Oregon Lakes Association
https://www.oregonlakes.org

R. Craig Kohanek
Oregon Water Resources Department
725 Summer St., NE Suite A
Salem, OR 97301
RE: PacifiCorp's Application for Preliminary Permit, Winter Ridge and Crooked Proposed Pumped Storage Projects

Dear Mr. Kohanek,

Please find our comments on the subject projects below. We appreciate having the opportunity to comment. The Oregon Lakes Association (OLA) is a 501(c)(3) is a nonprofit organization whose purpose is to be "a voice for quiet waters." We represent a diverse membership ranging from university and agency scientists to the concerned public. We request that our comments be added to the administrative record for these projects.

Although we support the need to develop renewable energy, we believe these proposed projects will have cumulative adverse impacts to surface water supplies in the Chewaucan Basin that are already stressed. Therefore, the projects are not in the public's best interest for the following reasons:
1. There has been a clear trend of decreasing water availability in the Chewaucan watershed due to climate change as well as past diversions. Extrapolating these trends into the future makes water availability in the project area uncertain;
2. Current OWRD water availability estimates are inaccurate because they are based on an unusually wet period in the last 70 years (1958-1987). The estimates urgently need updating;
3. The two projects even now (leaving aside the situation in a few decades) will require more water than is currently available. Although there are at present no water rights to protect the exceptional aquatic ecosystems at Abert and Summer Lakes, we are very concerned that additional diversions would harm these systems.

If OWRD decides to issue a preliminary permit to PacifiCorp for these projects, the permit should be contingent on data showing that water is actually currently available in the affected streams. Furthermore, the permit should also be based on evidence that sufficient water would continue to be available if climate change continues to reduce supplies and increases consumption. ***We therefore request that studies and measurements that establish water budgets for the Chewaucan River, Lake Abert and Summer Lake be conducted prior to a decision on this application.***

We explain some of our concerns in more detail below:

1. *The proposed projects are in a dry watershed in which climate change and past diversions have diminished the region's water supplies.*

The impact and viability of the proposed projects must be assessed in the context of predicted conditions over the coming several decades. The fifth Oregon climate assessment report (Dalton and Fleishman 2021) concluded Oregon's annual average temperature increased by about 2.2°F from 1895 to 1995. If greenhouse gas emissions continue to drive the even faster warming that has recently been observed, temperatures in Oregon are projected to increase on average by 5°F by the 2050s and 8.2°F by the 2080s, with the greatest seasonal increases in summer. Warming temperatures and changes in the amount and timing of precipitation, along with higher evaporation and evapotranspiration rates, will impact Oregon's — and the Chewaucan region's — water supplies. Summers are expected to be even drier and extreme heat and precipitation events more frequent, and the record heat and drought that Oregon experienced in 2014 and 2015 and even more severely in 2021, are predicted be more frequent. Dalton and Fleishman (2021) point out that hydrologic drought as defined by extremely-low stream flows have already intensified (Kormos et al. 2016), and are expected to become even more severe (Siirila-Woodburn et al. 2021), which could lead to severe water shortages and result in harm to society and ecosystems.

The mark of declining water resources is obvious in the Chewaucan watershed. First, cumulative annual Chewaucan River flow data show a dominance of low flows in recent decades and an overall downward trend (Figure 1).

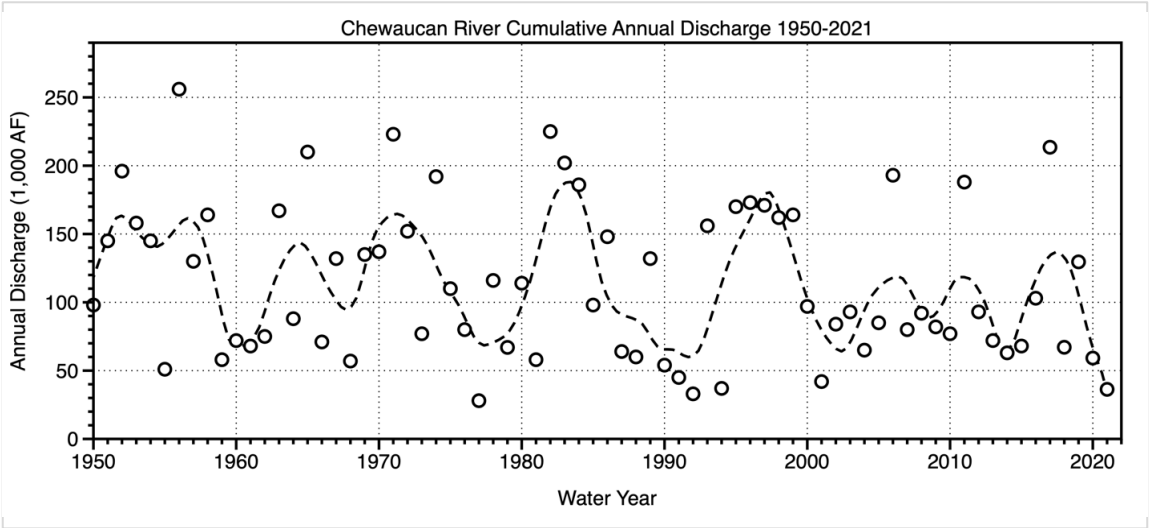

Figure 1. Chewaucan River cumulative annual discharge measured at the Paisley gage (OWRD #1038400), 1950-2021. The dashed line is a LOESS curve-fitting to show trends in the data. Data from https://apps.wrd.state.or.us/apps/sw/hydro_report/

Second, groundwater reserves have been declining, as illustrated by falling well levels in the Chewaucan basin (Figure 2). Water allocations and insufficient recharging over the last 60 years have resulted in a drop in groundwater levels near Paisley, upstream of Lake Abert, of about 0.3 ft year.

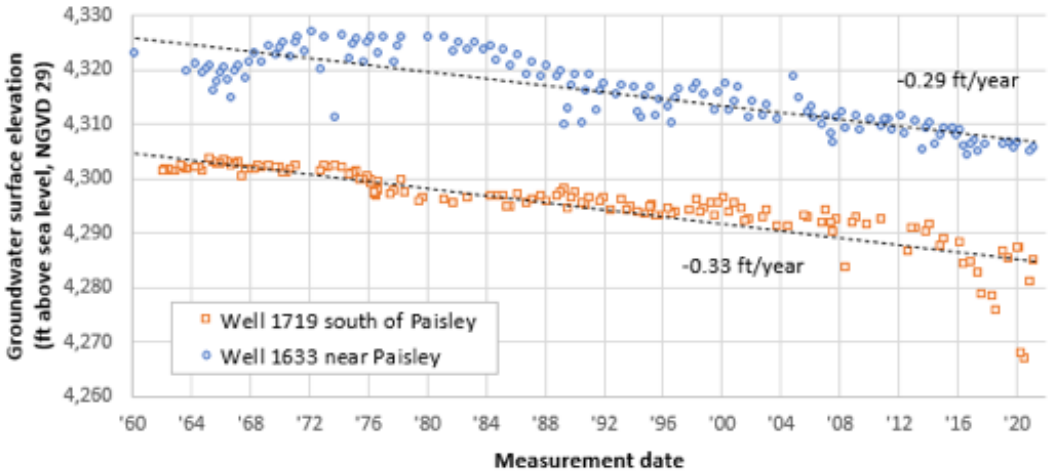

Figure 2. Decrease in water levels in two wells near Paisley since 1960. Data from https://apps.wrd.state.or.us/apps/gw/gw_info/gw_hydrograph/

Third, the primary source of water in the basin is derived from snowmelt. Recent analyses show that the snowpack in the western United States, including Oregon, is declining dramatically (Mote et al 2018).

These data highlight the fact that the Chewaucan watershed, already situated in a dry high desert region, is experiencing persistently declining water availability.

2. *OWRD's water availability assessment showing that water is available in the Chewaucan River in most months is no longer accurate*

The water-use analysis by OWRD is an estimate of the volume of water that is currently available, and is also a prediction of future water availability. In the document explaining how the water use assessment was developed, Cooper (2002) states that "The prediction is based on the assumption that future stream flow will be like past stream flow." Such a statement can no longer be supported after one of the hottest and driest summers on record.

Furthermore, estimates of water use in OWRD's assessments are based on different use categories, such as crops, industry, hydropower, domestic, and etc. Those estimates are from Broad and Collins (1996), who provided a general picture of water use in Oregon up to that date based on the best data available, but in many cases, data were lacking or the levels of uncertainty were unknown. While the results of the Broad and Collins assessment were adequate to provide a snapshot of water use in Oregon at that time, they were not meant to be used for regulatory decisions then or especially not three decades later when climate has changed substantially.

OWRD's water-use analysis that is based on hydrology from the 1958-1987 water years to assess current and ongoing water availability is problematic for several reasons. First, at least in the Chewaucan Basin, that period was relatively wet, as can be seen in Figure 3 for mean-daily Chewaucan River flows measured at the Paisley gage. Table 1 provides further evidence that the early time period was relatively wet. Additionally, the table shows evidence of a declining trend in mean and median flows indicative of climate change. Over-estimating the amount of water

available and allowing further diversions to be developed will not only harm other water users but will lead to lower instream flows, which is likely to adversely impact aquatic ecosystems.

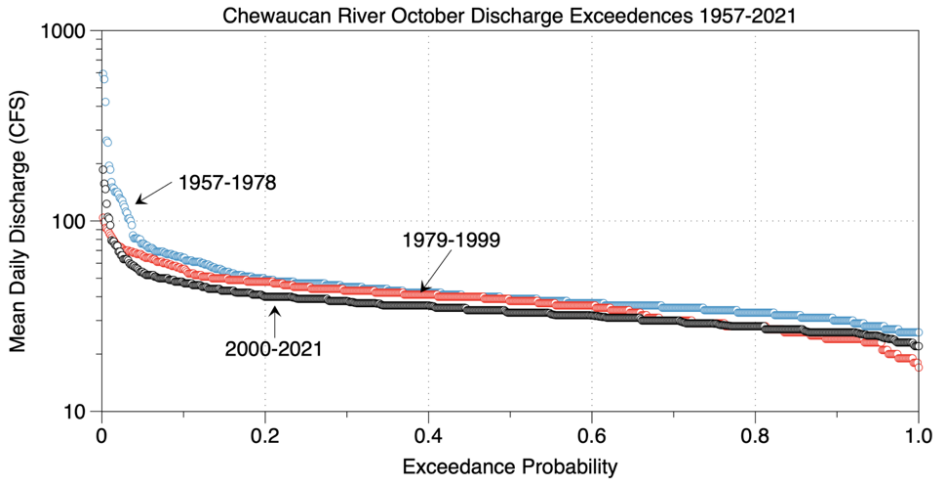

Figure 3. Plots of the October mean-daily Chewaucan River flows and their exceedances measured above Paisley for the 1957-2021 period, divided into three 2-decade intervals.

Table 1. Comparison of October, mean and median daily Chewaucan River discharges, and 0.8 exceedance values over the 1957-2021 period measure at the Paisley gage.

Time Period	Mean Discharge (CFS)	Median Discharge (CFS)	0.8 Exceedance (CFS)
1957-1978	46.8	39	33
1979-1999	39.1	38	28
2000-2021	36.0	33	28

3. *The combined Crooked Creek and Winter Ridge projects will require more water than is currently available in the project area.*

   According to the applicant's "Initial Application Statement," the project will require the following water amounts: 2,370 AF annually during construction (years 1-3); 7,600 AF for initial fill (year 4); 3,800 AF every 2-5 years for maintenance refill; 310 AF annually for evaporation losses; and 1,120 AF annually for leakage. Thus, for the first 4 years the project will require: 3x2,370 + 7,600 = 14,710 AF with an expected demand of 7,600 AF in year 4 (but note that elsewhere in the PacifiCorp application, reservoir capacities are estimated to be higher, 11,700 AF): an explanation is needed. After year 4, the project is estimated to require the following annual amounts to offset evaporation and leakage: 310 + 1,120 = 1,430 AF. Every 2-5 years, the reservoirs will need to be drained for maintenance and then refilled, resulting in 3,800 AF consumption every two years (worst case estimate) or 3,800 every five years (best case). Because there is no explanation of the methodology used to estimate evaporation and leakage, it is not possible to assess the accuracy of those estimates. Regardless, the water demand for the Crooked Creek development is not available from Crooked Creek, which is a small stream that is nearly dry during the summer and fall and is reduced to a series of pools with little flow between them. Thus, the creek will not provide enough water to fill or maintain water levels in the reservoirs except perhaps during short

high-flow periods in the spring. Consequently, both projects will be dependent on the Chewaucan River.

OWRD reported in 1989 that 45,000 acres were irrigated by surface water in the Chewaucan Basin and the "duties," which is the amount that can be applied to land with water rights, averages 4.6 AF per acre. Thus, if all the water rights in the basin were fully utilized, an annual consumption of over 200,000 AF would occur. As can be seen in Figure 1, there were few years since 1950 that sufficient water was available to meet existing water rights. Consequently, little if any water would be available to at least the Crooked Creek hydro-project because the water intake for the proposed hydro-project would be downstream of nearly all irrigation diversions. Furthermore, it can also be seen in Figure 1 that discharges during the past two decades have been relatively low, especially in 2021, which had exceptionally low flow in the 97-year period of record.

Just how much water would be available to the proposed hydro-project on a monthly basis is unknown; however, the total annual flow measured in the river upstream of most diversions in 2021 was only 36,000 AF. Based on the water usage data provided by PacifiCorp, the project would need 14,710 AF during the first 4 years, or ~3,680 AF/year, and 5,230 AF as often as every other year after the construction phase. In water-year 2021, there were long periods when river flows were <50 AF/d at the Paisley gage (Figure 4). Under low-flow conditions like this, it is doubtful that upstream irrigation water demands were met and thus there would be little or no water remaining that could be used by the hydro-project. In fact, during 2021, the River's End Reservoir just upstream from Lake Abert dropped several feet in elevation, suggesting there were insufficient inflows from the river to offset evaporation and any diversions from the reservoir. Thus, if conditions like 2021 become the norm, and that seems to be the consensus among climatologists as explained above, there would be frequent periods where no water would be available to the hydro-project to keep the two reservoirs filled.

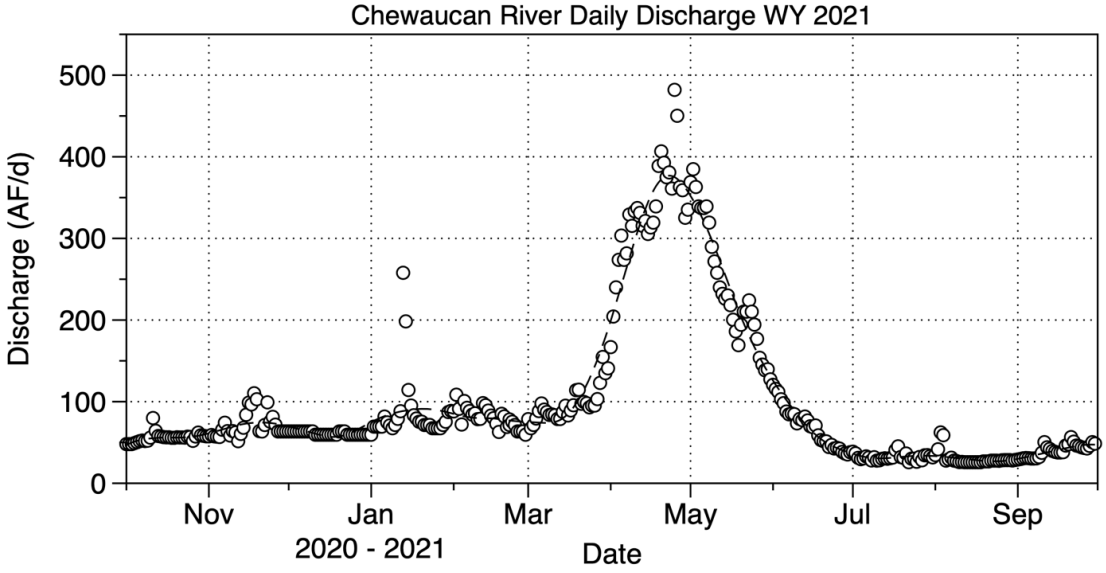

Figure 4. Chewaucan River daily discharge water-year 2021 measured at the Paisley gage.

As a general principle, it seems unwise to expose an already dry and overtaxed watershed to additional unproductive water loss in the form of surface evaporation, such as that from any new reservoir. Full consideration of the current and projected water situation in the Chewaucan valley

should occur before additional water allocations are granted. ***We request that studies and measurements that establish water budgets for the Chewaucan River, Lake Abert and Summer Lake be conducted prior to a decision on this application. We note that the above discussion has not included considerations concerning water supplies available to Lake Abert and its unique saline ecosystem supporting migratory waterfowl, in view the lack of legal standing for the lake's water supply. Nevertheless, the Lake Abert and Summer Lake ecosystems should be a factor in considering this PacifiCorp application.***

References

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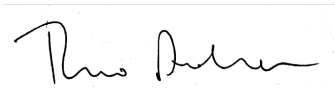
Submitted by:



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