists on the one hand, junior appropriators on the other, and the WPRB caught in the middle.** It would serve the interests of all to prevent these conflicts from intensifying.”³*

¹ Oregon Water Resources Department, Rules Advisory Committee Meeting, [Division 512 Rulemaking: Ground Water Regulation for the Malheur Lake Administrative Basin](#), (PowerPoint presentation, August 29, 2023). [9-10]

² Oregon Water Resources Department, “Division 512 RAC Presentation,” August 29, 2023. [8]

³ Bret William Stafford, “[The Problems and Issues of Implementing Oregon's Minimum Stream Flow Program](#)” (Master's Thesis, Oregon State University, 1977). [22, **emphasis added.**] (Bret William Stafford's 1977 master's thesis explores instream and out-of-stream values, tensions, and proposed solutions that were debated a decade before the 1987 instream water rights statutes. Brett was the son of the great poet, William Stafford. He explains: “The WRD consists of the Water Policy Review Board (WPRB), the Water Resources Director, and the staff and assistants working under the Water Resources Director.” [5])

I. Introduction:

The Oregon Water Resources Department is wrapping up the first phase of a fraught yet high-functioning rulemaking process that will have lasted approximately three years by the time it is complete.

The process has been fraught because the state is attempting to manage the *Tragedy of the Commons*⁴ destruction of water sources, which in its own right is very difficult. But, OWRD has followed state law, which requires that: “The membership of an advisory committee appointed under this subsection must represent the interests of persons and communities likely to be affected by the rule.”⁵ This requirement has made the Rules Advisory Committee (RAC) meetings even more challenging to conduct because a supermajority irrigator-aligned cohort formed a bulwark against the proposed rules that would restrict groundwater pumping, even though such rules are necessary to prevent irreversible groundwater depletion to protect the broader public interest.

The rulemaking process has also been high-functioning because at every turn, OWRD staff practiced patience, active listening, and considerate responsiveness in meetings. They held many more meetings than planned and allowed meetings to focus on sticking points; they attended a dozen independent “Discussion Groups,” some of which were day-long activities; they prepared extensive documentation to convey many complex ideas and proposals, and paired them with extensive discussions to ensure no RAC member or member of the public was left behind; and staff provided constant and thorough notice of meetings, produced comprehensive agendas and slide decks to run meetings in logical and sequential formats, provided meeting summaries and video recordings for review at any time, and were responsive to post-meeting follow-up emails and discussions related to questions, comments, and concerns.

In response to HB 3800 in 2025, which sought to enact a law superseding the Division 512 Rulemaking process and was sponsored by Representative Mark Owens (a RAC member and irrigator from Crane whose wells sit atop some of the steepest cones of depression in the Harney Basin), Water League wrote to OWRD staff on March 27, 2025:

The 184-page slide deck presentation for the April 2 DIV 512 RAC is an extraordinary accomplishment by OWRD that demonstrates your meticulous work to address all aspects of the CGWA process, from hydrology, modeling, economics, input from the community and broader public, responsiveness to that input, and painstaking clarity in developing and

⁴ Garrett Hardin, "The Tragedy of the Commons," *Science* 162, no. 3859 (December 13, 1968): 1243–48, <https://doi.org/10.1126/science.162.3859.1243>.

⁵ ORS 183.333 *Policy statement; public involvement in development of policy and drafting of rules; advisory committees*. (1).

explaining rules language to ensure informed and constructive feedback. Along with diligence and patience to get this process right over two years by finding the best broad-based alternatives to the status quo, OWRD has hedged against picking winners and losers or letting that process devolve into such inequity.⁶

Water League uploaded that 184-page slide deck presentation as a report to the HB 3800 testimony tab⁷ to show the extent to which OWRD staff have conducted due diligence in the Division 512 rulemaking process despite extraordinary resistance to the rulemaking process.

We begin our comments on the proposed Division 512 rules with this duality (fraught yet high-functioning) because a central fault line exists between the public interest in stopping the harm to the state's water sources and the minority special interests who are mining the groundwater in the Harney Basin. The tension built along this fault line has sustained conflict throughout the rulemaking process. Notably, this conflict has driven the process closer to a resolution that incorporates the public interest. The past consensus that water use was the sole purview of the water user, and that OWRD must service such "clients" to enable them in their unsustainable endeavors, has finally begun to recede. The conventional water management paradigm has been evolving for a number of years towards greater consideration of the long-term public interest as irrigators' longstanding demands of OWRD to permit subprime water right applications led to widespread over-appropriation and subsequent over-pumping.

II. Public Sentiment and the Greater Public Interest

Many people have an interest in the well-being of the public's water sources, whether they live in any particular basin today, lived there in the past, or may live there in the future; whether they visit the region, have friends and family that have ties to the region, or care about the water sources for ecological, spiritual, ancestral, social, cultural, and economic interests during the present and long-term future. We contend that people who have not been born yet hold the same interests, and our actions today should not foreclose upon their forthcoming rights to enjoy the same.⁸

⁶ Note: The April 2, 2025, RAC #14 meeting was postponed to April 16 to account for the flooding in Burns.

⁷ Oregon Water Resources Department, "[Groundwater Regulation for the Malheur Lake Administrative Basin Rules Advisory Committee](#)" RAC #14 slide deck, April 2, 2025. (Submitted as testimony for HB 3800 to the Oregon Legislative Information System by Water League. Ultimately, the bill died, sequestered in the House Committee on Rules, where it was being reengineered.)

⁸ Clark Wolf, "Contemporary Property Rights, Lockean Provisos, and the Interests of Future Generations," *Ethics* 105 (July 1995): 791–818. (We distinguish, as Clark Wolf does, between the public of the future having an interest in the usufructuary right to water sources and the present public's limited entitlement to use those sources without destroying or degrading them. While current users may have access to the fruits of water resources, they do not have a moral or legal claim to compromise the underlying substance of those resources in ways that foreclose access for future persons. The interests of future generations, though not presently assertable in conventional legal forums, nonetheless impose

We note, however, that the Notice of Proposed Rulemaking (similar to the dozen-plus RAC meetings) frames regulatory actions with a dour tone. The language is devoid of optimism, reflecting the gravity of the situation from a solely present-day outlook. This bias contrasts sharply with how the same actions might be viewed from a future perspective. Those living in a future when water sources have been stabilized would likely be delighted, seeing these rules not as a cause for harm, but as a forward-thinking decision that prevented the collapse of the basin's resources and ensured water availability for generations to come. Water League calls for a more equitable reckoning of the public sentiment. Water Users in the present improperly act as if they have seniority over the future, resulting in the present regulating off the future's access to water.

Water use and water quality are broadly held concerns by the public across and through all basins. While only some lands belong to the public, ORS 537.110 *Public ownership of waters* declares that "All water within the state from all sources of water supply belongs to the public." No one person can own the water because it belongs to everyone.

In 2023, The New York Times conducted an expansive study of groundwater declines across the entire U.S., titled "America Is Using Up Its Groundwater Like There's No Tomorrow."⁹ Notably, the readership of the NYT is national. The article contains almost 1,800 comments, which is much more than the average headline article. We regard the public sentiment as a legitimate statement of the greater public interest in groundwater.

We read most of the comments and had Chat GPT review the entire set to find themes. Based on these two types of review, the overall sentiment of the NYT commenters was concern about the unsustainable trajectory of groundwater use and a sense that political will and public awareness are lacking. Many believe the depletion of aquifers is an immediate crisis resulting from anthropogenic activity overwhelming ecological limits. They are frustrated by short-term outcomes driving political and economic decisions and call for better planning, regulation, and stewardship. The prevailing mood is one of realism bordering on alarm. These public concerns are not without justification: recent findings show that groundwater depletion is the dominant driver of global freshwater loss, affecting the majority of the world's population and in many cases representing an irreversible decline on human timescales.¹⁰

real obligations on today's society not to exhaust or pollute water sources that must remain intact for the future's equal and undiminished enjoyment.)

⁹ Mina Rojanasakul, Christopher Flavelle, Blacki Migliozi, and Eli Murray, "[America Is Using Up Its Groundwater Like There's No Tomorrow](#)," *New York Times*, August 28, 2023.

¹⁰ Hrishikesh A. Chandanpurkar, James S. Famiglietti, Kaushik Gopalan, David N. Wiese, Yoshihide Wada, Kaoru Kakinuma, John T. Reager, and Fan Zhang, "Unprecedented Continental Drying, Shrinking Freshwater Availability, and Increasing Land Contributions to Sea Level Rise," *Science Advances* 11, no. 30 (July 25, 2025): ead0298, <https://doi.org/10.1126/sciadv.adx0298>. [10] ("The authors surmise: "In many places where groundwater is being depleted, it will not be replenished on human timescales. The disappearance of groundwater from the world's aquifers (13, 14, 20, 26, 27, 50) is a critical, emerging threat to humanity and presents cascading risks that are rarely

The comments revealed three main themes: concern for water sources, ecosystems, and communities; frustration over continued depletion; and disillusionment that officials' insufficient response will fix the problem. Commenters overwhelmingly viewed groundwater depletion as a preventable crisis driven by corporate greed, political cowardice, and consumer denial. Many expressed anxiety and a sense of powerlessness, feeling that large-scale water use is beyond their control. There was also anger directed at industrial agriculture and bottled water companies that profit from water extraction while local communities face scarcity. There was broad consensus that water should be treated as a public trust, not private property.

Commenters are especially critical of state and federal inaction, and cite a lack of leadership, transparency, and unwillingness to confront powerful water use interests. Commenters believe climate change, population growth, and wasteful lifestyles (e.g., lawns, golf courses, and meat consumption) are accelerating the groundwater crisis.

While a few propose hopeful solutions like recharge basins, conservation, or regenerative agriculture, the prevailing mood is that we are running out of time to find solutions. Among many comments is a sense of urgency and powerlessness in the face of long-standing mismanagement. The tone veers from resignation to moral outrage, with many fearing that only collapse will finally provoke action. (Notably, the Harney Basin had to drain uncontrollably for 35 years before state officials could muster the fortitude to take action, which still faces significant political headwinds.) The overall sentiment feels burdened by a reckoning with ecological limits and skepticism that our current political and economic systems are capable of meaningful change. This feels similar to the despair many feel about how the climate change crisis will not be resolved favorably. Water League, however, agrees that while climate change may be out of our reach, officials can always reduce the over-pumping of groundwater reservoirs.

To hold water in trust, the WRC and state officials must consider the greater public interest as a distinct factor unto itself that embodies the sentiment discussed above. In a recent radio segment, we discussed how:

The public interest is neither the addition of all the special interests in a room nor a thematic reduction of them to a few generic concepts. Rather, the public interest is a wholly separate phenomenon, which is what the entire society needs in order to remain civilized. Not surprisingly, serving the greater public interest usually requires some degree of limiting individual special interests. Freud talked about frustrated individuals in his book, *Civilization and Its Discontents*; these were the folks who resented giving up some liberties

incorporated in environmental policy, management, and governance. It is an intergenerational resource that is being poorly managed, if managed at all (20, 26, 50), by recent generations, at tremendous and exceptionally undervalued cost to future generations. Protecting the world's groundwater supply is paramount in a warming world and on continents that we now know are drying.”)

to enable everyone to get along. Laws and regulations set limits on behavior for the greater good in both the present and the future. The public interest is what's an interest to society as a whole, which sometimes is going to be different from individual special interests.¹¹

III. Review of the Existing Division 512 Rules adopted in 2016

We comment below on select provisions of the existing Division 512 rules adopted in 2016 to set the context for our comments on the proposed new Division 512 rules in 2025.

The existing 2016 rules are a temporary placeholder, anticipating the current Div 512 rules that are to impose a CGWA. The existing 690-512-0020 *Groundwater use in the Greater Harney Valley Groundwater Area of Concern* rule states:

(12) Within 1 year after the Groundwater Study discussed in subsection 11 has been published by the Department, the Department will convene a Rules Advisory Committee to explore whether there is a need for updates or changes to these rules.

Overdraft problems in the Harney Basin needed immediate cursory restrictions on new water rights in 2016 to bide time for the current 2023-2025 rulemaking process to proceed. The 2016 rule, 690-512-0020, also states:

(1) The Greater Harney Valley Groundwater Area of Concern (GHVGAC) is established to ensure that groundwater in the GHVGAC is appropriated within the capacity of the resource and that new appropriations of groundwater assure the maintenance of reasonably stable groundwater levels and prevent depletion of the groundwater resource.

We acknowledge that the temporary 2016 Div 512 rules sought to limit new water use allocations in anticipation of imposing water use curtailments shortly thereafter, but the language fails to acknowledge the circumstance that OWRD and water right holders had already over-appropriated the Harney Basin beginning around 1990. Ensuring “that groundwater in the GHVGAC is appropriated within the capacity of the resource” in 2016 was moot, and should have been state policy 30 years earlier. But the sense of urgency is palpable: for over a decade, there have been numerous studies and models by OWRD and the USGS,¹² two Div 512 Rulemaking processes in 2015-2016 and 2023-2025, the Harney Basin Place-Based Planning and the Groundwater Study Advisory Committee (SAC), and many other related meetings and discussion groups, including regular updates before the WRC. Numerous studies since the mid-20th century have noted the

¹¹ Christopher Hall, Water League “[WaveMaker Report #6](#),” KXCJ 105.7 FM, Valley News and Views, July 15, 2025.

¹² For just one example: Gingerich, S.B., Johnson, H.M., Boschmann, D.E., Grondin, G.H., and Garcia, C.A., 2022, “Groundwater resources of the Harney Basin, southeastern Oregon: U.S. Geological Survey Scientific Investigations Report” 2021–5103, 118 p., <https://doi.org/10.3133/sir20215103>.

potential for industrial-scale water users to over-draft groundwater in the West, in eastern Oregon, and the Harney Basin.

We also note a key aspect of that diligence related to water use management in the existing 2016 rules, 690-512-0020, which state [**emphasis added**]:

(3) In processing applications to appropriate and use groundwater within the GHVGAC, the Department **may not find that the proposed use will ensure the preservation of the public welfare, safety and health unless** the use is classified, and unless water is available for the proposed new use as described in subsections (4), (5), (6), and (7) of this section.

This rule inheres the self-evident fact that the “public welfare, safety, and health” are fundamental constituents of the public interest, as there can be no credible assertion that these elements are not, individually or collectively, essential to the public interest. If OWRD encounters a proposal for water use that is not classified or that would pump from a location where water is not available, such a proposed water use could not possibly constitute a public benefit; at the very least, it could not be allowed to impair the public welfare, safety, and health. Prohibited water uses referred to in Section (3) above could not possibly be a beneficial use of water because the state “may not find that the proposed use will ensure the preservation of the public welfare, safety and health.”

IV. Ensuring Beneficial Use by Limiting Harm

The 2025 proposed Division 512 rules strike the content from the existing 690-512-0020 section and add several new sections with clear statements that outline precisely how OWRD will curtail 35% of all irrigation water use to protect the public health, safety, and welfare. There is no clearer statement about what constitutes a non-beneficial use of water than restricting uses that conflict with the public's interest in their water.

The profound imposition of water use curtailments in the proposed 2025 Division 512 rules greatly increases protection of water sources to the extent Permissible Total Withdrawals (PTW) are far more consequential than conditioning new water right allocations on certain criteria, such as classification and water availability. The addition of withdrawal limits in the proposed Division 512 rules indicates a greater consideration of the public health, safety, and welfare over the 2016 policy that merely conditions new water use allocations.

In Oregon, reasonable use is implied in beneficial use; whereas, for comparison, in California water law, reasonable use and beneficial use track together as independent terms. OAR 690-0300-0010 states:

(5) “Beneficial Use” means the reasonably efficient use of water without waste for a purpose consistent with the laws, rules and the best interests of the people of the state.

For 150 years, Oregon’s beneficial use of water doctrine has been frequently misconstrued to apply only to the water user, even though many statutes acknowledge that all water uses impact the public generally. The intent to designate a CGWA by the proposed Division 512 rules acknowledges that some water use irrigating alfalfa is beneficial to both the users and the public (or at least does not harm the public’s health, safety, and welfare), but that 35% of the water use irrigating alfalfa is not beneficial to the public, even if it remains beneficial to the users who would stridently resent the imposition of Corrective Control Orders curtailing their water use. In more than a dozen RAC meetings, we have seen the disjunction between the users who argue that their water use is beneficial to them, while others have equally argued that the same water use harms the greater public and ecosystems. Clearly, the state agrees that at least 35% of the existing irrigation water use in the Harney Basin is harmful because it intends to implement and enforce the CGWA statutes, ORS 537.730 to 537.742, ORS 537.780, the rules in OAR 690-010, and the proposed rules in OAR 690-512.

Recent statutes acknowledge how some water use is not sufficiently beneficial to the greater public and cannot be allowed to continue, despite how the water users feel otherwise. For example, HB 4061 in 2022 prohibited the distribution of municipal use water to sites where unlicensed cannabis plants are present because the public made it clear to officials that such deliveries harmed the public health, safety, and welfare. Due to the income generated, the unlawful cannabis growers, the bulk water truckers, and the municipalities all thought the municipal water use was beneficial to them. But the greater public felt otherwise, and HB 4061 came down in support of the greater public.

SB 326 in 2023 prohibited the use of any water from any source to be used in any way on a site where unlicensed cannabis plants are present. While the unlicensed cannabis plant growers believe their water use is a benefit to them for income purposes, the general public holds a different view: water use related to unlicensed cannabis grows harms them and the ecosystems upon which they rely. Therefore, the state concluded that irrigating unlicensed cannabis plants is not a beneficial use of water. We incorporate by reference *Cannabis Industry Impacts to the Environmental Health of the Illinois River Basin and Community Well-Being*,¹³ which describes in detail the disjunction between the water users’ interests and those of the general public. SB 326 prohibits all such water use, including water use authorized by water right permits and certificates, because irrigating unlicensed cannabis is not “reasonably efficient use of water without waste for a purpose consistent with the laws, rules and the best interests of the people of the state.”

¹³ Hall, Christopher. 2022. [Cannabis Industry Impacts to the Environmental Health of the Illinois River Basin and Community Well-Being](#). Illinois Valley Soil & Water Conservation District, Oregon.

We offer a more rosy example of how laws comply with the beneficial use of water doctrine: for 70 years, Oregon *unreasonably* prohibited the public from using their exempt use domestic wells on their 1/2 acre gardens when those water users would have sold their produce at their local farmers' markets. Given the state's allowance of water uses for commercial and industrial activities at a rate of 5,000 GPD from these same wells (a double standard), coupled with the community value of local food production, Oregon rightly ended the 70-year prohibition by enacting HB 3372 in 2025. Irrigating a 1/2 acre garden from an exempt use domestic well is indeed a beneficial use of water that promotes the public health, safety, and welfare because it is a "reasonably efficient use of water without waste for a purpose consistent with the laws, rules and the best interests of the people of the state."

A plant does not have to be heavily regulated by the OLCC to pose a threat to the public health, safety, and welfare insofar as its irrigation is concerned. Numerous factors may account for why water use harm related to a plant occurs besides the state's controlled substance regulations. Those factors include, but are not limited to: aridification, excessively declining groundwater levels, subsidence, impaired water quality, dewatered perennial streams and springs, negative impacts resulting from climate change, prolonged drought, the misappropriation of water, ecosystem impairments, violations of the Environmental Species Act, and the use of water in the commission of a crime.

To address these harms and ensure water use truly serves the "best interests of the people of the state," Oregon law establishes rigorous standards. For example, consider Section 2 of ORS 537.780, which places a burden of proof on the Water Resource Commission (WRC) when commissioners seek to impose groundwater restrictions or make determinations about groundwater-surface water interactions.¹⁴ Since substantial evidence shows in the Harney Basin that groundwater levels are excessively declining and that groundwater reservoirs below 100 feet are not replenishing on *meaningful human timescales*, this data serves as the justification for water use restrictions. The purpose of these restrictions is to prevent the impairment, if not destruction, of public and ecological resources for present and future generations. Yardstick measurements are not the end purpose (*telos*); rather, they are the evidence of manifest harm to the public health, safety, and welfare. The Division 512 designation of a CGWA is data-driven and directly related to the negative impacts on the ecosystems and the public in the present and future.¹⁵ The substantial

¹⁴ Or. Rev. Stat. § 537.780(2) (2025), which states, "Notwithstanding any provision of subsection (1)... the commission may not: (a) Adopt any rule restricting ground water use in an area unless the rule is based on substantial evidence... to justify the imposition of restrictions. (b) Make any determination that a ground water use will impair, substantially interfere or unduly interfere with a surface water source unless the determination is based on substantial evidence."

¹⁵ Gordon Lyford, "[Audit of Harney Basin OWRD Excel Spread Sheet of Well IDs](#)," Water League, April 15, 2025. (OWRD's well identification data in the Harney Basin is incomplete, inconsistent, and in many cases erroneous, undermining the Department's ability to meet the "substantial evidence" standard of ORS 537.780(2) and jeopardizing the enforceability of curtailments or other CGWA management actions. OWRD rightfully intends to prohibit all misappropriations of water in the Harney Basin before curtailing lawfully conforming junior water rights. OWRD

evidence required by ORS 537.780(2) delineates the very harm taking place throughout the Tragedy of the Commons.

The statutory requirement for substantial evidence means the WRC cannot arbitrarily restrict groundwater use or make unfounded determinations. Commissioners must have demonstrable, fact-based justifications for their assessments and actions. When the OWRD presents substantial evidence of excessively declining groundwater levels, overdrawn groundwater reservoirs, failing domestic wells, dried-up springs, desiccated Groundwater Dependent Ecosystems (GDE) and pasturelands, or unrecoverable Ancient Water, that evidence is, by its very nature, a direct articulation of the harm to the public health, safety, and welfare and to the ecosystems upon which all life depends.

The existence of such an evidentiary standard in ORS 537.780(2) indicates a legislative intent that water management decisions must be grounded in compelling reasons that go beyond those articulated by special interests. Since water use has broader impacts than just those enjoyed by the water user, WRC determinations and restrictions are directly related to the greater public good. Requiring substantial evidence for determinations and restrictions means that the reasons for WRC actions *are the rationale* that connects directly to public interest concerns. Through the evidentiary standard in ORS 537.780(2), the WRC resolves the disjunction between the benefits that water users enjoy and the harms their water uses cause to the public health, safety, and welfare. The evidence of these harms becomes the basis for determining that such a use is no longer a beneficial use of water that is a “reasonably efficient use of water without waste for a purpose consistent with the laws, rules and the best interests of the people of the state.”

The very act of the state needing to determine substantial evidence to justify restrictions on existing water uses demonstrates an inherent acknowledgment that some previously permitted or existing uses, over time or under changing conditions, have lost their status as beneficial. This circumstance cannot come as a surprise to anyone. The state cannot say that the water use it intends to restrict is still a beneficial use of water. Why? Because the water use is no longer “consistent with... the best interests of the people of the state.”

By demanding substantial evidence, ORS 537.780(2) ensures that when the WRC approves a water use or allows one to continue, it is necessarily beneficial in a way that aligns with a contemporary understanding of the public’s current and future interests in their health, safety, welfare, and in ecological sustainability. The substantial evidence standard finding measurable harms serves as a powerful foil to beneficial use by allowing the state to demonstrate where water use ceases to be beneficial and becomes detrimental.

must ensure all wells have been positively identified as either conforming, non-conforming, or in a state of coming into conformance to meet this standard.)

ORS 537.780(2) provides the factual basis and legal justification to impose water use limitations. By presenting such evidence, the state can concretely measure and determine the opposite of beneficial use, which is the harmful uses we discussed in our paper, *Water Use Harms: The Unintended Consequences of Beneficial Use*, which we incorporate by reference here.¹⁶

V. The Greater Harney Valley Groundwater Area of Concern

In the Greater Harney Valley Groundwater Area of Concern (GHVGAC), the harms driving the state's designation of a CGWA and subsequent Corrective Control Orders include: excessively declining groundwater levels, subsidence, impaired water quality, misappropriation of water, domestic well failures, desiccation of GDEs and pasturelands, and the dewatering of springs, lakes, and drainages.

Regarding the impairment of water sources: in a sweeping scientific investigative report, the USGS calls Harney Basin groundwater "Ancient Water" that glaciers deposited 30,000 to 5,000 years ago.¹⁷ In a fact sheet used to summarize that report, the authors state their three *Important Study Findings*, one of which is "Most groundwater pumped from lowland wells is ancient and not being replenished at meaningful human timescales."¹⁸ Their discussion of the harm related to over-pumping groundwater states that [**emphasis added**]:

Geochemical evidence indicates that modern recharge generally circulates to a depth no greater than 100 feet below the floodplains of major rivers and streams in the lowlands. Away from the major river and stream corridors, pre-modern water commonly is found at the water table. Recharge to groundwater and recovery of groundwater levels in the most heavily pumped areas in the Harney Basin lowlands are restricted by the limited spatial extent and depth of modern recharge in the Harney Basin lowlands and the relatively fine-grained deposits underlying most of the lowland areas.¹⁹

The USGS and OWRD scientists explain that recovery of a large portion of the groundwater pumped from the Harney Basin cannot be recovered within human time scales. To be clear, most irrigation wells in the Harney Basin that are deeper than 100 feet are drawing from ancient,

¹⁶ Christopher Hall and Gordon Lyford, [Water Use Harms: The Unintended Consequences of Beneficial Use](#), Water League, September 27, 2024.

¹⁷ Gingerich et al., Full Study, 2022. [48] (Based on the multi-tracer evidence, much of the deep groundwater in the uplands and most of the groundwater in the Harney Basin lowlands was recharged in the late Pleistocene to mid-Holocene (about 30,000–5,000 yrs ago) when climatic conditions in the northern Great Basin were cooler and wetter than today.)

¹⁸ Gingerich, S.B., Garcia, C.A., and Johnson, H.M., 2022, [Groundwater resources of the Harney Basin, Southeastern Oregon](#) (ver. 1.1, June 2025): U.S. Geological Survey Fact Sheet 2022–3052, 6 p. [1]

¹⁹ Gingerich et al., Full Study, 2022. [1]

effectively non-renewable groundwater.²⁰ For this obvious reason, it appears that OWRD has not generally sought recovery of groundwater levels; instead, the department has focused on a *Target Groundwater Level Trend* of zero decline. For groundwater reservoirs deeper than 100 feet, excessively declining groundwater levels are on a one-way elevator going down, with no hope for going back up anytime soon.

Water League has a few questions that are directly related to the long-term public interest, insofar as the beneficial use of water is concerned:

- Can OWRD incorporate two distinct outcomes in the rules: one for unconfined aquifers where the water-table level is the key indicator of recovery, and another for confined aquifers where the piezometric level (or potentiometric surface), as identified in the USGS and OWRD study, is the relevant measurement?
- At what point in the groundwater reservoir elevation will the state choose to stop the harm from worsening, both at the shallow <100-foot level and the regions deeper than 100 feet?
- If the loss in groundwater below the 100-foot level since 1980 is a permanent loss, then has the state agreed to discount the loss as “water under the bridge,” as apparent in the proposed rule, 690-512-0080(2)?

Since the state has declared that water equals money,²¹ water mining is the *de facto* business of irrigators who gross one penny for every five to nine gallons of water used to irrigate alfalfa.²² Water mining directly causes the enormous deficit in the Harney Basin water budget, alternately referred to as the diminishing groundwater bank account. A key factor leading to the designation of a CGWA in the Harney Basin is the persistent and substantial imbalance between annual groundwater recharge and discharge. The Harney Basin is being overdrawn by approximately 110,000 acre-feet per year, which is equivalent to the annual municipal water use of Portland.

Much of the deficit results from discharging reservoirs below 100 feet that were last charged during the late Pleistocene glacial period and will take an unknown number of generations to recharge. Most recharge in the basin percolates to depths of less than 100 feet. These shallow zones support springs and GDEs, and are tapped by relatively shallow wells. These ecosystems

²⁰ Gingerich et al., Full Study, 2022. [62]

²¹ ORS 536.310 *Purposes and policies to be considered in formulating state water resources program*. “(2) It is in the public interest that integration and coordination of uses of water and augmentation of existing supplies for all beneficial purposes be achieved for the maximum economic development thereof for the benefit of the state as a whole.”

²² In 2020, Oregon alfalfa irrigators produced on average 4.6 tons/ acre * \$205/ ton = \$943/ acre-year. 2.5 acre-feet irrigation water use/ acre-year is a reasonable median irrigation requirement, which equals 813,953 total gallons of irrigation water used per acre. The value alfalfa unlocks = \$0.00116, or roughly 1/9th of one cent per gallon. If, however, we use the claims made in the ECONorthwest study (discussed later): Harney Basin alfalfa irrigators produced on average 5.5 tons/ acre * \$273/ ton = \$1,501/ acre-year, which means this value alfalfa unlocks = \$0.00184, or roughly 1/5th of one cent per gallon. Water League argues in the section of these comments titled “Fiscal Impacts and Economics” that this higher figure is not credible.

have been stressed for at least 30 years, and an increasing number of domestic wells must be deepened (a remedy not afforded to the ecosystem).

Geochemical and isotopic evidence indicates that these deeper aquifers do not receive meaningful modern recharge under current climatic conditions. The USGS/ OWRD report explains a common phenomenon:

The vertical distribution of groundwater ages observed in this region is similar to that observed in the Silvies River/Poison Creek floodplain—namely, a thin layer of predominantly modern groundwater resting atop a large body of predominantly pre-modern groundwater.²³

The takeaway is that recharge and discharge in the thin, shallow geologic layer is dynamic and aridifying. As well pumps drain the upper 100-foot layer, shallow domestic wells, GDEs, and springs to dry out. Meanwhile, in the underworld, below the 100-foot layer, groundwater recharge does not meaningfully occur at human timescales.

These facts point clearly to severe harm to the public health, safety, and welfare of the present and future, and to the ecosystems upon which all flora, fauna, and humans rely. Destruction of Oregon’s water sources must be prohibited. We do not see how such destruction is not a legal injustice perpetrated on others, particularly those in the future who are the quintessential silent majority.²⁴

Referring to groundwater pumping, the USGS states that “the extraction of this resource for economic gain constitutes ground-water mining in the truest sense of the term.”²⁵ In his law review article, “Ground Water Mining Law and Policy,” J. David Aiken explains that “Ground water mining or depletion occurs when withdrawals from an aquifer, a ground water formation, exceed net recharge.”²⁶ And to round out the concept is Harold E. Thomas’ USGS circular from 1955, which states: “Ground water mining, the progressive depletion of storage in a ground-water

²³ Gingerich et al., Full Study, 2022. [90]

²⁴ Wolf, “Contemporary Property Rights.” [810-818] (Rather than granting absolute dominion over resources, usufructuary rights impose duties of care, restraint, and preservation, especially when dealing with finite or slowly renewing natural systems. Oregon does not allow possessory ownership of water. Those with a usufructuary water right to use the public’s water, and the very public themselves have a responsibility across time to ensconce long-term sustainability and accountability into law. Elected and appointed officials must provide leadership holding water in trust to ensure the sanctity of water for posterity.)

²⁵ Devin L. Galloway, David R. Jones, and Scott E. Ingebritsen, eds., *Land Subsidence in the United States*, U.S. Geological Survey Circular 1182 (Reston, VA: U.S. Geological Survey, 1999), <https://doi.org/10.3133/cir1182>.

²⁶ Aiken, J. David, “Ground Water Mining Law and Policy” (1982). Faculty Publications: Agricultural. [4] Economics. 32. <https://digitalcommons.unl.edu/ageconfacpub/32> [505] (Aiken continues on page 512: “If water levels decline annually as well as seasonally, however, ground water mining is occurring.”)

reservoir.”²⁷ Oregon’s Economic Pumping Level²⁸ describes how pumping continues until it's no longer financially viable for irrigators, based on the cost versus crop value. Short of regulatory action, the ongoing decline of groundwater in the Harney Basin highlights that this economic threshold is unavoidable.

To date, the most effective remedy is the 1955 CGWA statutes that the state adopted, knowing back then that excessive declines in groundwater levels were a critical public health and environmental issue. As trustees of the water that belongs to the public, OWRD staff and the WRC have always had a fiduciary duty to ensure the Harney Basin groundwater bank account would not be overdrawn. Because they did not discharge their fiduciary duties sufficiently in the past (due to unjustified powerful political and economic reasons), today they are faced with the job of curtailing water use to protect the future, both in the short and long terms.

We ask a question conspicuously absent from the Division 512 Rulemaking process: for whom are these CGWA rules written? Are they written for people in the past who have since died? Are they written to benefit people in the present, or are they written for those in the future, who would like water in the coming generations?

Left to the inexorable facts of the Tragedy of the Commons, irrigation over-pumping would foreclose future access to water. The Division 512 rules are not designed to benefit those currently draining the resource (they are already over-benefitted), but to prevent irreversible harm and preserve the public trust resource (for those who are under-benefitted). We again refer to Clark Wolf’s seminal paper on this topic:

Our duty not to damage or destroy resources is not based on the property rights of future persons, only on the general prohibition against causing harm. We may stipulate, however, another sense of the term 'usufruct' on which it refers to a limited property claim that affords the claimant the right to use and to consume the fruits of property but no right to damage or destroy its substance. . . While there is no one else whose claims supersede those of current owners, such owners simply do not possess any valid claim to degrade, consume, or destroy resources in which future persons have an important stake.²⁹

²⁷ H. E. Thomas, *Water Rights in Areas of Ground-Water Mining*, U.S. Geological Survey Circular 347 (Washington, D.C.: U.S. Geological Survey, 1955). [1] (Thomas continues on page 9, stating: “The water in areas of ground-water mining, however, may have great storage volume but negligible replenishment, and thus may not qualify as a renewable resource.”)

²⁸ Or. Admin. R. [690-008-0001\(6\)](#) (2024), Oregon Secretary of State, Administrative Rules, Chapter 690, Division 8, “Statutory Groundwater Terms.” (“Economic Pumping Level” means the level below land surface at which the per-acre cost of pumping equals 70 percent of the net increase in annual per-acre value derived by irrigating.”)

²⁹ Wolf, “Contemporary Property Rights.” [811-812] (Clark concludes his assessment, stating: “If current claims on resources constitute usufructuary rights rather than more robust rights of full-blown ownership, then these rights will not be violated by legislative restrictions that prohibit destruction or degradation of privately owned resources needed by future persons.”)

Recall that we began our Division 512 comments, noting how the process of drafting these future-oriented rules has asked the very parties responsible for the crisis to provide advice on how to stop their water mining. Their ensuing cognitive dissonance led to sustained resistance against proposed curtailment measures and a push to “water down” regulations that would otherwise protect future access to the very water they want to use for their income.

Oregon does not revise the Division 512 rules to serve industrial-scale water users today; if it did, then irrigators (who use 95% of all water in the Harney Basin each year) would be more amenable to the coming water use reductions. The state adopts rules for others’ benefits but seeks advice from those to whom the rules will apply. Notably, there is a difference between seeking the advice of those whom the rules are likely to negatively impact and adopting rules that will benefit others who are forthcoming. Oregon’s Division 512 rulemaking process is not a negotiation with current water users, but a legal and moral obligation to consider their input while ultimately making a decision that serves the broader and long-term public interest. The time has come to stop avoiding this elephant in the room and accept the unspoken truth that the Division 512 rules serve tomorrow’s residents who have no voice but are deeply affected by the decisions made in the present.

The Division 512 rules are clearly a future-facing moral and legal intervention: a line drawn to say that the destructive practices of the present cannot continue unabated, especially when their costs are shifted forward in time onto those who had no part in the harm and cannot be present to advocate for themselves, even though we know for a fact that they will eventually be present.

VI. Fiscal and Economic Impacts

To properly evaluate the fiscal and economic impacts of the proposed rules, it is necessary to consider not only the present-day costs but also the long-term benefits for future generations. We highlighted this perspective in our public comment at the Division 512 RAC on October 2, 2024, when we articulated what a Harney Basin economic study should consider: **[emphasis added]**:

As a term, *fiscal impact* relates to both current conditions and future conditions. If pumping is not sufficiently curtailed in the short-term, then the long-term fiscal impact is harmed. Fiscal impact research by an economist has to consider the future public interest.

An important question of the day is: “Over what timeline should OWRD achieve the goal of Zero Rate of Decline?” What would folks alive in 2100 say?

Saying that OWRD's position of “No Rate of Decline” reduces irrigated acreage too much is a *present-day perspective* that impacts the future *of those here today*; however, no rate of decline helps the long-term needs of others who are not here today. There's an important

difference to acknowledge between protecting the future of those who live today, and protecting the future of those who will live when we are all gone by the end of the century.

Allowing further declines protects the short-term future of those here today in the present. Stabilizing water levels by curtailments and no rate of decline protects the long-term future for others who are not here today. By degrees, pumping will slow and stop one way or the other: either through curtailments today, or later, when the groundwater reservoirs go below the economic pumping level.

The current hydrologic and fiscal impact debate is not just among those here today; it's really between those here today, and the silent majority in the future whose voices we cannot hear. Currently, the present moment has seniority over the future, and the magnanimous choice is to cede some of that power.³⁰

This brings us to our next topic, which is a review of the ECONorthwest report OWRD commissioned upon the request of RAC members and the public (including Water League) to evaluate the economic impacts of reducing groundwater use in the Harney Basin.³¹ Our assessment is that the commissioned economic report is severely impaired.

First, the report primarily displayed economic harms to those in the present, despite the fact that the future of the region would benefit economically from water use reductions. Second, RAC members successfully lobbied to insert the cattle herding industry into the economic loss calculations to worsen the outlook, which OWRD sought to rectify by requesting a “Sensitivity Analysis” on pages 16-17 of the ECONorthwest report. The Division 512 rulemaking process was marked by a dour focus on negative impacts to the present. There was no upbeat discussion or acknowledgement of positive long-term outcomes for the basin's public health, safety, welfare, and ecosystem. Indeed, the premise stating that “The goal of the rules is to make sure that groundwater levels are sustainable for the future”³² served as the basis for the entire report that explains why the rules would harm the present economy.

The ECONorthwest report's assumptions, which we critique here with significant additions from [our previous comments submitted to OWRD on May 16, 2025](#), include:

1) The ECONorthwest report assumes that Alfalfa crop prices were \$273 per ton, based on a five-year average from 2019 to 2023.³³ This price is substantially higher than the historical average and cannot be relied upon for the future. The study should have taken a 30-year average price if it

³⁰ Oregon Water Resources Department, “[Division 512 RAC Meeting 10 - October 2, 2024](#)” YouTube video, posted October 7, 2024.

³¹ Nathaniel Trull and Mark Buckley, [The Economic Impacts of Groundwater Management in Harney County, Oregon](#) (Portland, OR: ECONorthwest, 2025).

³² Trull and Buckley, *Economic Impacts of Groundwater Management*. [4]

³³ Trull and Buckley, *Economic Impacts of Groundwater Management*. [10]

intends to project out 30 years into the future. Taking a 5-year snapshot distorts reality: the price of alfalfa was \$224, averaged over the past 30 years, when adjusted for inflation. The ECONorthwest price fixes an 18% overstatement in value that unreasonably inflates the claims of harm done to the irrigation industry and regional community.

2) The ECONorthwest report assumes \$58 million of total annual revenue is generated by alfalfa production. Not only is this dollar value unsubstantiated in the ECONorthwest report in its “Exhibit 1. Crop and Livestock Production,” on page 8, it does not pencil out based on its \$273/ per ton average (do the math in the table). Furthermore, the \$58 million number is 50% larger than the \$36 million (\$39 adjusted for inflation in 2024) that the USDA NASS Census reports.³⁴ There is little debate that the USDA NASS Census is the gold standard for such information. It’s notable that ECONorthwest chose to use the USDA NASS Census to account for the total Market Value of the livestock industry and for the past five-year average for alfalfa prices, but chose not to use it for the total Market Value of alfalfa. ECONorthwest’s reported value of the alfalfa is improbably high, and it is not clear where the figure came from.

For a point of reference, the Harney Basin alfalfa assessments in the 2023 *Business Case for Investing in Water in Oregon*, itself a study on how to frame values, claims that the Economic Output for “All other crop farming (primarily hay and forage)” is \$49 million.³⁵ It is unclear, however, just how comparable the terms “Economic Output” in the Business Case and the “total annual revenue is generated by alfalfa” in the ECONorthwest table are, or how both relate to the USDA NASS Census “total Market Value.”

The ECONorthwest report cites OWRD’s most recent and accurate number of irrigated acres as only 48,003.³⁶ But the Business Case states that:

Assuming all 108,760 acres of irrigated cropland are dependent on groundwater withdrawals, the estimated gross revenue from lands irrigated with groundwater is approximately \$59.4M, and the estimated net cash farm income on these lands is \$14.5M (Aspect Consulting 2021).³⁷

These various numbers from both reports elevate *discrepancy* to an art form: just how can half the number of irrigated acres in the ECONorthwest report equate to the Business Case’s values of

³⁴ 2022 Census of Agriculture, [U.S. Department of Agriculture \(USDA\) National Agricultural Statistics Service \(NASS\)](#), Table 2. Market Value of Agricultural Products Sold Including Food Marketing Practices and Value-Added Products: 2022 and 2017, [249] (See page 249 for “Other Crops & Hay” and for “Cattle & Calves.” Total sales in Harney County in 2022 were \$99,336,000, which is 1.8% of the total agricultural output of \$97,527,000.)

³⁵ Pilz, D., Kruse S., Raucher R., Clements J., Gardner T., Odefey J., Madsen T., Purkey A., Sheridan C., McCoy A., Ehrens A., The Business Case for Investing in Water in Oregon. AMP Insights. (June 2023). [161] (Note that all so-called “hay and forage” in the Harney Basin is alfalfa.)

³⁶ Trull and Buckley, *Economic Impacts of Groundwater Management*. [8]

³⁷ Pilz et al., “The Business Case for Investing in Water in Oregon.” [163]

either the \$49 million in Economic Output for “All other crop farming (primarily hay and forage),” or the \$59.4 million, which, quoted above, is “the estimated gross revenue from lands irrigated with groundwater is approximately?”

Not to belabor the point, but the ECONorthwest claims an average yield of 5.5 tons/acre at \$273/ton, which equals \$1,501/ per acre; whereas, the Business Case footnote #28 on page 163 states that:

...gross revenues from irrigated cropland were calculated by multiplying the 108,760 irrigated acres times \$474.24 per acre in average commodity sales as reported in the Appendix A in the 2021 Aspect Consulting report...³⁸

The Business Case, which also cites ECONorthwest *in a previous study*, speculates on fallowing between 37,000 and 53,000 acres in the Harney Basin, which is incomprehensible in the present ECONorthwest study conducted for OWRD’s Division 512 rulemaking process (their calculations only fallow 16,000 acres). We cite these discrepancies because they raise significant questions about the consistency, transparency, and accuracy of the data used to inform water management decisions related to the economic impact of water use reductions. OWRD relies on both the ECONorthwest study and the Business Case in the Notice of Proposed Rulemaking it filed with the Oregon Secretary of State.

3) The ECONorthwest report declares that **[emphasis added]**:

Alfalfa/hay is an important input to livestock production and preliminary analyses revealed that groundwater reductions had approximately a 1:1 relationship with reductions in alfalfa/hay production (e.g., a 10% reduction in groundwater use would result in a 10% reduction in hay production). **This 1:1 relationship is thus passed through to the livestock production value.**³⁹

We are incredulous that the 1:1 water-to-alfalfa ratio would arbitrarily be carried over to rationalize the same ratio between alfalfa production and cattle production. There is no logical basis for this assumption because the ECONorthwest report assumes that only 20% of the alfalfa purchased stays in the basin,⁴⁰ which, if accurate, would show that pegging livestock industry losses to reductions

³⁸ Pilz et al., "The Business Case for Investing in Water in Oregon." [163]

³⁹ Trull and Buckley, *Economic Impacts of Groundwater Management*. [7]

⁴⁰ Trull and Buckley, *Economic Impacts of Groundwater Management*. [8] (The authors’ anecdotal interviews of farmers about how much alfalfa remained local ranged widely. They state: “According to local farmer interviews, between 5 and 35 percent of on-farm alfalfa production goes to the livestock operation. This analysis uses an average value of 20 percent that goes to livestock production and reduces the revenue from alfalfa production by that amount to account for the alfalfa that does not go to market.” We note that *The Business Case* by Pilz, et. al., claims 17%, which raises questions of why ECONorthwest didn’t trust that study and just cite it, which says on page 160: “Even then, local use accounts for a relatively small percentage of total supply generated within the County (17%), leaving a significant amount for export to other counties, states, and countries.”)

in alfalfa production in a 1:1 ratio is incomprehensible. If ECONorthwest knows that there is more than enough alfalfa after curtailment to stay in the basin for local use, then what effect does the baseless ratio serve but to improperly inflate the economic impacts of water reductions to serve a predetermined conclusion? This is not only a rhetorical question; we would like a credible answer as to why this flawed calculation was not completely removed from the final draft of the report.

The ECONorthwest report inserted \$65M total annual revenue generated by the livestock industry as an additional basis from which economic losses were calculated above the alfalfa industry valuation. OWRD rightfully states:

In response to comments regarding the relationship between reduced alfalfa sales and reduced livestock sales, ECONorthwest ran a sensitivity analysis holding the livestock production constant over the 30 years.⁴¹

Below, we argue for entirely disregarding ECONorthwest's use of the livestock industry, beyond just adding another scenario where it is excluded:

Since the sales of alfalfa are commodity-priced across the West, and if it *were true* that the average price per ton in Harney County is \$273, then it is all but certain that livestock operations would already be importing cheaper, similar quality forage from other markets, notwithstanding the marginal increase due to trucking. An average price of \$273 per ton is not competitive.

The sale of alfalfa is intrastate, interstate, and international because it is a commodity (see numbers in the weekly Capital Press). The fact that 80% of the Harney Basin alfalfa is exported out of the basin demonstrates the ubiquity of shipping alfalfa. Livestock operations all over the West buy their alfalfa from many locations. Furthermore, as is well established, cattle graze the vast lands they roam, and they are not solely dependent on alfalfa (if all cattle ate was alfalfa, they'd die from bloat in short order). Aside from grazing, cattle also feed on smaller amounts of baled meadow grass. These facts further undermine ECONorthwest's decision to peg presumptive livestock industry losses to reductions in alfalfa production in a 1:1 ratio.

Local livestock operations often buy lower-quality alfalfa; the amount of reduction in alfalfa production resulting from water use curtailments in that particular crop segment will be a small portion of that lower-quality product as the water use curtailments phase in over 30 years. The water use curtailments do not all target one quality of alfalfa, which ranges from utility to supreme quality. There will still be an oversupply of Harney Basin alfalfa to buy locally, of various qualities. Nonetheless, the fact of 80% exports out of the basin necessarily demonstrates that alfalfa is exported and imported across Oregon and neighboring states, and that livestock

⁴¹ Oregon Water Resources Department, "[Notice of Proposed Rulemaking, Chapter 690, Division 512,](#)" May 27, 2025, Oregon Secretary of State, Archives Division. [23]

operations in the Harney Basin can import whichever quality of alfalfa they need that is on the market in the very same way all others do who buy alfalfa on the commodity-priced region-wide market.

Regarding the Sensitivity Analysis in the ECONorthwest report, which reluctantly pulls out livestock herding from the report, OWRD states:

These results suggest that assuming livestock production does not depend on the availability of local alfalfa will cut the rulemaking's estimated economic impacts by at least half. These results do not account for the cost of securing alternative alfalfa supplies, which may be available but at higher cost to the consumer.⁴²

We reject this statement being relegated to the back of the report, long after the front of the report boldly declares that presumptive livestock industry losses will suffer reductions similar to alfalfa production in a 1:1 ratio. The purpose of the ECONorthwest report should have accurately demonstrated the impact of the Permissible Total Withdrawals (PTW) on the Harney County economy for better and worse in the future and present. The report's conclusions may have resulted in the irrigator-aligned supermajority cohort increasing pressure on OWRD to allow increases in PTWs to offset the alleged economic losses. This economic report is unreliable and could mislead state officials and the public in the next couple of years, not just by falsely influencing pushback on PTWs in the short term and resistance to stabilizing groundwater at shallower levels, but also in how contested case hearings are resolved. Researching and calculating the various numbers, dollars, and percentages with accuracy matters because they shape perceptions, administrative rules, and Contested Case hearings. We expect there will be a lot of scrutiny of the methodology of this report, or it will be summarily ignored.

On the matter of job losses: if we were to accept the Sensitivity Analysis numbers that exclude the livestock industry, then Harney County would absorb the losses of 160 jobs over 30 years (which would impact about 64 jobs in the first six years, since the OWRD plans to frontload 40% water use reductions in the first six years).

We strongly support economic development in the basin that could come in other forms, as often is the case when industries and technology evolve. The possibility of industrial evolution and economic development brings us to declare our strong support for the testimony on behalf of the City of Burns' staff at the Division 512 Public Hearing, Seneca, on June 26, 2025.⁴³ The amount of water the city uses is a tiny fraction of all the water irrigation uses (irrigation uses 95% of all water in the Harney Basin). There is no justification for punishing the small rural cities for the substantial over-appropriation of groundwater by OWRD for irrigation use and the subsequent over-pumping

⁴² OWRD, "Notice of Proposed Rulemaking." [24]

⁴³ Oregon Water Resources Department, "[Division 512 Public Hearing, Seneca – June 26, 2025](#)," YouTube video, posted June 27, 2025.

by irrigation water users. Cities in the high desert must have adequate access to groundwater, and their relatively infinitesimal volume of use must not get caught up in the serious problems they did not and could not have ever caused.

We hold that penalizing Burns and Hines is an equity issue that must be rectified. Claims of a double-standard – that allowing cities to continue unabated while curtailing irrigation water use is unfair – are spurious and unfounded because the cities did not cause or contribute to the over-pumping, and they use less than 1/19th of annual water diversions in the Harney Basin. The idea of a city suffering in the high desert because an irrigator wants to keep exporting animal forage crops is an anathema to any principled system of resource allocation and good governance. We are appalled at the immorality of the false equivalence that cities bear any comparable blame for aquifer decline.

Numerous statutes strongly suggest that Oregon should place the health, safety, and welfare of desert communities above the export of commercial forage crops. Claiming the obverse – that continued irrigation of alfalfa is necessary to support local communities – is a cynical justification and affront to reason: *over-pumping groundwater for forage crops led to the crisis in the first place*. To suggest that the same practice is essential to the community's welfare is a tortured inversion of the very rationale to designate a CGWA and impose Corrective Control Orders on irrigators. No amount of exported alfalfa can compensate for a community's basic (e.g., Maslow) needs for water.

As Nick Green testified on behalf of the City of Burns' staff, Harney County can increase economic development by siting data centers along Highway 20, where a massive fiber optic cable runs. Claims that data centers use a lot of water are baseless when set in the context of irrigating alfalfa: a medium to large data center uses one million gallons/day, which equals about 1,100 acre feet of water annually, and is about 12% less water than the duty required to irrigate 500 acres of alfalfa at 2.5 acre feet per acre during the irrigation season. For comparison, OWRD proposes 16,000 acre feet of water use curtailments, which would equal 32 medium to large data centers.

Water League strongly supports water right transfers from one or more remaining irrigation operations to industrial uses to offset economic impacts from water use curtailments and even increase economic development in Harney County. Medium to large data centers employ between 25 and 50 personnel, which is considerably more employment than a 500-acre pivot-irrigated alfalfa operation that uses the same amount of water. Along with solar, wind, and electrical transmission systems, there are reasons to believe that the economic impacts from water use reductions in Harney County can be offset during the 30-year phase-in through 2058 and beyond.

Oregon is not designating a CGWA and planning to reduce water use to make a bad situation worse, as the supermajority irrigator-aligned cohort has insinuated. Every gallon left in the

groundwater reservoirs will secure the public health, safety, and welfare for generations and prevent the ongoing desiccation of the ecosystem. Nonetheless, in more than two dozen recorded meetings (RAC and Discussion Groups), irrigators characterized the common good as a narrow form of their economic interests and effectively *force-teamed* the local economy into their plight. We hold a much more positive view of the potential for the Division 512 rulemaking process to benefit the local community in the long run because people can and will thrive by creating new economic development opportunities over the 30-year phase-in period of irrigation water use reductions. The non-irrigating local community can reasonably be expected to grow and benefit from water use curtailments on irrigation operations.

VII. Discussion Groups

OWRD announced that Oregon Consensus, with support from the High Desert Partnership (HDP), would facilitate “Discussion Groups” to run parallel to the Division 512 RAC meetings.⁴⁴ These sessions were presented as informal opportunities for RAC members and the public to explore details, work through issues, and ask questions outside the formal RAC framework. In practice, however, the Discussion Groups often functioned as a countervailing force to the RAC process. By removing OWRD staff from their presiding role and relegating them to that of observers and consultants, these sessions periodically shifted the power center-of-gravity in the rulemaking process to the supermajority irrigator-aligned cohort and their moderators.

The structure of the Discussion Groups, particularly the moderators’ effort to maintain a “consensus-like” environment, naturally favored the majority interests present, most notably the supermajority irrigator-aligned cohort of RAC members (Cohort). The moderators always sought to hear from all participants; however, their attempts to accommodate the broadest sector of participants effectively amplified this dominant bloc, creating a mechanism for irrigators to consolidate their positions outside the formal RAC process. Instead of confronting opposition in RAC meetings, irrigators were able to use these sessions as a safe venue to form consensus around preserving their status quo and to coordinate strategies that would influence RAC agendas.

Midway through the dozen Discussion Groups, a RAC member joked, prompting laughter precisely because the joke contained an awkward truism related to in-group and out-group dynamics:

John Short: John Short, water right guy and RAC member. And I don't think Harmony let people know that she did used to work for Water Resources...

⁴⁴ OWRD and Oregon Consensus, [Discussion Group Charge, Harney Groundwater RAC](#), 8/9/2024. [3] (“The discussion groups will have staff support from High Desert Partnership to assist with organizing discussion group logistics; and bringing information into the discussion on the options and considerations offered by the discussion groups, RAC, and/or OWRD.”)

Harmony Burright: And, yes...

John Short: And came over to... [Laughter]

Harmony Burright: The Dark Side... [Laughter]

John Short: The Good Side... [Laughter]

[Inaudible comments and laughter]

Kristen Shelman: Geez, John, give us your opinion of the department again...[Inaudible]

Bobby Cochran: Let's not go down that route.⁴⁵

The unspoken, yet persistent, circumstance is that the Cohort in the Discussion Groups opposes the efforts by OWRD and non-aligned others. When HDP moderator, Harmony Burright, a former OWRD employee, playfully refers to her old workplace as “The Dark Side,” she uses a humorous label that aligns with a common, though generally unstated, perception held by the Cohort. John Short's immediate correction, “The Good Side,” is also a playful affirmation that the Cohort and their interests represent the morally right position. It's clear among those laughing that the underlying truth the joke points to is a sensitive, yet widely held, perspective among the Cohort. The exchange, far from being *just a joke*, served as a rhetorical tool to reinforce the shared in-group identity and collective opposition to the OWRD, using humor to safely express a serious divide. By solidifying this internal cohesion, the Cohort could more effectively present a united and unwavering front in the Discussion Groups, which we argue served as a mechanism to coalesce the countervailing force.

A complete study on the concept of neutrality and bias among the Discussion Group moderators throughout more than a dozen Discussion Group meetings, hundreds of emails, documents, and conversations is beyond the scope of this Division 512 set of comments. Furthermore, the efforts by the Discussion Group moderators to uphold the appearance of neutrality, a sight to behold in real-time, require extensive research after the fact. We highlight this structural problem inherent in the Discussion Groups because we believe the moderators were under the same pressure that OWRD staff were under, as the department sought to resolve the Tragedy of the Commons. However, a key difference was the moderators' attempt to appease the Cohort in the Discussion Groups, a strategy that ultimately eroded their neutrality. Had the moderators truly maintained a critical distance (in theatre, directors are scolded for becoming friends with the actors), we surmise that the Discussion Groups would have been much less accommodating affairs and would have appeared more like the disciplined RAC meetings.

The friendly atmosphere naturally led to shaping Cohort-preferred advisory decisions during Discussion Groups that were carried back into the advisory RAC meetings,⁴⁶ effectively making

⁴⁵ Bobby Cochran and Harmony Burright, moderators, “[Harney Groundwater Discussion Group, Oct 28 2024](#),” Zoom recording, Portland State University. [at 0:8:50]

⁴⁶ Oregon Water Resources Department, “[Division 512 Rulemaking: Groundwater Regulation for the Malheur Lake Administrative Basin](#),” (PowerPoint slide presentation, Rules Advisory Committee Meeting, May 30, 2024), slide 19. (RACs are advisory; OWRD has the responsibility to draft rules as they see fit; WRC has the duty to decide upon the

the Discussion Groups *de facto* RACs. The constant presence of the supermajority Cohort and the consensus-like environment in Discussion Groups ensured that the bulk of the information served the Cohort in RACs. This is a classic example of how using consensus to solve a longstanding problem born from consensus (here, a *Tragedy of the Commons*) serves to deepen the problem. The informal consensus-based influence was so strong that it unreasonably impacted the formal RAC process, leading to a blurring of roles between what a person could do in an informal Discussion Group and a formal RAC meeting.

This conflation may have undermined the intent of the Administrative Procedures Act (ORS 183) and its implementing rules (OAR 137). OWRD tried to keep a lid on the problem by periodically sending emailed public notices that explained how [**emphasis added**]:

The discussion groups are an informal opportunity, designed to provide access to information and incorporate the collective wisdom of the RAC and the public into the RAC's role in developing an approach to groundwater management in the Harney Basin.

The groups do not make decisions. Each discussion the group hosts is guided by the current topics being worked on by the RAC. For any topic, Oregon Consensus may ask a discussion group to:

- Discuss particular questions posed by the RAC and/or OWRD;
- Offer additional options and considerations for a particular topic and/or
- Keep a record of the discussion to help inform RAC feedback to OWRD.⁴⁷

In practice, and despite repeated notices from OWRD, the effort to constrain Discussion Groups to their limited mandate was nearly impossible in the consensus-catering, Cohort-enabling atmosphere: just how could the moderators maintain order when conviviality “*had*” to be maintained? One memorable attempt came during the final Discussion Group on April 28, 2025, when a moderator had to start the meeting with a reminder [**emphasis added**]:

Welcome to the Harney Groundwater Rule **Decision...or Discussion Group**.

I'm Bobby with Oregon Consensus, and it's been a little while since we came together, but just as a quick reminder as we get going: the role of the discussion groups is really around brainstorming ideas, kind of an advisory role of the Rules Advisory Committee is to give advice to the Water Resources Department. For us here, it's just to kind of develop more of

manner of adoption or to not adopt. In the context of the Discussion Groups, the supermajority irrigator-aligned cohort of RAC members wanted to control the entire gamut.)

⁴⁷ Oregon Water Resources Department, “[Meeting Notice: Division 512 Discussion Group](#),” GovDelivery Bulletin, April 24, 2025.

that shared understanding that if there is advice, kind of going back to the department, we could do that.⁴⁸

A Freudian slip is usually nothing much to consider. But here, the cognitive dissonance about the “Decision...or Discussion Groups” arose because the moderator held both realities in mind simultaneously: too often, the Discussion Groups had been *de facto* Decision Groups,⁴⁹ and the legal problem needed to be addressed. We appreciate this attempt in the final meeting to keep the Discussion Groups in their lane. Even without the slip, reiterating the guideline highlighted the ongoing problem. But the reminder was insufficient: further along in the meeting, the moderator noted that:

...we had a lot of comments that probably were more RAC-like than discussion group-like. So I'm wondering if we even do want to meet on Monday. It seems like folks have their heads wrapped around the key issues in the rule...⁵⁰

Instead of maintaining order, which would have required a modicum of sternness, the suggestion was to just cancel the next meeting. Through more than a dozen of these Discussion Groups, some of which were day-long events with breakout groups, the supermajority irrigator-aligned cohort of RAC members secured disproportionate influence, controlled narratives, redrew hydrologic subarea maps to favor prospective Voluntary Agreements, and prescribed content for official RAC agendas. This belated, yet noble attempt by a moderator to bring order to the Discussion Group on April 28, 2025, was the perfect example of the adage “too little, too late,” considering the less direct reminders that had occurred throughout the eight-month process. Given the proclivity by moderators to ingratiate themselves with the Cohort to gain their trust, coupled with using consensus methodology to incorporate all points of view, the Cohort's intransigence made it nearly impossible for moderators to keep the Discussion Groups from becoming Decision Groups.

Perhaps the most egregious act making advisory decisions in the Discussion Groups was how the Cohort gerrymandered OWRD's 15 subareas that staff delineated hydrologically to select high and low priority areas for the imposition of Corrective Control Orders. The GHVGAC initially comprised 15 subareas that were hydrologically distinct enough to be identified, even though groundwater reservoirs in the GHVGAC are hydraulically connected to varying degrees. RAC members, in Discussion Groups, made several proposals that reduced the number to five or six, the

⁴⁸ Bobby Cochran and Harmony Burright, moderators, “[Harney Groundwater Discussion Group, April 28, 2025](#),” Zoom recording, Portland State University. [at 0:0:05]

⁴⁹ We acknowledge the use of the word *decision* needs clarifying: there are *advisory decisions* individual RAC members make during RAC meetings as are there the same among the supermajority irrigator-aligned cohort of RAC members. There are also advisory decisions made by the same persons and members of the public during the extra-curricular Discussion Groups, which make those groups appear to be RAC meetings. Notably, these advisory decisions are not to be confused with the legal authority the WRC has in deciding whether and how to adopt rules. Throughout these comments, unless explicitly stated, Water League never intends to refer to the term *decision* as it relates to the duty held by the WRC.

⁵⁰ Harney Groundwater Discussion Group, April 28, 2025. [[at 1:16:58](#)]

effect of which increased the sizes of the subareas. RAC members eventually settled on seven subareas.

RAC members present in the Discussion Groups sought this change for two reasons: 1) they wanted to merge the high-priority subareas with low-priority subareas to spread the pain of water use curtailments into larger subareas (subprime water rights would likely taint these larger subareas, reminiscent of Collateralized Debt Obligations),⁵¹ and 2) high-priority subareas have few irrigators within their area with whom to negotiate a Voluntary Agreement and need to incorporate others from low-priority subareas who are not likely to be regulated off.⁵²

We incorporate by reference here our extensive comments on ORS 537.745 *Voluntary Agreements* that we submitted to OWRD when the department sought input on the topic.⁵³ In our comments, we discuss at length the supermajority cohort's two rationales for gerrymandering OWRD's initial subarea proposal layout. While the internecine conflict among irrigators in the first rationale will likely resolve in the Contested Case hearings,⁵⁴ we wondered if:

A constitutional crisis is likely to occur under the proposed regime required to make VAs functional for the most at-risk irrigators whose pumps are located on top of the most severe cones of depression. Putting ORS 537.735(1)(a) and OAR 690-010-0130(3) to work for a few irrigators by harming other irrigators is a *de facto* use of the law to benefit some at the expense of others.⁵⁵

The second rationale for gerrymandering larger subareas is linked to misusing OAR 690-010-0130(3) to define subareas within the greater CGWA for reasons other than the "implementation of corrective control provisions." That rule states [**emphasis added**]:

⁵¹ Darrick E. Boschmann, [Response to RAC request: "sub-basin" PTW for the Harney Basin CGWA](#), 02/26/2024. [6-8]

⁵² Christopher Hall, [Comments related to the Proposed Guidance for Voluntary Agreements Among Groundwater Users from the Same Groundwater Reservoir](#), Water League, February 13, 2025. [7-9] (High-priority subareas in OWRD's initial 15 subarea proposal have little to negotiate with if they are all likely to be regulated off.)

⁵³ Hall, *Comments related to Voluntary Agreements*.

⁵⁴ Oregon Water Resources Department, "[Division 512 Public Hearing, Diamond – June 24, 2025](#)," YouTube video, posted June 25, 2025. (Dan Otley from Riddle Ranch comments in reference to the reformation of the subareas: "I think the OWRD needs to explain the scientific rationale for this approach," which we believe is only what is permissible under OAR 690-010-0130(3). While not himself opposed to gerrymandering subareas for Voluntary Agreements, Mr. Otley goes on to state that: "OWRD previously explained at RAC meetings that subareas are intended to group wells together that behave similarly. My wells do not behave similarly to the wells in the Northeast Crane subarea, namely, they do not have the same shortages and drawdown issues as the wells in most of the Crane subarea. My wells and my neighbors' wells are more similar to the wells in the Lower Blitzen and Voltage area. Importantly, my wells and my neighbors' wells are also physically separated from the Northeast Crane subarea by Windy Point, which I showed on the map.")

⁵⁵ Hall, *Comments related to Voluntary Agreements*. [9]

For the purposes of ORS 537.735(1)(a) the exterior boundaries of a critical groundwater area may be reasonably inferred or ascertained:

(a) According to the presence of physical natural boundaries, hydrological conditions, or recharge or discharge areas; or

(b) Administratively by defining an affected area that does not have boundaries defined by natural features.

(c) Additionally, **to the extent that subareas wholly contained within the designated critical groundwater area must be defined to allow for implementation of corrective control provisions, these subarea boundaries will also be reasonably inferred or ascertained as in 690-010-0130 (3)(a) or (3)(b).**⁵⁶

In our comments on Voluntary agreements, we argued that:

The rule permits defining subareas to implement corrective control provisions, which are regulatory actions, not for implementing VAs under ORS 537.745. This distinction is important. There is much ado about gerrymandering the Harney Basin CGWA subarea maps to make VAs work because OWRD has been clear that the geographic limits of VAs will be contained within those subareas, however they are configured. ORS 537.745 only permits “voluntary agreements among groundwater users from the same groundwater reservoir;” therefore, the gerrymandering of the Harney Basin subareas is effectively reverse engineering the presence of groundwater reservoirs as a legal fiction under 0130(3)(b) and (c) rules. This machination is not how the CGWA statutes or rules “envision” water management of CGWAs, which are the most sensitive and at-risk hydrologic regions in the state. We are incredulous that irrigators pumping from the most severely impaired groundwater reservoirs would use 0130(3)(b) and (c) to aggrandize themselves by harming their neighbors[, whom] they would administratively map-in.⁵⁷

Recall, these advisory decisions to rearrange subareas occurred in the *extra-curricular* Discussion Groups. While there is much to note about the impropriety of the advisory decisions’ content, which we discussed above, our concern is that these advisory decisions occurred in what we believe were quasi-RAC meetings where OWRD was stripped of authority. OWRD’s acceptance (reluctant or otherwise) of the advisory decisions made in the Discussion Groups could undermine the Division 512 rulemaking process under ORS 183.400 *Judicial determination of validity of rule*, which states:

⁵⁶ Or. Admin. R. 690-010-0130(3) (2025).

⁵⁷ Hall, *Comments related to Voluntary Agreements*. [9-10]

- (3)Judicial review of a rule shall be limited to an examination of:
 - (c) Copies of all documents necessary to demonstrate compliance with applicable rulemaking procedures.
- (4)The court shall declare the rule invalid only if it finds that the rule:
 - (a)Violates constitutional provisions;
 - (b)Exceeds the statutory authority of the agency; or
 - (c)Was adopted without compliance with applicable rulemaking procedures.

We believe the rulemaking process could become subject to ORS 183.400(4)(c). More specifically, as related to the internecine conflict about who's in or out of which gerrymandered subarea (and, later on, who's in or out of which Voluntary Agreement), there might be an equal protection clause concern that ORS 183.400(4)(a) addresses. When some RAC members guided OWRD's decisions to benefit their own operations, while many others were left out of the discussion-decision making process, there could be an effect not unlike a forced (involuntary) water right transfer, whereby an irrigator in a low-priority subarea (as defined by OWRD in its initial proposal for 15 discrete subareas) all of a sudden has to experience water use curtailments to offset being lumped in with a high-priority subarea that some RAC members merged during the Discussion Groups. We refer back to Mr. Otley's comments from June 24, 2025,⁵⁸ above as one example, and the memo by Darrick E. Boschmann, "Response to RAC request: 'sub-basin' PTW for the Harney Basin CGWA." We believe a tiny minority of Harney Basin irrigators may have used their position on the RAC and in the Discussion Groups to benefit themselves and possibly disadvantaged some who were not part of the RAC or rulemaking process.

In addition to subarea mapping to serve Voluntary Agreements, Discussion Groups also used the premise of informal discussions to guide and manage other topics on the RAC meeting agendas, which included proposing model scenarios and adaptive management. Advisory decisions on those topics from the friendly Discussion Groups were also carried into the more contentious RAC meetings. To be clear, the Cohort periodically used the Discussion Group venue not so much to gather information but to fortify their positions in preparation for the RAC meetings, effectively caucusing to game out their preferred positions and alternatives.

Discussion Group moderators also provided an entirely different service to all-comers: they promoted one-on-one support services outside of both the Discussion Groups and RAC meetings, offering to help RAC members and members of the public to complete surveys and submit comments to OWRD related to the Division 512 rulemaking process when the RAC meetings were still being convened. Because these interactions occurred off the formal public record, neither OWRD nor the public can assess the independence, consistency, or influence of the feedback generated. Water League differs from those who critiqued offline public comment submissions on

⁵⁸ Oregon Water Resources Department, "Public Hearing, Diamond."

the grounds that they couldn't keep abreast of comments sent by email, even though every submission is subject to public records laws. Rather, Water League critiques the possibility of moderators coaching comments, inadvertently or otherwise, and enriching them with strategic insight or points of view under the pretenses of neutrality carried over from the promises of Discussion Group principles.

While we do not question individuals' rights to free speech or assembly, the possibility of moderators coaching commenters is a line in the sand few can be sure about having been crossed. What is the difference between answering a survey and submitting comments by oneself, and having a paid Discussion Group tutor assist in those activities?

The moderator, Harmony Burright, advertised free services (underwritten by a contract with the High Desert Partnership (HDP)) in the last Discussion Group meeting on April 28, 2025, saying:

I'm just making sure you all know that, you know this is, this is really an important window for you to provide comments to the department, and if you want help, I, you know, I've talked to several people, they're like, "I don't really know how to comment." If you want to talk with me through it, and I'll write things down for you, and I've done this for a couple people, and then I send you what you said, kind of organized in these areas. And then you can determine if you want to send it to the department. I'm happy to do that. So please reach out, and we'd just love to help make sure that you have the ability to comment as you wish during this time.⁵⁹

Either neutrality or blatant advocacy is perfectly acceptable; however, either posing as the other is not. What is the effect of offline assistance by "The Good Side" moderator who sought to express a neutral posture? The optics of such assistance matter in the context of rulemaking. The moderator's contract with HDP and the emphasis on *neutral* support create an appearance of impartiality. Yet, the offer to help participants draft polished, structured comments could, at scale, produce a larger, more coherent body of local opposition than might otherwise arise organically. The concern is not the legality of this help, but whether neutrality is being used as a protective veneer for selective advocacy.

We acknowledge the widespread practice of organizations sponsoring community engagement related to all kinds of government actions, including legislation, rulemaking, and agency management. Indeed, *Calls to Action* by organizations are a ubiquitous form of electronic "Election/ Advocacy Litter." Generic public comment form letters people can sign onto are ubiquitous. Water League supports engaging the public in water stewardship; indeed, that is our mission. However, we wish to highlight an important distinction: the line between impartial public assistance (as HDP advertises) and strategic advocacy becomes blurred when an individual who

⁵⁹ Harney Groundwater Discussion Group, 4-28-2025. [at 1:25:22]

previously facilitated the official Discussion Group process, as described, now offers direct, unrecorded aid in documenting public comments.

The same comment writing services have now been offered by the moderator retained by the HDP to assist the public with submitting their public comments during the formal Secretary of State Notice of Proposed Rulemaking period. The first of eight consecutive emails (from June 11 to August 12, 2025) advertising the comment-writing assistance services stated:

You are receiving this message because you have expressed interest in groundwater policies being considered for the Harney Basin. These policies are very likely to have a transformative impact on on[sic] Harney County through significant regulatory reductions of groundwater use.⁶⁰

Despite promises “...to provide this service to *anyone* with an interest in groundwater management in Harney Basin regardless of their background/interest/desired outcome”⁶¹ [*emphasis in original*], we do not see a durable pathway to neutrality as advertised. How meaningful is neutrality if the majority of likely participants are constituents of a monolithic bloc that adheres to the uniform principle of rejecting the designation of a CGWA and subsequent water use curtailments? Does calling the assistance available to “anyone” amount to a distinction without a meaningful difference in neutrality? Water League stands by our assessment that the Discussion Groups functioned as a countervailing force to the RAC process. The moderator’s offer of personal writing assistance could reasonably be perceived as an extension of that leverage, and is a matter deserving of further inquiry only because of the appearance of neutrality claimed.

VIII. Comments on the Notice of Proposed Rulemaking Criteria

1) The Notice of Proposed Rulemaking (NoPR) states on page 9:

Finally, reduced spring and streamflow will also decrease the availability of water and vegetation for domestic livestock grazing in the basin. Reductions in springs and stream flows will substantially impact water-dependent ecosystems and human populations that rely on these systems for recreational use and livestock grazing.

We wonder about how the EcoNorthwest report could have ever justified incorporating the \$65 million value of livestock production as part of the economic losses resulting from the water use curtailments affecting irrigated alfalfa if the irrigators’ over-pumping of groundwater reservoirs is

⁶⁰ Harmony Burright, [Email Message to BCC](#), Wednesday, June 11, 2025 at 11:25 AM.

⁶¹ Burright Email, June 11, 2025.

desiccating pastureland? Wouldn't water use curtailments benefit herders seeking to pasture their livestock? Why was the possibility of such a benefit never raised in the ECONorthwest report?

This issue is also confirmed on NoPR page 19, which also states: "Finally, reduced spring and streamflow will also decrease the availability of water and vegetation for domestic livestock grazing in the basin."

2) The NoPR states on page 11:

By minimizing groundwater development in the upland areas of the Basin, the new rules will preserve recharge into the Basin's lowlands, where severe groundwater level declines are occurring.

Please explain the extent to which this recharge concern relates to the shallow layer less than 100 feet deep, where most recharge reaches, and the extent to which the deeper layers below 100 feet do not experience recharge. We previously cited "Groundwater resources of the Harney Basin, southeastern Oregon" in these comments that discuss this topic. We believe that distinguishing between the layer that experiences recharge from the deeper layer that does not get recharged within human timescales is necessary for water management purposes.

3) The NoPR states on page 11:

On April 7, 2025, the Director sent a follow up letter to the Burns Paiute Tribe, offering dates and times that might be convenient for the Tribal Council.

We believe the Director could prioritize their schedule, clearing it as needed, to meet with the Burns Paiute Tribe. Since the tribe reached out to OWRD, it is the department's responsibility to ensure a timely meeting. We ask rhetorically: how many non-tribal lobbyists were on the calendar during those eight months?

4) The NoPR has typos on pages 19, 20-21, and 28:

The total costs associated with the remediation of domestic wells appear to have incorrect figures on pages 19, 20-21, and 28. Please check the math.

5) The NoPR states on page 20 says:

[T]he Department set a goal of groundwater level stability rather than full water resource recovery. If recovery were the goal, the estimated economic impacts would be much higher

because recovery would require regulating more groundwater users to return groundwater conditions to historic levels.

The claim that if OWRD sets recovery of groundwater levels as the goal, “economic impacts would be much higher,” appears short-sighted because the obvious fact is that future water users would see increased economic vitality and security (we refer back to our comments on the fiscal and economic impacts and the public sentiment).

On another topic, please explain if the presumptive “recovery” refers to only the shallow layer less than 100 feet deep. According to the *Groundwater resources of the Harney Basin, southeastern Oregon*, recovery is not possible in human time scales for groundwater reservoirs below 100 feet deep, which is where the vast majority of irrigation use wells are located. We question the claim that OWRD has ever had the option of choosing “recovery” for the majority of irrigation wells, and that recovery is only possible within the most shallow groundwater region. Did this perceived concession – that OWRD “forwent recovery” – function as a palliative to discontented irrigators? We would like to know just how a policy of groundwater recovery for all the wells pumping water from below 100 feet could be possible. Would the policy simply be shutting off those deep wells and waiting for multiple generations for recovery?

6) The NoPR states on page 21 says [emphasis added]:

As the springs, streams, and Malheur Lake ecosystem services within the Harney Basin depend heavily on groundwater, **the proposed rules expect** to stabilize groundwater levels at a new level after 30 years. Groundwater declines will continue through the 30-year implementation; however, stabilizing the groundwater levels after 30 years may help stabilize baseflow needed to sustain springs and streams, thereby mitigating some of the potential long-term impacts to the ecosystem and the services it provides.

The first sentence conflates the positive welfare of GDEs, springs, and the lake with the 30-year period during which groundwater levels decline before they are stabilized. This sentence, beginning with “As the springs, streams, and Malheur Lake,” and the paragraph that concludes with “thereby mitigating some of the potential long-term impacts to the ecosystem and the services it provides,” attempts to frame a period of sanctioned environmental degradation as a beneficial, long-term mitigation strategy, which is misleading. We know from the data that the rules will permit substantial ongoing harm to the various ecosystem elements, and that the final resting place of the groundwater levels will deprive the ecosystem of access to water.

7) Page 21 of the NoPR states:

ECONorthwest's key modeling assumptions are as follows:

If a supplemental water right is not irrigated, the primary water right is not irrigated.

First, we did not find such an assumption in the ECONorthwest report. Second, we think the logic of the statement is confusing. Shouldn't the statement read: "If the supplemental right is curtailed due to junior priority status, the model assumes the whole irrigated use stops because the primary right was not being used in the first place?" OWRD has a responsibility to be clearer.

8) Pages 21 to 24 of the NoPR discuss the ECONorthwest report – see Section VI of these comments.

9) Page 26 of the NoPR states:

Given the fluctuation in funding levels of the WARRF funds and the high demand across the state, the estimated 98 domestic wells that will go dry under the proposed rules may not have access to these funds when a well goes dry.

By projecting the number of domestic wells that will go dry and proposing to pay for the remediation of as many of those wells as possible, the state is agreeing to the continued excessive declines in groundwater levels and *subsidizing these declines* by paying for deepening domestic wells.

We understand the state's 30-year goal is to stabilize groundwater levels at lower levels than they were at in 2018 (or for that matter, 1980); however, the state ought to be more forthcoming that it supports the knowing harm and destruction of domestic wells (and, by extension, GDEs and springs that money can't buy the same way it can pay for deepening wells). Aligning with irrigators' interests to mine water for 30 more years until 2058 is an extraordinary policy decision.

Where else in the state is such a tiny population afforded such immense political power to knowingly plan the impairment of domestic wells within an expansive interstate free-market where alfalfa is priced as a commodity and readily accessible, otherwise? The state of Oregon should not subsidize alfalfa production when the cost is the long-term destruction of the state's groundwater sources; it's just not worth it. Water League supports perpetual eminent domain condemnations of water rights with basin-wide total withdrawals not to exceed 1990 volumes.

10) Page 26 NoPR states [**emphasis added**]:

CGWA - LOCAL GOVERNMENT: Harney County assesses land value to collect property taxes. A loss of irrigated land is expected to reduce collected property tax revenue. The

County uses three different land class values to assess property taxes. Land Class 2 is fully irrigated, Land Class 3 is land with some irrigation, and Land Class 5 is land without irrigation. For comparison, **Land Class 2 generates \$1,185 per acre in property tax revenue, while Land Class 5 generates \$93 per acre.**

This appears to be a misstatement or typo. The text states that “Land Class 2 generates \$1,185 per acre in property tax revenue,” which is implausible because one acre of irrigated alfalfa generates an average gross agricultural income equal to or less than that. That figure represents the average Specially Assessed Value (SAV) per acre for fully irrigated land (Land Class 2) in Harney County, not the tax revenue generated. Property taxes are calculated by applying the county’s mill rate, which we believe is \$11.84 per \$1,000 of assessed value, to the SAV. Using that rate, \$1,185 in SAV would generate approximately \$14.03 in annual property tax per acre, not \$1,185. The current phrasing in the document conflates assessed value with tax revenue and must be corrected.

This typo misrepresents the expected losses to the Harney County coffers and exaggerates the potential losses resulting from water use curtailment. This typo, coupled with the gross misrepresentations of losses in the EcoNorthwest report, combine to seriously mislead the public in their efforts to understand the Division 512 rulemaking process and their ability to respond competently to this rulemaking process in their comments.

11) On page 27, the NoPR states:

This change is estimated to decrease tax revenue \$146K. These reductions equate to a decrease of \$55,000 in the general fund, \$24,000 for hospitals, and \$66,000 for local schools. In fiscal year 2024-25, the property tax revenue for Harney County was \$11M, a reduction of \$146,000, is an estimated 1.3 percent decrease in annual property tax revenue collections.

This reduction hardly impacts the county government and is within the range of many other normal impacts on county funds. Notably, EcoNorthwest could not justify land value tax losses related to the much larger livestock industry, because the livestock industry will not see any contractions. This fact further undermines the improper inclusion of the \$65M livestock industry into the EcoNorthwest report, which overstates the economic impacts of water use curtailments. The report’s assumptions are flawed because the livestock industry can easily buy alfalfa on the free market or from the 80% of alfalfa irrigated in the Harney Basin that exceeds local demand.

12) On page 28, the NoPR states:

According to the Harney Electric Cooperative once the reductions in 2028 occur, power costs will increase by 18% with similar increases at each six-year adaptive management checkpoint. Consequently, rate payers may see higher electric bills.

OWRD plans to phase in water use curtailments over 30 years, so not all the electricity that would be shut off due to water use reductions will happen all at once. The Harney Electric Cooperative will see a reduction in consumer demand proportionate to the phasing-in of water use curtailments. What percent of a cut will the electrical use be in 2028 and in each of the six-year adaptive management scenarios? Did anyone consider the fact that there could be other economic drivers over the next 30 years, such as a Burns data center or a Crane solar farm?

13) On page 29, the NoPR states:

The Department's existing water use reporting system does not allow for timely comparison to ancillary data to validate reported numbers, nor can the system easily identify whether the reported use is allowed within the limits of the water right or a combination of water rights associated with each well. Improvements to connect three existing databases, the Water User Reporting System (WURS), Water Rights Information System (WRIS), and the Groundwater Information System (GWIS), will allow the Department to monitor water use at all wells and for each water right. New resources are needed to implement these improvements. In lieu of improvements, minimal quality control will be done to reported data.

Funding the connection of the three databases must be a priority by 2028. Oregon has sufficient resources to make this database integration happen; only political will is lacking to overcome those who oppose the process. Similar statements are made about funding to implement and enforce water use measurement and reporting, which also must be prioritized.

14) On page 31, the NoPR states:

A water right holder does not need to participate in the contested case, but should the holder choose to do so, he or she is likely to incur significant legal fees to participate.

Large numbers of water right holders may enter into joint representation agreements and pool their funds into a single law firm to represent them. While each water right is unique and will be adjudicated as such, the potential for an economy of scale in both representation of many water rights and the costs associated with each vested holder is not only possible but desirable. We strongly suggest that state officials provide informational services that incentivise water right holders to enter into joint representation agreements to pool their funds.

IX. Comments on the Proposed Draft Rules for OAR 690-512

690-512-0010 Definitions

Consider adding a new definition:

(6.5) “Regulated Off” and “Reduce” mean limiting the use of groundwater pursuant to ORS 537.742.

We recommend adding these definitions, “Regulated Off” and “Reduce,” to ensure there is no question about the legal terminology related to limiting water use and the intent of these rules.

Throughout these proposed rules, there are several euphemisms for the legal phrase “limiting the use of groundwater” in ORS 537.742, which include “Regulated Off” in 690-512-0110 Serious Water Management Problem Area (SWMPA), and the root verb “to reduce” in several sections, such as: “water use reductions,” “schedule for reductions in groundwater use,” “water will be scheduled to be reduced,” “the schedule for reductions,” “regulatory reductions scheduled,” and “scheduled quantity of reduction.”

We suggest that if OWRD perceives a difference between the terms “Regulated Off” and “Reduction/ Reduced,” that these rules clarify that difference. For example, does “Regulated Off” mean shut off completely, whereas “Reduced” means only partially? How does the term “Regulated Off” differ regarding surface water, which is the most common use of the term? Do Watermasters who reduce surface water use still call it being “Regulated Off” even if some water is still allowed to flow for any given water right?

690-512-0041 Harney Basin Critical Groundwater Area

(6) The Harney Basin Critical Groundwater area defined in OAR 690-512-0020(7) shall be divided into seven subareas for the purpose of management as shown in Exhibit 6.

Must be more specific -- replace “the purpose of management” with “implementation of corrective control provisions.” 690-010-0130 *Additional Requirements for Critical Ground Water Area Rulemaking Process* (3) states [**emphasis added**]:

(c) Additionally, to the extent that sub-areas wholly contained within the designated critical groundwater area must be defined **to allow for implementation of corrective control provisions**, these sub-area boundaries will also be reasonably inferred or ascertained as in 690-010-0130 (3)(a) or (3)(b).

There are no other legal actions other than implementing corrective control provisions for which OWRD/ WRC can define subareas within a CGWA. Using the general term “management” opens up the possibility of misunderstanding 690-010-0130(3)(c) to include management of Voluntary Agreements or placating politically powerful irrigators who seek to minimize pumping reductions they personally experience by gerrymandering subareas to spread the pain of regulatory actions curtailing water use, as we have discussed in these comments.

690-512-0050 Permissible Total Withdrawal for Each Subarea Within the Harney Basin Critical Groundwater Area

(3) The permissible total withdrawal for the Northeast-Crane subarea shall be 35,000 acre-feet per year.

On the matter of how the Groundwater Level Magnitude Trajectory in Crane went from a starting date of 2018 for measurement, showing -17 foot declines in groundwater levels at the April 16 RAC #14,⁶² to a starting date ten years later in 2028 for measurement showing -5 feet in the NoPR Groundwater Level Change Envelope graphs,⁶³ see the Crane Groundwater Level Magnitude Trajectory graph on page 3 of the Evaluation of RAC Alternate PTWs Memo 20250530.pdf, which also uses the 2018 starting date.⁶⁴ On page 1 of that memo, the alternate increase in the percent of water use reduction in Crane goes from 34% to 45%, an increase of 6 Kaf/yr in water use curtailments. Along these lines, the graph on page 3 shows an apparent commensurate increase in elevation of the final groundwater level to be near -5 feet below zero, and *that zero* is the 2018 year basis point. But the NoPR, which uses a 2028 start date, still keeps the Crane PTW at 35 Kaf/yr, similar to the April 16 RAC #14 presentation.

Is OWRD using the graph from the RAC Alternate PTWs Memo for the Crane Groundwater Change Envelope in the NoPR, while keeping the PTW at 35 Kaf/yr as shown in the RAC #14? Please explain what is going on here. The public should not have to sort out these numbers, especially when it appears the baselines for dates are shifting by ten years, the effect of which masks the severity of the groundwater level declines. Indeed, the RAC #14 graphs included a dashed line showing the declines since 1980, which tells the story of excessive declines in groundwater levels. We think the public should not be prevented from seeing the accumulated groundwater declines since 1980 in the NoPR. The omission has the effect of obscuring the extent of the tragedy in the Tragedy of the Commons. Minimizing the extent of the harm accommodates the backlash by special interests against the Division 512 rulemaking process to designate a

⁶² Oregon Water Resources Department, "[Groundwater Regulation for the Malheur Lake Administrative Basin Rules Advisory Committee](#)" RAC #14 slide deck, April 16, 2025. [97]

⁶³ OWRD, "Notice of Proposed Rulemaking." [59]

⁶⁴ Ben Scandella, OWRD, [Evaluation of Division 512 RAC Alternate PTW Scenario](#), May 30, 2025. [3]

CGWA. How is such a decision not interpreted as a political act, given how easy it is to show the 1980 dotted line?

690-512-0060 Determination of Initial Allotment for All Groundwater Rights

(1) To establish a schedule for reductions in groundwater use, the Department will determine an initial allotment for each groundwater right within the critical groundwater area which will be implemented through an order after completion of the contested case process as required in OAR 690-010. The initial allotment shall not exceed the total rate or duty authorized on the water right.

Irrigators may seek to expand the rate authorized by their water rights by claiming that they have always exceeded their rates in the past, which is an admission of guilt.⁶⁵ A rate increase must not be allowed in a region suffering from some of the worst groundwater over-pumping in the state. Pumping beyond the rate authorized by water rights is a misappropriation of water.

690-512-0070 Scheduling Water Use Reductions to Meet the Permissible Total Withdrawal

(7) If enforcement of corrective control orders reducing use does not occur as scheduled in 2028, then at such time as enforcement occurs, all reductions scheduled under OAR 690-512-0070(1)(a) and (b), including any adjustments that should have occurred at the adaptive management checkpoints defined in OAR 690-512-0080, will be included in the enforcement.

Typo -- the reference should be OAR 690-512-0070(1) and (2).

Also, this rule is the minimum standard by which OWRD should prevent stalling the imposition of Corrective Control Orders by presumptive attempts to drag out the Contested Case Process and likely Appeals Court Challenges.

690-512-0080 Adaptive Management of the Harney Basin Critical Groundwater Area

(2) For each subarea, if the contested case process is complete and corrective control orders reducing use can be implemented in 2028, the Department will:

(c) If the median annual high groundwater level in 2027 is found to be greater than or equal to than the median annual high groundwater level measured in 2022 and the groundwater

⁶⁵ Representative Mark Owens, [Draft Voluntary Agreement Guidance Document](#), email to OWRD, August 6, 2024. [3] (See admission that irrigators have been exceeding the rate limits set by their water rights and how they want to keep doing so.)

level decline rate calculated for 2022 through 2027 is found to be zero or above, then the regulatory reductions scheduled for 2028 will be reduced to zero.

The proposed language in OAR 690-521-0080(2) is both morally and hydrologically indefensible because it effectively discounts the significance of 30+ years of documented aquifer decline between 1990 and 2022, the very depletion that necessitated the CGWA designation in the first place. By tying corrective action in 2028 to a narrow five-year window from 2022 to 2027, the rule disregards the sustained overdraft that has caused irreversible ecological harm, economic instability, and intergenerational injustice. The rule also narrows the frame of reference and serves to minimize the appearance of harm dating back to 1990 by obscuring the historical accountability that the state has to hold water in trust for the public.

This proposed rule is the same species of politics that moves the Groundwater Level Change Envelope graphs ten years ahead from 2018 to 2028 and deletes the dashed line showing on the RAC #14 Magnitude Trajectory graphs where the 1980 groundwater levels were. The prevailing conventional wisdom, much of which we scorn, suggests that the past 45 years of decline are a *sunk cost* that is now politically expedient to ignore. Removing the weight of the ecological destruction, much of which will not recover in human time scales, from the current policy debate is negligent and is no way to hold water in trust. Holding water in trust requires adhering to a fiduciary duty to protect the resource for both present and future generations. Disregarding past harm and the lessons it provides is a failure to uphold that duty because it normalizes the continued degradation of a public resource and suggests a lack of political will to uphold a principled fiduciary duty into the future. We suspect the ease with which the state proposed a 30-year phase-in to stabilize a groundwater level trend of zero decline comes from this same political calculus.

Hydrologically, such a short five-year comparison period preceding 2028, when curtailments are set to begin, is insufficient to show the long-term groundwater decline trends. The state sends the message that decades of damage do not count *unless they are made worse*. This undermines both the public trust responsibility and the precautionary principle embedded in Oregon water law. The inclusion of this ‘no worse than 2022’ clause codifies a permissive stance toward unsustainable use, improperly continuing the trend of favoring influential water users in the present at the expense of future generations, ecosystems, and the communities already suffering from dried wells and lost springs. To be clear, this trend, a function of the conventional wisdom, is the driving force behind the excessively declining groundwater level trends. 690-512-0080(2) is not adaptive management; rather, it’s a policy that disregards the past 45+ years of damage. OWRD and the WRC must honor all who have been harmed and will be harmed by the past 45 years of neglect by imposing water use curtailments in 2028, *come politics or high water*.

We also acknowledge that the likelihood of 2027 groundwater levels improving over 2022 is essentially zero, which suggests that 690-512-0080(2) is a political concession, crafted to create the illusion of flexibility. Perhaps it is a counterpoint to 690-512-0070. In this case, it's political theater. Codifying a symbolic off-ramp based on a knowingly unrealistic outcome serves no legitimate regulatory function. No rule should be based on the need to choreograph a narrative of restraint when decades of damage are already enough reason to take regulatory action; furthermore, should Voluntary Agreements ever coalesce into a reasonable alternative to regulatory action, which we doubt possible, this leniency will enable stalling across the board because Voluntary Agreements only work when there is a credible regulatory backstop.⁶⁶

690-512-0080(7)

(b) The target water level trend has not been achieved and all scheduled **reduction** have been implemented, the Department will initiate a rulemaking process to adjust the permissible total withdrawal as needed to achieve the target water level trend; or

Typo – the word should be pluralized to “reductions.”

690-512-0080(7)

(c) The target water level trend has been achieved and all scheduled reductions have not been implemented, the Department will initiate a rulemaking process to adjust the permissible total withdrawal to match the implemented reductions.

What if the previous 6-year period was abnormally wet and it had an outlier effect that permitted irrigators to rely upon rain a bit more than normal, which resulted in less groundwater pumping, and then in, the decades following 2058, there is another 20-year megadrought that incentivizes irrigators to pump as much groundwater as possible?

The OWRD should not adjust the PTWs to remove the remaining headroom in the PTWs if the groundwater level trend of zero decline has been met in 2058; rather, the OWRD should extend the adaptive management decision from 2052 beyond 2058 and hold that level of pumping steady if implementing the full PTW is ever required.

690-512-0110 Serious Water Management Problem Area (SWMPA)

(2) By no later than March 1, 2028, each groundwater right holder, well owner, or well operator shall properly install and thereafter properly maintain a totalizing flow meter on

⁶⁶ Felicia Marcus, Nell Green Nylen, Dave Owen, Michael Kiparsky, [“Five Guiding Principles for Effective Voluntary Agreements: A Case Study on VAs for Water and Habitat in California’s Bay-Delta Watershed.”](#) The Center for Law, Energy & the Environment, UC Berkeley Law, January 2024.

each well listed as a point of appropriation on a valid groundwater right within the Harney SWMPA boundary as defined in OAR 690-512-0020(3). The Department may extend the deadline as needed. If the deadline is extended, the Department will notify each groundwater right holder, well owner, or well operator at least 60 days before March 1, 2028. Groundwater wells that are regulated off and disconnected from all water use infrastructure do not require a totalizing flow meter to be installed unless or until use is permitted to resume.

There should be no need to plan for the failure to implement the SWMPA rules before the March 1, 2028, deadline for compliance.

Resistance from the supermajority irrigator-aligned cohort of RAC members during RAC meetings on water use measurement and reporting was an ongoing theme since the SWMPA regulations were initially discussed. There never was a credible justification for a mass extension of the deadline other than irrigators worried that OWRD wouldn't have the ability to manage the incoming data, which is not their concern.

We support offering one-time extensions for up to six months to individual irrigators to account for the possibility of supply chain disruptions or plumbing installations getting backed up. Applications for extensions should include evidence of having made timely arrangements for a meter that is on back order and/or for an installation with a plumber with a reservation date.

Following the adoption of the rules in December 2025, there are 27 months for irrigators to purchase and install meters, which is a reasonable amount of time to comply with the SWMPA rules, which do not need to be brought before a contested case process for implementation. We suggest that timely means nine months before March 1, 2028, for both the purchase of a meter and related materials, and the reservation of a plumber and related contractors. That leaves an 18-month cushion of time to plan the installation by the deadline.

X. Conclusion:

The Oregon Water Resources Department's Division 512 rules represent a paradigm shift from managing water for extractive interests toward stewarding water as a public trust resource for present and future generations. This rulemaking process acknowledges that current water users have excessively drained the Harney Basin's groundwater reserves, and they won't stop short of enforced regulatory action.

The politics overwhelming these rules have stifled optimism and imposed a regime of defeatism. The nihilistic, fatalistic narrative perpetuated throughout the Division 512 process is harmful to

those who stand to benefit from meaningful groundwater protections. This defeatist stratagem, employed by the supermajority irrigator-aligned cohort of RAC members, represents an unreasonable attempt to seize narrative control and shift blame for over-pumping consequences onto the very regulatory process designed to remedy the harm.

We incorporate by reference our July 17, 2024, letter to officials titled “No, We’re Not There Yet: Modernizing the Conventional Wisdom.”⁶⁷ Holding water in trust requires unwavering fiduciary duty to protect resources for both present and future generations.

The Critical Groundwater Area designation provides a service to all of Oregon by highlighting that in an era of over-appropriated water sources, 21st-century water management must prioritize the greater public interest over short-term extractive benefits. Only through such a reorientation can Oregon prevent mining its precious water resources and preserve them for generations yet to come.

While Water League prefers a more robust outcome, we support the designation of a Critical Groundwater Area and acknowledge OWRD’s implementation proposal. These rules mark a necessary and overdue departure from a century of groundwater mismanagement. Though opposition from entrenched water users has sought to delay, if not derail, this process, the WRC and OWRD have a fiduciary duty to uphold the public trust, safeguard future generations, and restore hydrologic balance to the basin.

⁶⁷ Christopher Hall, “[No, We’re Not There Yet: Modernizing the Conventional Wisdom](#),” Water League, July 17, 2024.



*Engaging the public
in water stewardship.*

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August 13, 2025

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Water League submits our comments on the Groundwater Report for the
Harney Basin Critical Groundwater Area Rulemaking.

As always, we appreciate the opportunity to share our thoughts.

Thank you,

A handwritten signature in black ink, appearing to read "Chris Hall".

Christopher Hall
Executive Director

In Memoriam

John L. Gardiner

Water League Comments on Harney Basin Groundwater Report

By Christopher Hall, Water League – August 13, 2025

The Groundwater Report for the Harney Basin is a technical summary of hydrologic conditions that satisfies the requirement by ORS 537.780(2) for the Water Resources Commission (WRC) to lawfully designate a Critical Groundwater Area (CGWA) under ORS 537.730 to 537.742, consistent with OAR 690-010 and OAR 690-512. Under the proposed Division 512 rules, the WRC may establish Permissible Total Withdrawals (PTW) to limit annual groundwater pumping from the Greater Harney Valley Groundwater Area of Concern (GHVGAC), and such limits must be supported by substantial evidence as required by ORS 537.780(2).

The groundwater report provides the substantial evidence required for the WRC to adopt the proposed Division 512 rules. By supplying this evidence, it enables the WRC to apply the Beneficial Use of Water Doctrine in a manner that safeguards the public trust and ensures that CGWA statutes are carried out in the best interests of the people of the state.

The procedure in ORS 537.780(2) sets a standard to be met before making determinations and imposing restrictions. This requirement prevents unreasonable restrictions on water use by requiring evidence of demonstrable harm to what can only be the public interest, which, among other things, includes the public health, safety, and welfare and the health and welfare of ecosystems. Substantial evidence shows the extent to which certain identified water uses cause measurable, ongoing harm. As such, the evidentiary standard in ORS 537.780(2) serves as a foil to the Beneficial Use Doctrine: the law recognizes that some specific water uses may no longer be a “reasonably efficient use of water without waste for a purpose consistent with the laws, rules and the best interests of the people of the state.”

The Groundwater Report documents groundwater declines and the deficit between annual recharge and irrigation season discharge. These measurements are not the purpose in themselves; rather, they are the evidence of public harm (means) that triggers the state’s fiduciary duty to act. The report fulfills the requirement for an evidentiary standard by identifying the groundwater reservoir, documenting which statutory criteria are met in ORS 537.730(1), connecting groundwater level declines directly to groundwater pumping volumes, documenting the consequences of these declines, and outlining corrective control

measures. These recommendations directly connect the evidence of harm to the policy decisions authorized under ORS 537.735 and OAR 690-010.

The Groundwater Report does not set policy; rather, it reports on “yardstick measurements” that we discussed in “Section IV. Ensuring Beneficial Use by Limiting Harm” of our Division 512 comments, which we incorporate here by reference. The greater purpose is in the WRC’s fiduciary duty to oversee the management of water resources for the long-term health of the public and the ecosystems that they rely upon. To be clear: the report’s role is to gather, analyze, and present facts that meet the substantial evidence standard, while the Commission’s role is to consider those facts when it determines whether and how to impose water use restrictions.

The Groundwater Report provides the WRC with the scientific basis for regulatory action so officials can hold water in trust for the public in the present and the future. Water League strongly supports the Groundwater Report findings that provide the substantial evidence required by ORS 537.780(2) to ensure the ongoing beneficial use of water by limiting harms resulting from water use.

AUG 11 2025

OWRD

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

PROPOSED HARNEY BASIN GROUNDWATER POLICIES – WRITTEN COMMENT FORM

This written comment form can be used to help you formulate effective written public comments for the Division 512 Harney Basin Program Rules being proposed by the Oregon Water Resources Department, which will be used to manage and regulate groundwater use in the Harney Basin. The questions provided in this form address various aspects of the rules. Each question includes space to write your answer and some questions include options for you to consider. Reach out to Harmony Burrig if you want help talking through or recording your comments (541-846-8863 / harmony@saltandfresh.solutions).

Public comments and related materials must be received no later than **August 7, 2025 at 5pm:**

By Email: WRD_DL_rule-coordinator@water.oregon.gov

By Mail: Kelly Mainz – Rulemaking Coordinator
Oregon Water Resources Department
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

Your Name (required):

Will Bentz

Your Email (optional):

Your Phone (optional):

Note: All personally identifiable information may be made public. Please do not include this information if you do not want it included in the public record. A first name and last initial must be included to be considered.

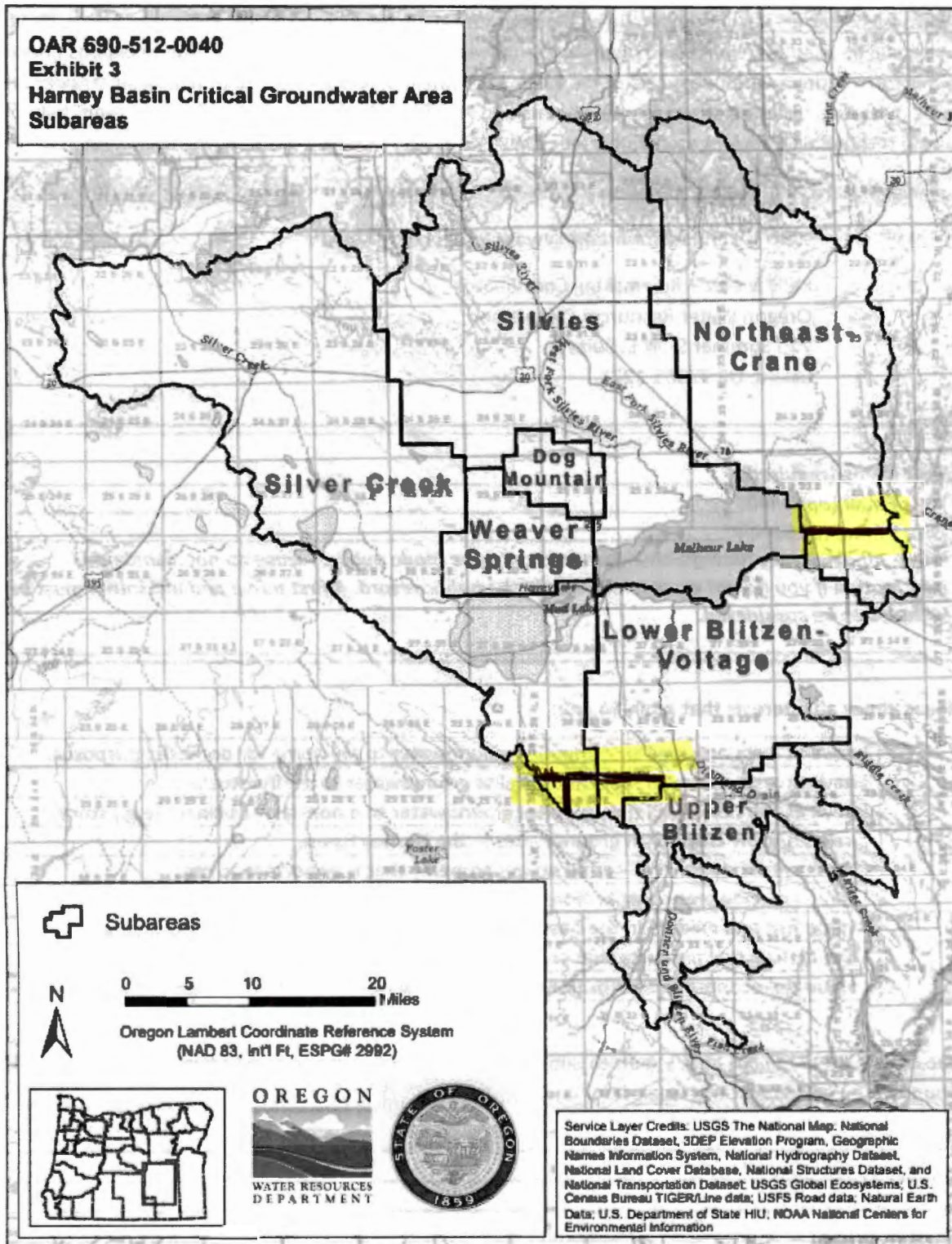
Please check all interests that apply to you:

☐	I have at least one well that supplies groundwater to my home for domestic purposes.
☐	I have at least one well that that supplies groundwater to my livestock.
☐	I have at least one well that supplies groundwater to a non-farm business (e.g., store).
☐	I irrigate/grow crops with groundwater in the Harney Basin.
☐	I have a groundwater fed spring on my property that is important to me.
☐	I value groundwater contributions to the environment (e.g., springs and native vegetation).
☐	I value fish and wildlife in the basin, including those that benefit from groundwater.
☒	I use agricultural products that are produced with groundwater.
☐	I value the economic contributions of agricultural operations that use groundwater.

Question 1. Please tell us about yourself and describe why groundwater is important to you. If you use groundwater, describe how you use it.

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

Question 2. If you use groundwater in the Harney Basin, mark with a color dot on the map provided where you use groundwater (this can be a rough approximation).



Question 3. The Water Resources Department proposes to designate the area in the map outlined in black as a **Critical Groundwater Area**, which would give them the authority to regulate or curtail/reduce groundwater use. Do you have any feedback on the boundaries or the basis for designating a Critical Groundwater Area described in the **Division 10 report**? (See 609-512-0041 in the proposed rules)

I would like to see the boundary moved between Northeast Crane & Lower Blitzen because of topography.
I would also like to see the boundary moved between upper & Lower Blitzen since the Jack Mt area ~~ends~~ into the Upper Blitzen area.
Drains

Question 4. The map on the previous page shows the seven proposed **subareas** that the Department will use to regulate groundwater use (with different levels of regulation for each area). Based on your knowledge of the basin, are there any changes you would suggest to the boundaries? Draw them on the map and describe the reason below. (See 609-512-0041 in the proposed rules)

Question 5. Please describe **groundwater conditions** where you are and what changes in groundwater levels or other groundwater changes you have observed in the last decade. If you have not observed any changes, please note that. You are also welcome to note any questions you have.

Question 6. If you have been or expect to be **impacted by changing groundwater conditions**, please describe how you have been impacted.

I buy 75% of my hay for livestock, I have concerns over the scarcity that may occur due to curtailment.
My hope is that the data will be subject to change if we find that in one sub area static water levels do not all trend on the same plane.

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

Question 7. The Water Resources Department proposes to achieve the groundwater management goal of durably stable groundwater levels (0 feet per year of decline) by the year 2058 for the entire basin by curtailing groundwater use in 6-year intervals. Do you have feedback on the groundwater level goal and target groundwater level trend? (See 609-512-0041 in the proposed rules)

	I support the groundwater management goal and target groundwater level trend as proposed.
	I support the target groundwater level trend, but I would like to see more time allowed to achieve the goal. Year achieved:
	I support the target groundwater level trend, but I would like to see the goal achieved in less time on a quicker timeline. Year achieved:
	I think minor declines are acceptable and should be allowed. Acceptable amount of decline (in total feet or feet per year):
	I would like to see groundwater levels come back up or recover. Desired amount of recovery (in feet):
	I would like to be able to see groundwater levels be allowed to fluctuate between certain levels (+/- within a certain "band" of acceptable declines)

Question 8. The proposed initial allocation (duty) for groundwater irrigation rights is 2.5 acre feet of water per acre for acres that were irrigated (wetted acres) sometime between 2020-2024. What feedback do you have on this proposal? (See 690-512-0060 in the proposed rules)

	I support the initial allocation of 2.5 acre feet for groundwater irrigation rights.
	I think the initial allocation should be greater than 2.5 acre feet. Proposed amount:
	I think the initial allocation should be less than 2.5 acre feet. Proposed amount:
	I support that wetted acres should be calculated based on use between 2020-2024.
	I think wetted acres should be calculated based on a different time period. Suggested time period:

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Question 9. The proposed initial allocation for municipal or quasi-municipal groundwater rights is 110% of water equal to 110% of the greatest single year in the previous five-year period. What feedback do you have on this proposal? (See 690-512-0060 in the proposed rules)

Question 10. The proposed permissible total withdrawal (PTW) for each of the seven subareas is described below. This is the amount of water that “represents the amount of water that the Water Resources Department has determined can achieve the target groundwater level trend by 2058. The Department may not reduce groundwater pumping to a value less than the permissible total withdrawal.” Highlight your feedback about the level of reductions for each area below. A memo produced by the Department explores a different allocation between the Lower Blitzen-Voltage area and the Northeast-Crane area. What additional feedback do you have on these proposed levels of groundwater use (PTW) and reductions? (See 690-512-0050 in the proposed rules)

Weaver Springs	Lower Blitzen-Voltage	Northeast-Crane	Silver Creek	Silvies	Dog Mountain	Upper Blitzen
PTW: 4,800 afy	PTW: 8,300 afy	PTW: 35,000 afy	PTW: 15,200 afy	PTW: 21,200 afy	PTW: 4,200 afy	PTW: 100 afy
75% reduction from 2018 use	39-40% reduction from 2018 use	34% reduction from 2018 use	27-28% reduction from 2018 use	15-16% reduction from 2018 use	9-10% reduction from 2018 use	0% reduction from 2018 use
Too much?	Too much?	Too much?	Too much?	Too much?	Too much?	Too much?
Too little?	Too little?	Too little?	Too little?	Too little?	Too little?	Too little?
Just right?	Just right?	Just right?	Just right?	Just right?	Just right?	Just right?
I don't know	I don't know	I don't know	I don't know	I don't know	I don't know	I don't know

This 10% seems small since it is so close to Weaver Springs.

Question 11. The reductions in each subarea will be phased in over time following a **proposed reduction schedule**, with the largest percent of reductions made initially and later reductions phased in over 6 year intervals based on existing groundwater level trends to ensure that groundwater levels are on track to achieve the groundwater management goal. Reductions will be based on priority date using the initial allocation as a starting point. What feedback do you have on the proposed reduction schedule? (See OAR 690-512-0070 in the proposed rules).

	2028	2034	2040	2046	2052	2058
Other Subareas	40% of total reductions	30% of total reductions	15% of total reductions	10% of total reductions	5% of total reductions	Stability achieved
Weaver Springs	75% of total reductions	25% of total reductions	--	--	--	--

	I support the proposed reduction schedule (percent reductions and implementation timeframe).
	I would like to see higher reductions implemented in the near-term.
	I would like to see lower reductions implemented in the near-term.
	I would like to see 20% reductions implemented at each step.
	I would like to see all reductions implemented immediately.
	I would like to see a shorter implementation timeframe (achieve stability sooner).
	I would like to see a longer implementation timeframe (longer period to achieve stability).
	If groundwater levels have not been declining in a subarea, I would like to see a grace period during the first 6-year period where no reductions are implemented.

Question 12. The Department is proposing to follow an **adaptive management approach** for implementing reductions informed by groundwater level trends. If groundwater level trends are “on track” then no adjustments would be made. This approach allows the Department to make changes to the reductions to achieve the goal. Reductions could be adjusted up or down depending on how groundwater levels change over the previous 6 years. What feedback do you have on the adaptive management approach? (See 690-512-0080 in the proposed rules)

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

Question 13. By 2028 all groundwater rights holders will be required to install a flowmeter to measure groundwater use and will be required to report groundwater use on an annual basis. A flowmeter must be installed on this timeframe in order to continue to legally use groundwater under existing rights. What feedback do you have on this requirement? Will you seek any assistance to meet this requirement? (See 690-512-0110 in the proposed rules)

Question 14. Under the proposed rules the only new uses that will be allowed are those uses that do not require water rights (i.e., permit exempt uses), such as domestic and stockwater wells, and non-consumptive geothermal uses. What feedback do you have on the proposed new uses? (See 690-512-0030 in the proposed rules)

I support this rule

Question 15. Please describe what personal impacts you expect these rules might have on you (either positive or negative).

Question 16. Please describe what basin impacts you expect these rules might have on the broader basin or community (either positive or negative). (See the Fiscal Impact Statement).

Return public comments by August 7, 2025 via email or mail to the Water Resources Department

Question 17. Describe actions that you would like the Department to consider that could mitigate or minimize anticipated impacts to you or the basin. This could include support for proposed policies or changes to the proposed policies.

Question 18. When you look into the future, what is most important to you? What do you hope to see for yourself and for the basin? What are you most concerned about?

Question 19. What else is important for you to communicate to the Department?

Question 20. Do you have any other feedback on the proposed rules or groundwater management?

For questions about the proposed rules, please contact Kelly Mainz at the Water Resources Department (WRD_DL_rule-coordinator@water.oregon.gov or 971-718-7087).

For assistance with developing effective written comments, please reach out to Harmony Burright with the High Desert Partnership who can help (541-846-8863 or harmony@saltandfresh.solutions).

High Desert Partnership
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Kelly Meinz - Rulemaking Coord.
OR Water Resources Dept.
725 Summer St. N.E. Suite A
Salem, OR 97301-1271

August 13, 2025

Kelly Mainz – Water Policy Analyst

Submitted by: Zach Freed, Sustainable Water Program Director

Dear Mr. Mainz,

Thank you for the opportunity to comment on proposed rule changes to Division 512.

The Nature Conservancy strongly supports the adoption of the proposed Division 512 rule changes.

I appreciate the time and effort that you and your colleagues have put into this rulemaking process, including the modeling of multiple management scenarios at the request of the Rules Advisory Committee (RAC), holding several additional RAC meetings, and collecting feedback through regular surveys. The Nature Conservancy acknowledges and supports the clear need to implement a Critical Groundwater Area, Serious Water Management Problem Area, and Groundwater Classification in the basin to ensure long-term sustainability for drinking water, agriculture, and ecosystems.

We offer the following comments on the process led by the Oregon Water Resources Department (OWRD) and the contents of the proposed rules.

Rulemaking Process

The Nature Conservancy has participated alongside the Harney Basin community in groundwater discussions since 2016. OWRD has provided continuous support, outreach, and engagement to the community through the Community-Based Water Planning Collaborative, the OWRD/U.S. Geological Survey Groundwater Study Advisory Committee, the Division 512 Rulemaking Advisory Committee, and has even supported locally-led “Division 512 Discussion Groups” for the community. The Nature Conservancy has participated in each of these processes and has seen the Harney Basin community process and engage in these difficult conversations.

We believe the content and intent of the proposed rules reflect the conversations that the community has been having for more than a decade. The Division 512 RAC lasted for more than two years, with 15 total RAC meetings that ranged from half-day to multiple-day meetings. The depth and breadth of the RAC discussions is apparent in

OWRD's meeting materials on the Division 512 rulemaking website. The Department solicited and acted upon feedback from the RAC and the community multiple times. To offer a few examples, OWRD initially proposed Permissible Total Withdrawals (PTW) within 15 subareas using a hydrograph and field data approach. Based on specific feedback from the RAC and the Harney Basin community on the number, size, and distribution of subareas, OWRD changed to the currently-proposed 7 subarea approach. Based on specific feedback from the RAC and availability of newly-released research, OWRD pivoted from a hydrograph approach to setting PTW to using an advanced groundwater scenarios model (MODFLOW-6; Harney Basin Groundwater Model, Gingerich et al. 2024) that could demonstrate tradeoffs and optimize the amount of pumping to achieve success with minimal curtailment. Other adjustments made due to RAC and community feedback, discussed below, include offering 30 years to achieve final PTW and adding an Adaptive Management approach within the rules.

The Nature Conservancy appreciates the robust process and the responsiveness of OWRD to concerns and suggestions raised by the RAC and the community.

Critical Groundwater Area Designation and Boundary

After two substantial cooperative groundwater investigations jointly led by OWRD and the U.S. Geological Survey, it is clear that criteria for designating a Critical Groundwater Area are met within the Harney Basin (ORS 537.701(1)). Groundwater levels have Declined Excessively, are Excessively Declining, and the Harney Basin is Overdrawn. The groundwater investigations clarify that groundwater in the Harney Basin occurs within a single, large flow system that includes local variability in hydrologic and geologic conditions. The groundwater flow system is bounded by recharge that occurs in higher-elevation areas within the Harney Basin watershed and discharges towards cones of depression caused by pumping. This evidence strongly supports the designation of the entire Harney Basin as a Critical Groundwater Area. Although the Critical Groundwater Area itself is divided into seven administrative subareas (discussed below), the overall boundary corresponds to the extent of the groundwater flow system described by Gingerich et al. 2022, Garcia et al. 2022, and Gingerich et al. 2024. Division 10 rules do not suggest that each administrative subarea *within* a Critical Groundwater Area must meet all criteria for the designation of a Critical Groundwater Area. Instead, Division 10 rules allow the designation of subareas to increase flexibility of corrective controls (OAR 690-010-0160).

Serious Water Management Problem Area (SWMPA) and Classification Designations and Boundary

The Nature Conservancy supports the proposed SWMPA and Basin Classification. Measurement and reporting of water use on points of appropriation with a valid water right is critical for transparency, accountability, and effective adaptive management. Classification of the Harney Basin for exempt groundwater uses only is important to

prohibit further development of new non-exempt groundwater rights which will otherwise contribute to the ongoing aquifer declines.

Target Groundwater Level Trend and Timeframe

The proposed Target Groundwater Level Trend as a median decline of no more than 0 feet per year in each subarea is appropriate for ensuring long-term sustainability of the Harney Basin, but should be strengthened. The approach to using groundwater level trends as an indicator for sustainable use is consistent with the most modern approaches to groundwater sustainability. However, the geographic size of the basin makes the spatial median criterion very permissive of continued localized declines in specifically problematic areas. We suggest a “median-plus” approach, where the primary criterion remains the same (median decline rate of no more than 0 feet per year) plus no more than 10% of all wells in the subarea can be below the 10th percentile target water level trend. This approach would allow for spatial variability within the large subareas, but would ensure that outliers or localized cones of depression cannot exceed certain subarea-specific thresholds of water level declines.

The timeframe for achieving the Target Groundwater Level Trend is 30 years with PTWs phased in over 24 years (except for the Weaver Springs subarea). Although OWRD originally proposed immediate implementation of PTW, the 24-year phase-in period with a 30 year timeline to achieve Target Groundwater Level Trend reduces economic impacts and offers time for Harney Basin community members to adapt, adjust business models, enroll in incentive programs, and develop voluntary solutions. The Nature Conservancy supports this approach as a way to reduce economic impact and provide a predictable transition to reduced water use for business owners.

Permissible Total Withdrawal and Administrative Subareas

The Nature Conservancy supports OWRD’s use of the Harney Basin Groundwater Model as a tool to determine PTW. We further support the proposed seven-subarea approach for implementing corrective control provisions.

The Harney Basin Groundwater Model (HBGM; Gingerich et al. 2024) was developed with the specific intent of informing management by using MODFLOW-6’s predictive scenarios capabilities. In a June 2024 presentation to the Harney Basin community, the developer of the model Steve Gingerich stated that the model is “ideal for evaluating various future scenarios” and the underlying software is the “international standard for simulating and predicting groundwater conditions.” Using the HBGM to develop management scenarios like PTWs is appropriate. Gingerich et al. (2024) write that “Resource managers and stakeholders can use results from future scenarios to gain insights for managing future groundwater resources.”

Members of the RAC strongly requested OWRD to utilize the HBGM to develop management scenarios during several RAC meetings and during the June 2024 Oregon Water Resources Commission meeting. This approach minimizes total curtailment throughout the Harney Basin while also achieving success criteria for each subarea. The Nature Conservancy stands by this recommendation and commends OWRD on using the most modern, up-to-date approaches available to determine evidence-based PTWs. The optimization approach used by OWRD is appropriate for the model and consistent with peer-reviewed scenarios developed for the HBGM (e.g., Jaeger et al. 2024, Webster et al. in press). The HBGM is open-source and publicly available for download and use.

The proposed seven subareas, originally proposed in January 2025, are well-aligned with local recharge and discharge dynamics found within the overall Harney Basin groundwater flow system. These administrative subareas are designated to provide additional, site-specific flexibility in corrective control measures, which is crucial in a basin as large as Harney Basin. The Nature Conservancy believes the subarea boundaries are appropriate for management within the basin, and we reiterate that Division 10 rules do not require each administrative subarea within a Critical Groundwater Area to individually meet criteria for designating a Critical Groundwater Area.

Adaptive Management

The Harney Basin has benefited from substantially improved availability and interpretation of groundwater data in the past several years—providing more than substantial evidence for curtailment of groundwater use. However, adaptive management to achieve PTW remains advisable due to the size and complexity of the basin, uncertainty in modeled information, and changing hydrologic or climatic conditions. Furthermore, collecting the information needed to adaptively manage will increase transparency and accountability during the transition to final PTW. The Nature Conservancy supports OWRD's willingness to include adaptive management to the extent possible in the rules.

The proposed adaptive management approach provides clear expectations for agricultural producers while offering an 'off-ramp' to regulatory action: if voluntary agreements, incentives, or other collaborative approaches are sufficient to stabilize the aquifer, then the adaptive management approach prevents needless additional regulatory actions. The reverse is also true: if changing climate conditions or modeling uncertainty results in the proposed PTW timeline being *insufficient* to achieve target water levels on a given timeframe, the adaptive management system will accelerate reductions accordingly. This system is clear, easy-to-understand, incentivizes voluntary actions, and sets an important positive precedent for future basin rulemakings throughout the state.

Closing

This robust RAC process and the many associated public meetings have resulted in a strong, evidence-based proposal for a long-term economic glidepath to achieving sustainable water use in the Harney Basin. The Nature Conservancy continues to support parallel processes such as voluntary agreements to help achieve sustainability without regulatory action; however, developing a clear and transparent regulatory backdrop is critical for achieving success through voluntary actions. The proposed rules contain elements like the adaptive management approach to incentivize voluntary and non-regulatory actions while ensuring that the aquifer trends towards sustainability. While we believe the proposed rules would be strengthened by some minor adjustments (e.g., changing criteria used for the Target Groundwater Level Trend), we strongly support the adoption of the proposed rules and we urge OWRD and the Water Resources Commission to take quick action.

Thank you for your consideration of our comments.

MEINZ Kelly A * WRD

From: Zach Freed <zach.freed@TNC.ORG>
Sent: Wednesday, August 13, 2025 4:58 PM
To: MEINZ Kelly A * WRD
Cc: SEYMOUR Tim R * WRD; SPRIET Jason D * WRD
Subject: Division 512 comments
Attachments: Div512_TNC_Comments_08132025.pdf

Hi Kelly, Tim, and Jason,

Please see attached for The Nature Conservancy's comments on the proposed Division 512 rules. We support the adoption of the proposed rules, and offer some feedback on strengthening a couple of elements (e.g., metrics for evaluating success).

Thank you for your consideration of our feedback, and thanks for the immense amount of time and effort you all have put into these rules.

Cheers,
Zach

Zach Freed | Oregon Water Strategy Director
The Nature Conservancy
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