



FISH PASSAGE CENTER

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MEMORANDUM

TO: Tony Nigro, ODFW

FROM: Michele DeHart

DATE: November 27, 2013

RE: Additional irrigation withdrawals from the upstream portion of the John Day Reservoir of the Columbia River

In response to your request, FPC staff has reviewed a conceptual proposal for a new 4000-acre-ft. additional water withdrawal from the Columbia River below McNary Dam over the period from June 1 through the end of September. This conceptual proposal includes a mitigation component for the adverse effects of the water withdrawal on water travel time and fish migration in the John Day Reservoir. To mitigate for this loss of in stream flow, it is our understanding that the proposal involves releasing 4000 acre-ft. of water, purchased from the Klickitat Irrigation District, over the same period into the forebay of the John Day Dam. This proposal is conceptual and was described to us verbally without a written version; therefore many details that would be relevant to the actual effects of and mitigation for this proposal are not available. For example, the actual release site of Klickitat Irrigation water was not specifically identified nor was the water source. This is an important detail, in order to determine whether or not the water is actually being added back to the Columbia River, as opposed to a "paper" transaction. It is also important to note that summer Biological Opinion flow targets at McNary Dam have been met in only 26% of the years between 1995 and 2013. Therefore, any additional withdrawal of water at McNary Dam will worsen the summer migration conditions. We were informed the 4000 acre-ft. of mitigation water would likely be introduced just upstream of the John Day Dam. In reviewing available documents regarding the operations of the Klickitat Irrigation District, we identified one potential source of the 4000 acre-ft of mitigation to be Rock Creek. For the sake of determining this proposals impact on water travel time through the John Day Reservoir, it was assumed that Rock Creek was the location of the 4000 acre-ft. of mitigation flow. The Klickitat Irrigation District annually appropriates approximately 8060 acre-ft. of water rights in the Rock Creek Basin, which is located approximately 13 miles upstream of John Day Dam (Aspect

Consulting, 2004). We have several concerns regarding this conceptual proposal which include:

- New water withdrawals from the upper John Day Reservoir will increase Water Travel Time through the John Day Reservoir which is adverse for fish migration particularly since summer migration flow targets have only been met 5 times in the past 19 years (26% of years).
- 4000 acre-ft of additional flow in the forebay just upstream of John Day Dam will not adequately mitigate for reducing travel time through the majority of the John Day Reservoir. To mitigate for the travel time effect of a 4000-acre-ft. withdrawal in the upper John Day Reservoir at McNary Dam even with reintroduction of 4000 acre-ft. at a location 13 miles upstream of John Day Dam, six times the water volume removed at McNary Dam (4000 acre-ft. or 16.5 cfs June–September) would have to be added in the Dalles Reservoir. This is because the water travel time in The Dalles Reservoir is 7.5 times faster than the water travel time through the John Day Reservoir (under average June–September conditions in 2001).
- Off-site mitigation, that is adding water downstream of John Day where water travel time is already better, will not adequately mitigate for water withdrawals in the John Day Reservoir, where water travel times are slow because of the size of John Day Reservoir. Fish stress and mortality in the John Day Reservoir cannot be realistically mitigated by enhancing passage measures downstream. Reservoir passage and water travel time in The Dalles and the Bonneville reservoirs are already vastly better than passage conditions in the John Day Reservoir.
- Assuming that Rock Creek is the location and source of mitigation water, there is a lack of current stream flow record for Rock Creek which is known to be an ephemeral stream. The only record of flows that have been obtained occurred in the 1960's, during which period the minimum flow record shows Rock Creek to be dry over the months of July, August, and September. The maximum flow record for the same months shows a lesser discharge than needed to sustain an even release of the 4000 acre-ft. over the entire period from June through September. The source of the proposed mitigation water volume should be reviewed.
- Fish migration delay in the forebay of the John Day project would be better addressed by increasing spill for fish passage at the project.

Water Travel Time

The Reservoir Replacement Method was used to calculate Water Travel Time (WTT) through the John Day and The Dalles reservoirs. This is a simple method if the following are known: flow rate exiting the reservoir, reservoir elevation, and reservoir storage/elevation rating curve.

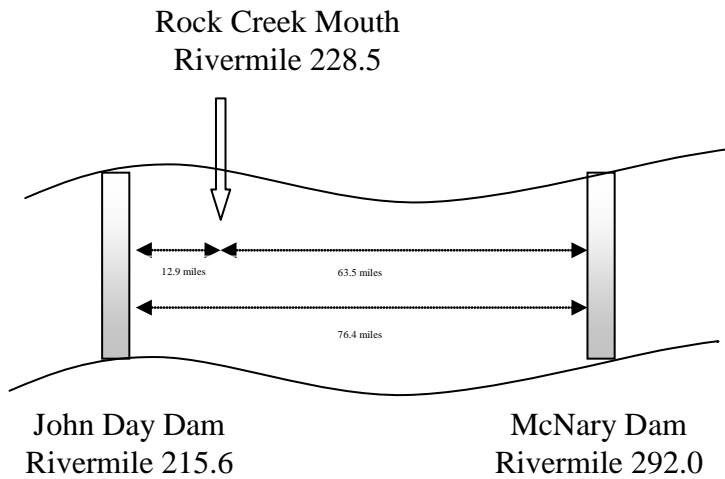
$$\text{WTT (s)} = \text{Reservoir Volume (ft}^3\text{)} / \text{Flow (ft}^3\text{/s)}$$

To analyze the potential impact of this operation in terms of WTT, we utilized actual operations that occurred in Water Year 2001, the lowest flow year in the recent flow record.

Between June 1–September 30, 2001, the following were utilized: average Forebay Elevation and average Outflow from The Dalles and John Day Dams.

Average 2001 Conditions, June 1–September 30		
	The Dalles Dam	John Day Dam
Average Outflow (Kcfs)	98.0	96.8
Average Forebay (feet)	158.7	263.8

To determine the impact of this proposed operation on WTT through the John Day Reservoir it was assumed that the 4000 acre-ft. of irrigation withdrawal occurred at McNary Dam uniformly over the period between June 1 and September 30, reducing the flow rate through the John Day Reservoir by a rate of 16.5 cfs per day. Additionally, it was assumed the 4000 acre-ft was reintroduced into the Columbia River at the mouth of Rock Creek at the same rate. The following figure demonstrates the distances between The Dalles and John Day Dam as well as the location of Rock Creek.



Three scenarios of WTT through the John Day Reservoir were calculated. The following table displays these scenarios.

Scenario	WTT (days)	WTT (seconds)
Water Travel Time (WTT) through John Day Reservoir under 2001 Conditions	12.0221	1,038,705
WTT through John Day Reservoir under 2001 Conditions with 4000 acre-ft. removed below McNary Dam between June 1 and September 30 (16.5 cfs average) impacting full length of reservoir (76.4 miles)	12.0241	1,038,883
WTT through John Day Reservoir under 2001 Conditions with 4000 acre-ft. removed below McNary Dam between June 1 and September 30 (16.5 cfs average) impacting John Day reservoir from McNary Dam to Rock Creek (63.5 miles), reintroduction of 4000 acre-ft. at Rock Creek impacting 12.9 miles of John Day Reservoir to John Day Dam.	12.0238	1,038,853

From the above table, under the average conditions recorded in 2001 between June 1 and September 30, WTT through the John Day Reservoir was calculated to be 1,038,705 seconds. Under the same set of flow and forebay conditions, with 4000 acre-ft. of irrigation water removed at McNary Dam (16.5 cfs/day) impacting the entire 76.4 mile length of the

John Day Reservoir, WTT increased by 178 seconds. The last scenario of this analysis continued to involve the removal of the 4000 acre-ft. of water at McNary Dam; however the same volume of water was reintroduced into the Columbia River at the mouth of Rock Creek. Under this scenario, WTT was increased by 148 seconds relative to that calculated under the average 2001 conditions.

The last portion of this WTT analysis dealt with determining the additional flow that would be needed through The Dalles Reservoir to offset the increase (148 seconds) in WTT through John Day Reservoir under the 4000 acre-ft. irrigation proposal. WTT was calculated through The Dalles Reservoir using June 1 to September 30, 2001, average outflow and forebay at The Dalles Dam. As the reservoir volume is much smaller at The Dalles Dam, WTT over the specified period was only a fraction of that seen through John Day reservoir under 2001 conditions: 1.6 days (140,570 seconds) as opposed to slightly more than 12 days through John Day Dam. By reducing the WTT through The Dalles under 2001 conditions by the 148 second increase in WTT seen through the John Day Reservoir (holding The Dalles forebay constant), the average outflow needed at The Dalles could be calculated that would offset changes to WTT through the John Day reservoir. For this exercise it was estimated that The Dalles average outflow would need to increase by 103 cfs to offset the increase in WTT this irrigation proposal would incur through the John Day reservoir.

Stream flow record for Rock Creek

Rock Creek is located within Water Resource Inventory Area (WRIA) 31 which includes four subbasins: Rock Creek, Wood/Alder Creeks, Glade/Fourmile Creeks, and Kennewick. There is limited stream flow data available for WRIA 31, only two flow gages in WRIA 31 (Rock and Alder Creeks) have had continuous flow data, and the data were recorded over the years 1963–1968 (Molenaar, 1982). According to reports, the 1960s gauging period occurred within a cool/wet climatic cycle; therefore the streamflow record from these gauges may overestimate long-term average conditions (Aspect Consulting, 2004). The flow records from both Rock and Alder Creeks were plotted in the 1982 report by Molenaar produced in cooperation with the USGS. These plots are shown below, shown exactly as produced in the report. Despite, the possible overestimation of this period in terms of stream flow, the obtained 1960s minimum flow record shows Rock Creek to be dry over the months of July, August, and September. The maximum flow record for the same months shows a lesser discharge than needed to sustain an even release of the 4000 acre-ft. over the entire period from June through September (16.5 cfs per day). In summary, the available flow record shows Rock Creek to be seasonally dry, or ephemeral. Furthermore, according to the available record, even under maximum flow conditions over the June–September period, flows are not sufficient to support the needed 16.5 cfs over a 4-month period to provide the 4000 acre-ft. From the available flow record, it does not appear that Rock Creek is capable of providing 4000 acre-ft. (16.5 cfs/d) of flow input into the Columbia River over the months between June and September, even under maximum flow conditions.

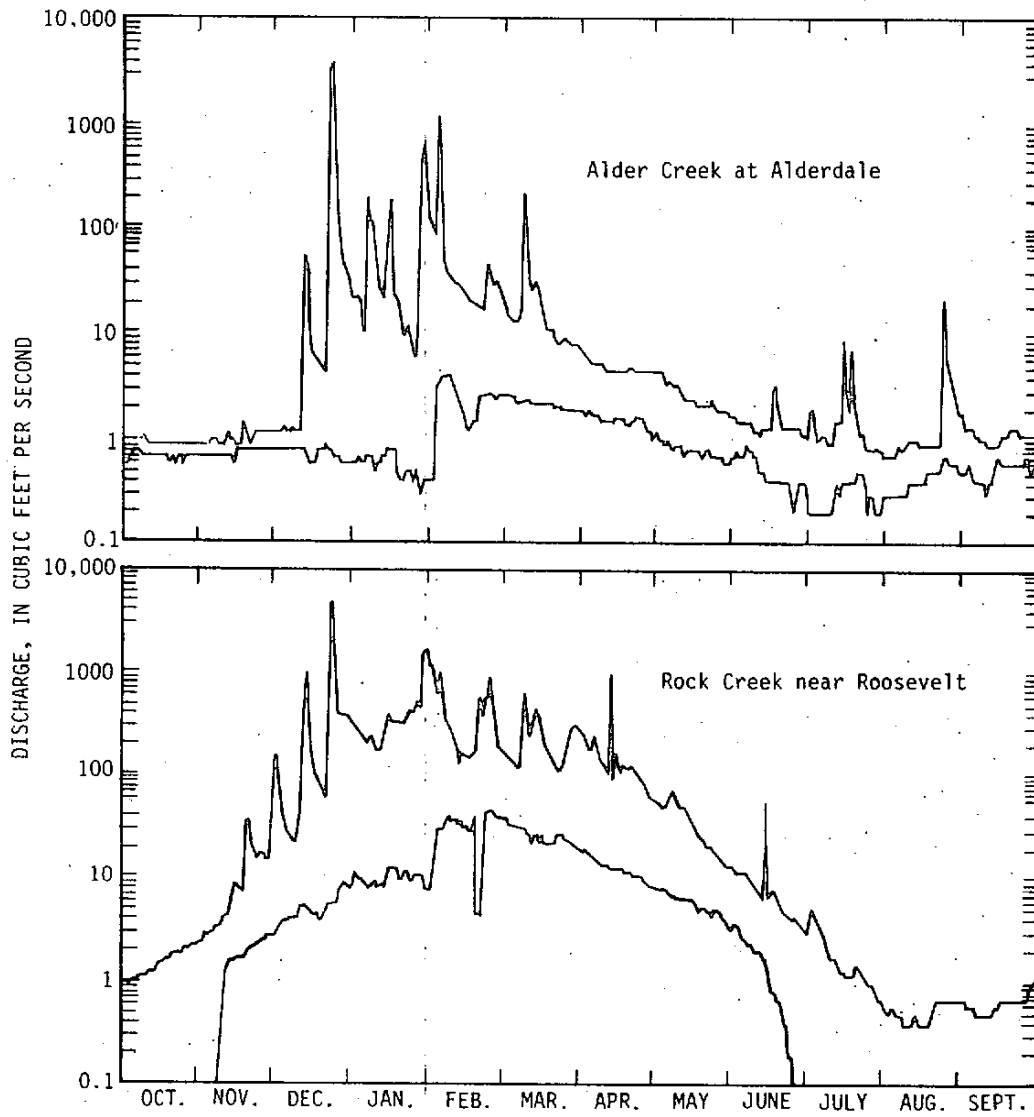


FIGURE 18.--Maximum and minimum daily discharges of Alder Creek at Alderdale and Rock Creek near Roosevelt, 1963-68. From Brown (1979).

Note: Above plots from Molenaar, 1982.

References

Molenaar, Dee. 1982. Water in the Horse Heaven Hills, South-Central Washington. Water Supply Bulletin 51. Prepared in Cooperation with the United States Geological Survey.

Aspect Consulting. 2004. Level 1 Watershed Assessment WRIA 31 (Rock-Glade Watershed). Prepared for WRIA 31 Planning Unit. Washington Department of Ecology Project No. 030009-001-01.