

Lauren M. Rule (OSB # 015174)  
Elizabeth H. Potter (OSB #105482)  
ADVOCATES FOR THE WEST  
3701 SE Milwaukie Ave. Suite B  
Portland, Oregon 97202  
lrule@advocateswest.org  
epotter@advocateswest.org

Attorneys for Plaintiffs

**UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF OREGON**

**NORTHWEST ENVIRONMENTAL  
DEFENSE CENTER, WILDEARTH  
GUARDIANS, and NATIVE FISH  
SOCIETY,**

Plaintiffs,

v.

**U.S. ARMY CORPS OF ENGINEERS  
and NATIONAL MARINE FISHERIES  
SERVICE,**

Defendants.

**CITY OF SALEM and MARION  
COUNTY,**

Intervenors.

Case No. 3:18-cv-00437-HZ

Fourth Declaration of Richard A. Domingue  
In Support of Plaintiffs' Request for  
Permanent Injunctive Relief

I, Richard A. Domingue, declare as follows:

1. I have personal knowledge of the facts set forth below and if called as a witness I would and could truthfully testify to these facts.

2. As with the declaration I filed in support of Plaintiffs' opening brief, ECF No. 120, this declaration provides my expert opinion about the Plaintiffs' proposed measures and is based on my professional experience, the references cited in that declaration and within this one, along with my general knowledge of the Willamette Valley Project ("WVP") and Upper Willamette River ("UWR") salmonids.

3. I have reviewed the Federal Defendants' response to Plaintiffs' opening brief on remedies and the accompanying declarations of Mr. Piaskowski, Mr. Askelson, and Mr. Taylor. In this declaration, I rebut several points that the Corps and those individuals make.

4. In response to the Corps' arguments, I support the following minor modifications and clarifications that Plaintiffs are making to their proposed measures:

- a. Starting the Detroit drawdown around July 31 to achieve 1450 feet by November 1 and avoid the undesirably high outflows that would result from an accelerated drawdown rate.<sup>1</sup>
- b. Adopting the Corps' process for designing structural solutions for total dissolved gas (TDG) abatement at the Big Cliff Dam spillway and the RO outfall stilling basin at Cougar Dam, under an aggressive schedule.<sup>2</sup>

---

<sup>1</sup> Askelson Declaration ¶¶ 57–60.

<sup>2</sup> Askelson Declaration ¶¶ 81–82.

- c. Starting the prioritization of spill over turbine use at Foster on October 15 rather than October 1;<sup>3</sup> and
- d. Maintaining Fall Creek reservoir at el 728 feet from mid-February through mid-April.

5. In my professional opinion, these changes will not significantly alter the likely effects of Plaintiffs' proposed measures and I continue to wholly support their implementation. I consider Plaintiffs' proposed measures to be demonstrably better to reduce ongoing harm to UWR Chinook salmon and steelhead than the interim measures adopted by the Corps.

#### **General Rebuttal Points**

6. I am familiar with Mr. Richard Piaskowski and Mr. Greg Taylor. They are experienced fisheries biologists, highly familiar with both the WVP and the needs of UW Chinook salmon and steelhead, and I respect their opinions. Mr. Askelson is a highly experienced engineer, and his declaration provides a description of the likely effects of the Plaintiffs' proposed measures and the difficulties the Corps might face in implementing them.

7. In most instances where these individuals have identified possible species-related conflicts in the Plaintiffs' proposed measures, I understand and appreciate their concerns and recognized most of the issues raised by them in my Third Declaration. Evidence available through the OMET process <sup>4</sup>, which evaluated measures similar to the Plaintiffs' proposed measures and found the effects to vary by water year type (e.g. wet, dry, average) and to be mostly manageable within the Corps' constraints, suggests that some of the Plaintiffs' proposed

---

<sup>3</sup> Taylor Declaration ¶ 32.

<sup>4</sup> USACE, 2012. Willamette River Basin Operational Measures Evaluation Report, Final Report U.S. Army Corps of Engineers, Portland District.

measures, like spring spill, might not always be possible, which the Plaintiffs recognize, and that the downstream effects like elevated TDG, water temperature deviations, and reduced ability to meet summer flow objectives, would not be substantial.

8. A good example of potential conflicts between the benefits and harms associated with the Plaintiffs' proposed measures is spring spill at the Detroit/Big Cliff complex, which all agree would benefit outmigrating juveniles originating upstream of Detroit Dam to safely pass the dam. When combined with spill at Big Cliff, elevated TDG would occur downstream and could exceed state water quality standards for a short distance downstream from the dam. This measure would occur in the spring, during or shortly after steelhead spawning. Hence, if not managed to prevent it, it is possible that spring spill to pass fish could create TDG conditions that could adversely affect steelhead spawning within the river reach directly below Big Cliff Dam and above the Minto trap. TDG concentrations downstream from Minto are likely to comport with the state standard as TDG dissipates rapidly through the four-mile reach between Big Cliff and Minto. I share the Corps' concern, but it is premature to assume that such injury, if any were to occur, would exceed the population benefit from improved passage at the dams. To deal with the modest risk from spill at the project on TDG and downstream biota, the Plaintiffs' proposed measures provide for monitoring TDG and adjusting operations should the TAT advise the Corps to reduce TDG.

9. Despite the Corps' lack of detail about the magnitude and duration of the potential conflicts that it identifies, I expect such conflicts to be small and manageable and the overall benefits of the Plaintiffs' proposed measures to greatly exceed such minor adverse effects. Further, if substantial fish survival-related conflicts arise during implementation, Plaintiffs' proposed measures include a simple process through the TAT for revising operations as needed.

Given annual fluctuations in hydrology and other events—like the wildfires of this year—in-season management and adjustments to address conflicts that may arise from the implementation of the proposed measures can be addressed through the TAT process.

10. Before addressing the Corps' arguments about specific measures, I will respond to three general concerns raised by the Corps regarding the potential conflicts between the Plaintiffs' proposed measures and other efforts to recover the fish and protect water quality and flows. The Corps' concerns are:

- a. Plaintiffs' proposed measures to spill water—either through dam spillways or regulating outlets to safely pass fish—would exacerbate existing issues with downstream water quality.
- b. Extended and deeper drafts would force more aggressive refill operations, reduce the likelihood of refill, and the ability to meet downstream water quality and flow objectives.
- c. Extended reservoir residence—as currently occurs—benefits the fish as growth rates are much higher in the reservoirs than in the tributaries, and the larger fish produced in the reservoirs are more likely to return as adults than smaller outmigrants that spend less time in the reservoirs.

#### Spill

11. Spilling water at the WVP's dams often causes elevated levels of total dissolved gas (TDG). The Corps has been aware of this issue since at least 1975.<sup>5</sup>

---

<sup>5</sup> Monk, B.H. E. Dawley, and K. Beiningen, 1975. Concentration of Dissolved Gases in the Willamette, Cowlitz, and Boise Rivers, 1970-72. National Marine Fisheries Service Data Report 102.

12. Recognizing this effect, the Plaintiffs' proposed measures include monitoring downstream TDG during fish-passage spills and adjusting operations as needed to avoid or limit exceedances of the state standard.

13. Further, it is worth noting that the Corps' operations to provide flood risk reduction episodically cause spills, far in excess of those that would occur under the Plaintiffs' proposed measure, resulting in TDG concentrations far in excess of the state standard, at levels known to be harmful to toxic to fish. These flood-risk-reduction related spills occur most frequently during the months of November through February. This is the period of Chinook salmon incubation and emergence, and fry are known to be particularly susceptible to injury and death caused by elevated TDG. Because flood-damage-reduction caused spill events generate levels of TDG known to be toxic to fish during a season when Chinook salmon embryos and fry in particular are exposed, the harms to fish from elevated TDG concentrations caused by flood risk reduction operations greatly exceed the potential downstream harms from additional TDG due to spilling water to pass fish. Further, the Plaintiffs' proposed measures are designed to protect downstream water quality.

#### Refill

14. The Corps argues that Plaintiffs' measures will reduce the agency's ability to meet downstream flow objectives due to reduced storage available to augment flows as is needed when the flow objectives exceed inflow. In several instances, the Plaintiffs' proposed measures call for delayed refill, and/or refill to a lower level than under the Corps' interim operations. Such delays and lower reservoir levels would result in less storage (conservation storage in the Corps' nomenclature) available to meet downstream flow objectives, particularly during drier springs when inflows would be insufficient to refill the reservoirs while meeting downstream

flow objectives, or, during refill when meeting the flow objective at a point in time would reduce the subsequent ability to meet other objectives, like water temperature control.

15. I agree that such effects are possible. However, they are likely small and manageable, or are meaningless to fish. In wet to average years, all WVP reservoirs would likely fill to normal levels, or the levels allowed by the Plaintiffs' proposed measures. In drier years there would likely be an overall reduction in conservation storage associated with delays in refill. Because the summer (July through September) mainstem Willamette River flow objectives often exceed the natural river flows, water must be drafted out of WVP reservoirs to meet the objectives. Hence, the Plaintiffs' proposed measures could somewhat increase the frequency and magnitude that summer flows fall below these objectives. However, managing the WVP to meet the flow objectives established in 2008 has proven to be more difficult than modeling had projected. Annual planning and in-season management processes have routinely dealt with the balance between meeting downstream flow objectives and achieving desired storage levels, and would do so under the Plaintiffs' proposed actions.

16. Further, it is important to note the 2008 RPA's mainstem Willamette River flow objectives during summer and fall were not based on the needs of the species. As the former NMFS hydrologist that reviewed the Corps' proposed action and was specifically assigned to assessing instream flow needs, I know how those flow objectives were developed. The tributary spawning and incubation seasonal flow objectives (mid-March through June for steelhead and September through January for Chinook salmon) were based on direct observation in the North and South Santiam Rivers, which were then extended throughout the tributaries using hydrologic ratios and professional judgement of fish needs, including Oregon Department of Fish and Wildlife biologists familiar with fish needs. The spring mainstem Willamette flow objectives

were based on a single study that demonstrated a flow/survival relationship for steelhead smolts that pass Willamette Falls during the spring.

17. But in general, outside of the spawning and incubation season, and the spring outmigration season on the mainstem Willamette, the RPA simply adopted the Corps' proposed minimum flows because they exceeded both natural flows at the time and the flows considered necessary to protect the species. However, because these flow objectives exceed natural flows during the summer, meeting them requires that water be drafted out of the WVP reservoirs. There is no clear need to augment flows during the summer to benefit UW Chinook salmon or steelhead. The higher than natural summer mainstem flow objectives were originally developed by the Corps to provide adequate depth for river navigation in an age when barges plied the river upstream of Willamette Falls, which is no longer the case.

18. Today, the Corps' efforts to meet those mainstem summer minimum flows constrain operational flexibility in a manner that limits the opportunities to reduce the Project's harms to fish. The potential adverse effects to fish of not meeting the summer flow objectives are likely small as the objectives currently exceed natural summer flows in most years and have been shown to be greater than the optimum flows for juveniles in the tributaries, the primary fish use during the summer.<sup>6</sup> In comparison, the Corps' efforts to meet the summer flow objectives requires storing incoming water during the spring, when juveniles are migrating and UW steelhead are spawning. In prior years, the Corps has requested reductions in established spring

---

<sup>6</sup> R2 Consultants, Inc. 2013. Evaluation of Habitat-Flow Relationships for Spring Chinook and Winter Steelhead in the North and South Santiam Rivers, Oregon. Draft. Prepared for: U.S. Army Corps of Engineers, Portland District; River Design Group, Inc., HDR, Inc. 2017. Evaluation of the Relationship Between River Flow and Fish Habitat Availability in the Middle Fork of the Willamette and McKenzie Rivers. Prepared for: U.S. Army Corps of Engineers, Portland District.

steelhead spawning flows in order to store water to meet the summer flow objectives and other purposes. In short, missing the summer flow objectives is unlikely to be harmful to fish, but the Corps' efforts to meet them could be harmful.

19. For these and other reasons, considering the anticipated benefits of reducing reservoir residence time and improving fish passage efficiency, I believe the likely effects of Plaintiffs' proposed measures on conservation storage, downstream water quality, and flows would be small, while the improvements in juvenile passage survival would be substantial.

#### Extended Reservoir Residence

20. Throughout its arguments, the Corps ignores the benefits from a reduction in reservoir residence time that would stem from continuous dam-ward flow under spring spill operations proposed by the Plaintiffs. Due to an array of morbidities present in the reservoirs, inherent in the Plaintiffs' proposed measures is an effort to increase reservoir passage survival by reducing reservoir residence time. The Plaintiffs' proposed measures would seasonally provide full nighttime spill when combined with daytime power peaking operations, or 24/7 spill when power production would be curtailed, thereby providing continuous dam-ward flow. In comparison, prior operations and the Corps' IMIP allow continued power peaking operations in which zero or very low flows occur for 12 hours or more daily at Detroit, Green Peter, and Lookout Point dams. Under zero or very low flows, fish do not receive cues to identify the downstream direction necessary to find and pass the dams, forcing them to spend more time residing in the reservoirs. I anticipate that monitoring of Plaintiffs' proposed measures will show that continuous flow through the reservoirs through spring spill reduces reservoir residence time.

21. Further, the Corps' rebuttal often argues that reservoir residence provides growth benefits and that larger fish enjoy a higher likelihood of adult return than small fish that pass the

dams. While this may be true, it ignores the very high rates of mortality that occur in the reservoirs. The number of juveniles entering the reservoirs is much larger than the number, of all sizes, that successfully pass the dams (reservoir mortality generally exceeds 50%). The benefit of high return rates of the survivors on population abundance is likely dwarfed by the in-reservoir losses prior to passage. Success in re-establishing self-sustaining populations upstream of the dams will require successfully passing a larger fraction of the juvenile fish entering the reservoirs than currently occurs at most of them.

22. Neither UWR Chinook nor UWR steelhead are well adapted to reservoir habitat conditions and extended reservoir residence reduces the fish's ability to display their natural life-history strategies, further reducing species viability.

23. The Corps also argues that there could be density-related effects on juvenile growth rates caused by lower reservoir levels. Such effects, to the extent they may occur, are likely to be small at present due to small population sizes, and the benefits in terms of lower reservoir residence time substantially greater.

### **North Santiam**

#### **Measure 4: Fall Drawdown of Detroit and Lower RO for Temperature**

24. The Corps suggests that in order to hit the water surface elevation target of el 1450 for Detroit Lake by November 1, it would have to choose whether to initiate drawdown earlier (before September 1), or draw the reservoir down faster. The former option could reduce the Corps' ability to spill warmer surface water in its efforts to control downstream water temperatures, while the latter could result in high discharge rates that could interfere with Chinook spawning downstream.

25. I support Plaintiffs' clarification that the Corps should choose the former option and begin the drawdown earlier. Maintaining high reservoir elevations until September 1, then drafting rapidly to achieve the desired el 1450 on November 1 could cause undesirably high flows downstream during the Chinook spawning season, potentially leading to spawning in areas that would be subsequently dewatered and potentially elevated TDG conditions. By drafting earlier, these potential effects would be avoided but the length of time the spillway would be available to discharge warmer surface water from the reservoir would decline. It is not possible, without detailed modeling, to know how much difference this might make in the effects of the operational temperature control program, but because the goal of summer spill is to reduce the volume of warm water trapped near the surface of the reservoir and the same volume of water would be discharged through the spillway under the Plaintiffs' proposed measure, albeit earlier in the summer, the effect is likely to be quite small. It should be noted that the Corps' current efforts to control downstream water temperatures through operational means alone has seen limited success<sup>7</sup> which is why the Corps is currently developing plans to install a variable-elevation intake structure designed to capture water at the seasonally desired temperatures to more frequently hit established downstream temperature targets.<sup>8</sup>

26. The Corps has also expressed concern that extended use of the Detroit Dam regulating outlets to pass fish and cool the river in the fall could result in exceeding downstream TDG limits, particularly while the powerhouse is offline from November through January. I

---

<sup>7</sup> USACE, 2019. Willamette Basin Annual Water Quality Report for 2018. U.S. Army Corps of Engineers, Portland District. (See Figure 5-4)

<sup>8</sup> USACE, 2019. Draft Environmental Impact Statement, Detroit Dam downstream fish passage and temperature control, Willamette River Basin, North Santiam River, Oregon. U.S. Army Corps of Engineers, Portland District.

share this concern. However, in the event that TDG in excess of the state's standard occurs, the powerhouse could be operated as needed to control TDG downstream as is prescribed in the Plaintiffs' proposed actions. TDG concentrations in powerhouse discharges are very low and by mixing the higher TDG water resulting from RO spill to pass fish and control downstream water temperatures with powerhouse discharge, TDG could be controlled. I also consider the Corps' concern about downstream TDG to be somewhat overstated. During the winter flood control season, the Corps routinely chooses to discharge water from Detroit Dam at rates it knows to create very high TDG, not just in excess of the state standard of 110% of the saturation concentration, but at times as high as 130% of the saturation concentration—levels that are known to be harmful to fish. And these high spills occur when Chinook salmon fry, which are highly susceptible to gas bubble trauma caused by high TDG, are emerging from the gravel.

27. The lack of safe and effective juvenile dam and reservoir passage is a primary harm caused by the WVP and improving juvenile passage is the focus of the Plaintiffs' proposed remedy. Spill, via spillways and regulating outlets, provides the safest route of juvenile passage available. The known concern with spill-generated TDG downstream from Big Cliff Dam is the impetus for the Plaintiffs' request to expedite development of a solution (proposed measure # 13). The need to manage this action to avoid harmful levels of TDG downstream is fully recognized in the Plaintiffs' proposed actions.

28. The Corps is also concerned that operating the lower RO at Detroit Dam during November to reduce downstream water temperatures would be countered by Plaintiffs' proposal to operate the upper ROs for passage because warmer water would be going through the upper ROs. Both sets of ROs (upper and lower) capture cooler than does the powerhouse. Notably, the Corps IMIP also plans to use the upper ROs for passage during this same period. As clearly

shown in Figure 3 from Mr. Askelson's declaration, copied below, water temperature at the lower RO invert elevation is measurably cooler than that at the upper RO during November, indicating that operating the outlet would further cool the discharge stream. There may be issues with the use of the lower ROs in terms of other water quality parameters (ammonia, anoxia and high biochemical oxygen demand), but it is quite clear that releasing water from the lower ROs would reduce downstream water temperature. Therefore, Plaintiffs' measures that combine water releases from the upper and lower ROs would result in lower water temperatures than the Corps' operation that releases water only from the upper ROs.

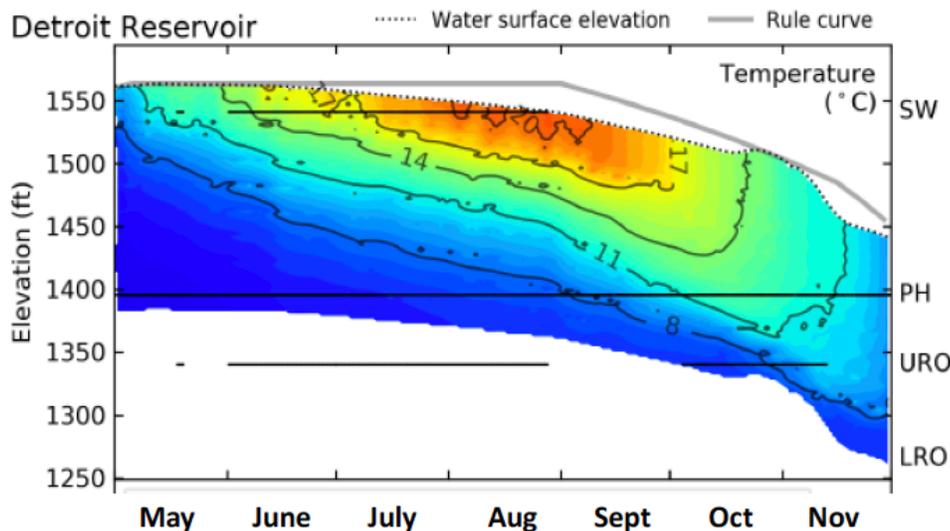


Figure 3. Detroit Reservoir's Thermal Stratification and Associated Operations to Achieve Downstream Water Temperature Targets During an Average Water Year (2019).

29. Importantly, Plaintiffs' proposed measures are designed to not only provide immediate benefits to the fish but, through the robust monitoring proposed, evaluate potential benefits and other potential adverse effects of operational measures like this. The RPA required the Corps to conduct operational fish passage and temperature control measures long ago, but the Corps routinely failed to do so, so this information is long overdue. If, as the Corps opines, the

operation of the lower RO along with the upper RO will provide negligible benefits, then it will merely confirm that a permanent temperature structure is needed prior to obligating hundreds of millions in taxpayer funds to such a structure. This brings to light the experimental nature of the Plaintiffs' proposal. Examining the limits of operating existing facilities to meet downstream water quality and fish habitat goals, and to provide safe downstream passage, will help to develop future operations and to identify where such operational measures would be inadequate and costly structural actions would be needed to accomplish these goals. Accordingly, I continue to support using the lower ROs to reduce downstream water temperatures and operations that would make the lower RO available by November 1 each year.

Measure 6: Spring Spill when Detroit Refills to 1543'

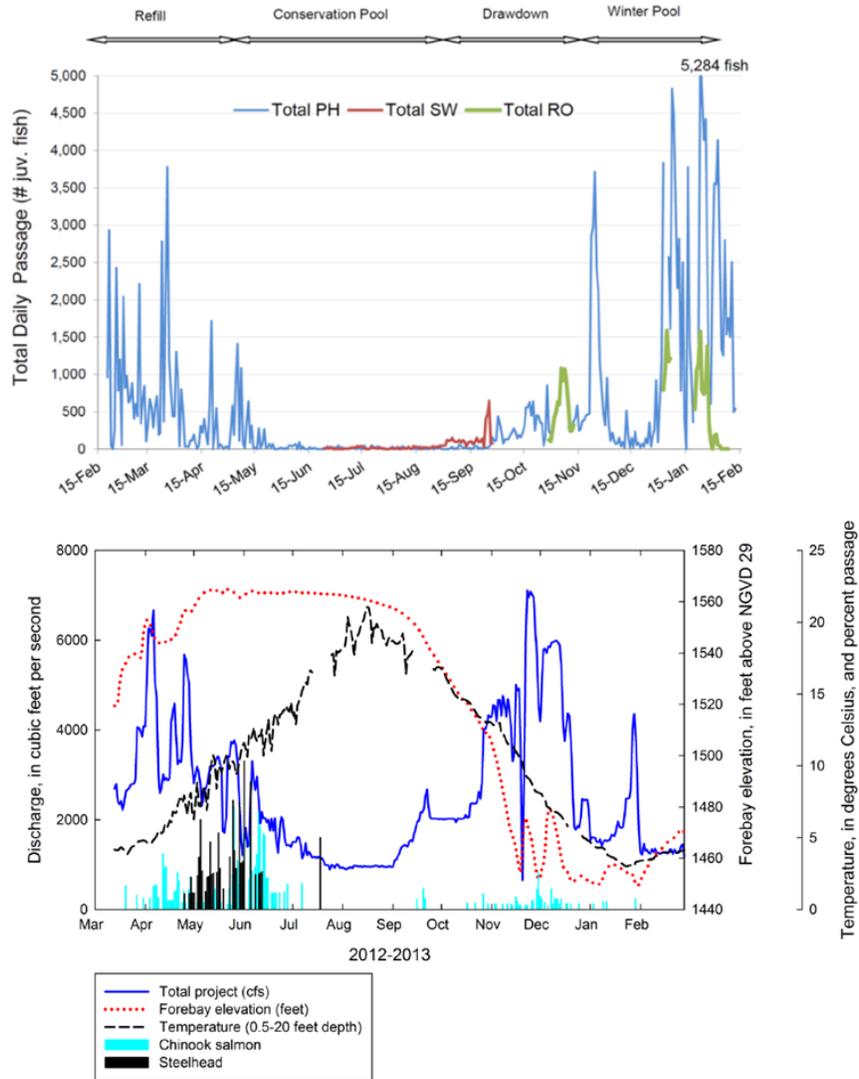
30. The Corps has several concerns with regard to the Plaintiffs' proposed measure to spill water as soon as el 1543 is reached in the spring. The agency believes that spilling early could: start too early to effectively capture fish, reduce the Corps' ability to spill warmer water later in the year, and cause exceedances of the state TDG standard downstream.

31. The first of these concerns is that juvenile fish are not near the spillway until later in the year and thus spilling as early as mid-April—as indicated by the Detroit Dam storage reservation diagram—would miss the majority of spring migrants. I disagree. Data developed by the Corps (see graph below) shows that juvenile salmon begin to arrive at the forebay in April. Delaying spill until June, as suggested by the Corps, would miss the majority of passing fish.<sup>9</sup> The graphic below shows that the vast majority of juveniles pass the project between the first of

---

<sup>9</sup> Hansen, A.C., Kock, T.J., and G.S, Hansen, 2017. Synthesis of downstream fish passage information at projects owned by the U.S. Army Corps of Engineers in the Willamette River Basin, Oregon: U.S. Biological Survey Open File Report 2017-1101, 118 p., <https://doi.org/10.3133/ofr20171101>.

November and the first of June. For most of this period, the water surface elevation of Detroit Lake is below the spillway and all fish must pass via the powerhouse or ROs. Powerhouse passage causes very high rates of injury and death and the ROs are generally too deep for the fish to locate. Plus, even if the fish find the deep ROs, the change in pressure experienced in passing through them would injure or kill them. Hence, early spring spill would likely be highly effective in reducing turbine passage and improving dam passage survival. Passage monitoring would inform the TAT/WATER process and the spill program could be modified as needed if it fails to safely pass a large fraction of spring migrants.



1 Graphs showing estimated total daily passage of smolt-size fish at powerhouse (PH), spillway (SW), and regulating outlet (RO) from February 20, 2011 through February 12, 2012 (top graph), and daily mean dam operations and environmental conditions at Detroit Reservoir, Oregon, from March 13, 2012, through February 21, 2013, when fish were detected in the study area (bottom graph). Arrows at the top of top graph indicate the four distinct pool elevation periods. Fish passage in bottom graph (blue and black vertical bars) is plotted as percentage of fish passing out of the number of fish available to pass. NGVD 29, National Geodetic Vertical Datum of 1929. Top graph from Khan, Royer, and others, 2012. Bottom graph from Beeman, Hansel, and others, 2014a. Figure 15. Graphs showing estimated total daily passage of smolt-size fish at powerhouse (PH), spillway (SW), and regulating outlet (RO) from February 20, 2011 through February 12, 2012 (top graph), and daily mean dam operations and environmental conditions at Detroit Reservoir, Oregon, from March 13, 2012, through February 21, 2013, when fish were detected in the study area (bottom graph). Arrows at the top of top graph indicate the four distinct pool elevation

*periods. Fish passage in bottom graph (blue and black vertical bars) is plotted as percentage of fish passing out of the number of fish available to pass. NGVD 29, National Geodetic Vertical Datum of 1929. Top graph from Khan, Royer, and others, 2012. Bottom graph from Beeman, Hansel, and others, 2014a. (Source: Hansen et al. 2017). Source: Hansen et al. 2017.*

32. For the second of these concerns, it is unclear how spilling in the spring to improve fish passage survival would prevent spilling later in the year to manage downstream water temperatures. The Plaintiffs are not asking the Corps to draft the reservoir to facilitate spill, but to spill half of the daily outflow from the project for 30 days. The measure would not change total project outflow, but would put more water through the spillway and less through the powerhouse. Project storage would not change.

33. For the final concern, I addressed the TDG issue in paragraph 8 above. Somewhat elevated TDG is expected as a result of spill and TDG would be managed to avoid or minimize exceedances of the state standard by blending powerhouse discharge with spill, as needed.

#### Measure 13: Structural Solution for TDG at Big Cliff

34. The Corps has identified two issues with the Plaintiffs' proposed measure for a 60% Design Report for a permanent solution to gas abatement at Big Cliff Dam. It suggests that an Engineering Design Report (EDR) would first need to address alternatives before picking an acceptable approach for development in a detailed a design report. The Plaintiffs do not object to the Corps' insistence that its design process be followed provided it occur on a more aggressive schedule than the Corps proposes. The Corps has known for years that it must design a permanent solution for TDG problems at Big Cliff but has not yet done so. Further, the TAT should be involved in each iterative step in the EDR process, including the selection of an approach for detailed design and construction.

#### **South Santiam**

#### Measure 16: Spill at Green Peter Once Reservoir Reaches 970'

35. The Corps' declarations explained that the fish horns at Green Peter Dam have been removed and only the original pipe system continues to exist even though recent studies by the Corps on fish survival through the pipe system suggested that the system remained intact. Even without operating the fish horns, Plaintiffs' proposed measure would provide continuous spring spill as the primary mechanism to pass fish downstream without passing them through the powerhouse. The ROs would be too deep to provide safe passage during the drawdown and winter periods, making spill the safest passage route and the only way to avoid passing fish through the powerhouse.

36. The Corps suggests that because prior studies determined that survival through Green Peter reservoir was very poor, the Plaintiffs' proposed measure to provide continuous spill to attract and pass fish through the dam would be unlikely to succeed. However, those studies were conducted during normal operations, meaning all flow passed through the powerhouse which was operated as a power-peaking facility, releasing high flows during daylight high electrical-demand hours and low or no flow at night. I believe that through the provision of continuous spill during the spring, not only would passage survival be increased at the dam, but the continuous dam-ward flow would attract fish from the reservoir toward the spillway, reducing reservoir residence time. This flow signal would be small, but it is not at all clear that it would be imperceptible to the fish which have remarkable sensory organs. Hence, the best way to determine whether continuous attraction to the project spillway during the spring would result in lowering reservoir residence time and increasing reservoir passage survival is to perform the experiment. I strongly support Plaintiffs' proposed measure 16.

37. The Corps expresses concern that the proposed spill would reduce its ability to meet downstream flow objectives. The wording of Measure 16 is to spill at least one half the

daily discharge through the spillway. As with Detroit, drafting the reservoir to provide spill is not being proposed. I recognize that fine tuning spillway gates to meet desired rates of discharge is virtually impossible and that overages and shortages will occur, but there should be very little change in storage at Green Peter caused by this measure.

38. The Corps also suggests that it is uncertain whether the high rates of spillway passage survival will be observed at Green Peter like they are at Detroit Dam due to unspecified differences in spillway and stilling basin conditions. I agree, which is why the Corps must try this measure and conduct studies to better understand spillway passage survival at Green Peter under the proposed continuous spring spill program. Even if the survival of fish passing the Green Peter Dam spillway is found to be somewhat less than the high spillway passage survival rate shown at Detroit Dam, surface spill would remain a far safer route of passage at Green Peter Dam than the powerhouse, the only other route of passage available. Surface spill would attract fish away from the powerhouse penstocks, increasing fish passage efficiency during the spill period, and I continue to strongly support this measure.

Measure 23: Delayed Refill of Foster Reservoir until May 15

39. Plaintiffs propose delaying refill of Foster reservoir to speed juvenile passage through the reservoir during the spring migration period. The Corps expresses concern that delaying the initiation of refill at Foster reservoir until May 15 could interfere with spill operations at Green Peter in some years and that achieving refill would require the release of water stored in Green Peter reservoir. As with many other arguments, the Corps' complaint is general and does not describe what the frequency and magnitude of such effects may be. Nevertheless, I agree that during dry springs, the Corps' efforts to refill Foster reservoir could require drafting Green Peter reservoir. But from an anadromous fish passage survival

perspective, this is irrelevant as there is no need to refill Foster reservoir. When stored water is needed to augment natural flows in an effort to meet downstream flow objectives, water stored at either Green Peter or Foster reservoir would provide the same benefit. Further, as described above, augmenting natural flows through drafting stored water out of WVP reservoirs during the summer months of July and August to meet the mainstem Willamette River flow objectives is unlikely to benefit UW Chinook salmon or steelhead. Thus, the potential for missing flow objectives in the summer is a tradeoff worth making to keep Foster reservoir at a low level in the spring to facilitate passage.

40. The Corps also expresses concern that spills at Foster and Green Peter dams to pass fish could cause exceedances of the state's water quality standard for TDG. Under the Plaintiffs' proposed measure, TDG would be monitored during the fish passage spill operations and operations adjusted as needed to meet the state's water quality standard. Again, the potential adverse effects of discharging water with elevated TDG during spring fish-passage spill operations are small while the adverse effects of far larger spills that routinely occur during the flood risk reduction season are much larger. Further, the potential benefits derived from improving passage through spill far outweigh the limited potential harm from elevated TDG. Thus, I continue to support this measure.

#### **McKenzie**

#### **Measures 29-30: Deep Drawdown of Cougar for Downstream Passage**

41. The Corps is concerned that deeper, earlier drafts would interfere with operation of the variable elevation intake tower used to manage water temperatures to more closely mimic natural conditions. The Corps indicates that it could lose the ability to operate the Water Temperature Control Tower ("WTCT") once the reservoir water surface elevation fell to el 1571,

which could occur earlier than the September 1 target of Plaintiffs' proposed measure 29 due to the need to draft the reservoir to meet downstream flow objectives during the summer (as I describe above). While the WTCT has been successful at improving temperatures in the fall, I believe that the Corps' concerns about this issue are overstated and can be addressed. For example, the Corps has presented the outcomes from operations during 2015 as an example of how the Plaintiffs' proposed measures could affect downstream water temperatures and fish survival during low water years, which was an exceptionally hot and dry year. Effects during average and wet years would be smaller. Further, the lens of warm surface water that would be generated during the summer would be reduced through Plaintiffs' proposed measure 28, which would decrease the surface area of the reservoir subject to solar and atmospheric heating, suggesting a somewhat reduced need to pass warm water prior to the Chinook salmon incubation season. Moreover, it is notable that the Corps' IMIP includes an identical refill limit, similarly limiting the range of WTCT operations without concern. The Corps currently continuously monitors water temperatures and if a substantial downstream water temperature issue is identified, operations designed to minimize the problem could be identified and implemented.

42. There are only two currently operating mechanisms at Cougar Dam to pass downstream migrating juveniles, the powerhouse, or the ROs. Passage through the ROs is far safer than passage through the powerhouse, but safe operation of the ROs for fish passage requires that they be locatable by the fish and safe to pass. This requires that they not be too deep in the reservoir. The majority of fish that currently pass the project pass during the fall drawdown, often after spending months in the reservoir, while pre-dam outmigration peaked in the spring and was completed by July 1. By maintaining a low reservoir elevation through early spring (May 1) and providing passage through the ROs through June 1, this measure would

provide safe and timely passage, and would allow the population to express the array of life-history strategies native to the species, thereby increasing population viability. Downstream effects are likely to be small and manageable. Because they provide safer fish passage and are likely to reduce reservoir residence time, I continue to strongly support the Plaintiffs' measures to limit refill, draft the reservoir deeper, operate the ROs to pass fish when safe, and to extend the duration of low reservoir levels. Continued monitoring and adaptive management are a necessary component of these measures.

43. The difficulty in meeting downstream flow and water temperature objectives during warm, dry years like 2015 illuminates the value of access to the fish's critical habitats located upstream of WVP dams. These headwaters streams remain cooler throughout the summer and are upstream of human demands on water resources, meaning they provide better and more protected fish habitat. Thus, improving passage for juvenile Chinook salmon and steelhead that originate upstream of these dams is critical to reducing Project-caused harms and recovering the species, which is why I have opined that implementing new and more aggressive fish passage operations is important despite some potential tradeoffs.

44. The Corps suggests that in order to meet the reservoir elevations specified in the Plaintiffs' proposed measures it might need to evacuate stored water at rates that would cause it to violate the state's standard for TDG in the South Fork McKenzie River. This would be due to high rates of discharge through the ROs. During wet falls with significant inflow to the reservoir, it could be difficult to maintain el 1505 for 30 days as prescribed without causing high TDG downstream. Hence, it would be wiser to attenuate the discharge rate by storing the water above el 1505 when needed to avoid discharging water at rates known to be harmful downstream. Such

operations are similar to normal flood damage reduction operations and would be managed through the Corps' in-season management process in consultation with the TAT.

45. Overall, I understand the Corps' concerns about the potential effects of Plaintiffs' proposed measures 29 and 30 but believe that the benefits of improving fish passage at Cougar Dam far outweigh the potential tradeoffs, which can be monitoring and managed through the TAT.

Measure 35: Structural changes to RO to reduce fish injury

46. The Corps suggests that a simple coating of the RO discharge chute likely wouldn't improve passage performance and that changes to the stilling basin to improve TDG performance would require extensive design and regulatory compliance work. I understand that substantive changes to project works, like stilling basin reconstruction, must go through the Corps' extensive design and review process, but spillway grouting and the like is generally viewed as ongoing maintenance requiring less extensive review. In light of the risk of injury to fish passing through the Cougar ROs, I continue to support Plaintiffs' measures to improve RO passage survival and to achieve clear progress toward resolving project-generated TDG concerns identified decades ago that the Corps has failed to resolve.

**Middle Fork**

Measure 36: Deep drawdown of LOP for downstream passage

47. The Corps has expressed concern that during the fall drawdown of Lookout Point reservoir, in order to achieve el 750, project outflows would exceed the maximum flow objectives under the 2008 RPA. This is likely accurate. Those spawning season maximum flows were intended to avoid Chinook spawning in areas that subsequently could be dewatered when flows return to the minimum, and allowed higher maximum flows if minimum flows were also

increased to avoid dewatering of established redds. Drafting the reservoir to achieve el 750 by November 15 would maintain higher flows through that date, and the higher minimum incubation flow established by these higher maximum flows during the drawdown would only come into play thereafter. November through February is the wettest season of the year, suggesting that deviations from the downstream incubation flow objective associated with deeper reservoir drafts would be small and infrequent. I conclude that drafting Lookout Point reservoir to achieve el 750 by November 15 would increase the required incubation season flows downstream in some years, somewhat complicating compliance, but are unlikely to cause incubation flows that could not be achieved.

48. The Corps is concerned that deep drafting of Lookout Point reservoir would liberate large quantities of sediment, leading to high turbidity events downstream. I acknowledged the potential for the increase in turbidity in my third declaration.<sup>10</sup> High turbidity events themselves are not particularly hard on all life stages of salmon but are often associated with high concentrations of sand and other settleable solids which can smother salmon redds. Most of the settleable solids entrained during the drawdown of Lookout Point would drop out of solution in Dexter reservoir, making increased turbidity the primary effect downstream. Entrained sediments would also likely contain organic materials that could affect water quality parameters downstream. Much like operation of the lower ROs at Detroit Dam, these water quality parameters should be monitored under Plaintiffs' proposed monitoring measures. Such effects would be most significant in the first year of drawdown as the most easily entrained

---

<sup>10</sup> Third Declaration of Richard Domingue ¶ 74.

material would be removed, leaving more stable substrate and lower entrainment rates in subsequent years.

49. The Corps is correct that high turbidity and sedimentation could affect municipal water supply operations. I consider high turbidity to be likely but sedimentation problems with the intake itself unlikely as sedimentation would occur primarily in the flow path from the Lookout Point ROs to the Dexter Dam spillway. At any rate, as described in Mr. Askelson's declaration (§ 160), the City of Lowell monitors turbidity and has systems in place to treat or avoid it. Turbidity and sedimentation would be monitored and if problems arise the operations could be adjusted.

50. The Corps argues that a deep drawdown of Lookout Point will require earlier drafting of the reservoir that would worsen temperature problems in late summer and fall due to the discharge of warmer water from higher in the reservoir. The Corps argues that the earlier release of warmer water is a problem because elevated summer water temperatures would have implications for returning adult Chinook salmon, including increasing pre-spawn mortality ("PSM") and this should be monitored. However, the Corps fails to recognize that Plaintiffs' proposed measure would draw down the reservoir earlier than normal and should release warmer water in advance of spawning, which in turn would reduce the heat retained in the reservoir and likely lead to somewhat cooler water during incubation which is desired to avoid early emergence. This concept—discharging warmer surface water during the summer to reduce reservoir heat retention—is part of the ongoing temperature control operations at Detroit and Cougar dams. Further, the Plaintiffs' proposed measures address this potential issue by operating the ROs beginning on August 15 to reduce discharge water temperatures, thereby avoiding the release of water with undesirably high temperature later.

51. For these reasons, I continue to strongly support the deep drawdown measure as downstream water temperature effects and harms to returning Chinook salmon would likely be small. Current reproductive success is low downstream from Dexter Dam and production from areas upstream of Lookout Point Dam is limited mostly by poor survival of juveniles passing Lookout Point and Dexter dams and reservoirs. Hence, the potential to improve the viability of the Middle Fork Willamette River Chinook salmon population through improving juvenile passage is much higher than the potential reductions in viability that might be caused by the operations needed to improve juvenile passage.

52. The Corps also expresses concern that initiating Lookout Point reservoir drawdown on August 1 would reduce the duration that spill could be used to control downstream water temperature. This is true, but immaterial. The same volume of warm surface water would be spilled as under the IMIP, but spill would be initiated earlier. This likely would provide greater benefit to Chinook reproductive success downstream than later drafting as more of the undesirably warm water generated by the project would be discharged prior to spawning.

Measure 37: RO for temperature control

53. The Corps argues against using the discharge through the ROs to reduce downstream water temperatures because experience in project operation and studies already conducted have “concluded that improvements to water temperatures downstream of Lookout Point and Dexter Dams through operational or structural means (including use of the regulating outlets) are not likely to support the spawning/incubation life stages of UWR Chinook salmon.” (Askelson Declaration ¶ 166). However, research recently conducted by the USGS found that operating all of the outlet systems at Lookout Point Dam, including seasonal operation of the

ROs, provided the highest likelihood of meeting water temperature targets downstream.<sup>11</sup>

Hence, operating the ROs at Lookout Point to reduce downstream water temperatures is the best option available with the existing system configuration.

54. Even small temperature reductions could substantially improve survival when temperatures are near the fish's tolerance limits as they typically are in August. It is also likely that use of the ROs would somewhat increase TDG. I agree with the Corps that the ROs are not safely operable at Lookout Point reservoir levels in excess of 900 feet, but support the use of the ROs at reservoir levels below that point to reduce downstream water temperatures during the adult Chinook salmon migration. I continue to support Plaintiffs' proposed measure 37 for this reason.

Measure 39: Prioritize refill of Lookout Point and provide 2-4 weeks of free, ungated spill

55. The Corps argues against this measure due to the potential for violating state standards for TDG and undesirably high discharge rates, which would require controlling the spill rate (meaning discharge would no longer be ungated). Plaintiffs' proposed measures address these problems by providing for monitoring and adjustments through the TAT process.

Deviations to provide flood damage reduction and protect dam safety are expected. This is a very important measure for improving spring fish passage at the Lookout Point/Dexter complex and I continue to support measure 39.

Measure 47 and 48: Extend duration of deep drawdown at Fall Creek and spring draft

---

<sup>11</sup> Buccola, N.L., Turner, D.F., and Rounds, S.A., 2016, Water temperature effects from simulated dam operations and structures in the Middle Fork Willamette River, western Oregon: U.S. Geological Survey Open-File Report 2016-1159, 39 p., <http://dx.doi.org/10.3133/ofr20161159>.

56. The Corps argues that few additional fish would pass during an extended fall drawdown under measure 47. But this ignores that biologically, extending the duration of the drawdown, while not passing the high numbers of fish that occur during the initial drawdown, would pass fish that enter the reservoir footprint later as well as the freshets needed to move sediments in the channel downstream. Both sediment delivery and fish passage would be highest as the reservoir approaches and reaches the riverbed elevation. Extending the duration of this drawdown and allowing non-damaging freshets to pass the dam freely is more likely to move accumulate sediments in Fall Creek than the one-week of drawdown currently provided. Hence, the Corps' concern that extending the duration of the drawdown would cause adverse sediment and channel morphometry issues downstream is unfounded. Obviously, if freshets occur that would cause or exacerbate downstream flooding, the project gates should be used to limit discharge. I strongly support measure 47.

57. The Corps has identified another concern with this measure regarding the potential for wave action during the extended drawdown to erode the upstream face of the dam, creating a dam-safety issue. To address this problem, the Corps should monitor the dam and suspend the operation if erosion threatened dam safety. Plaintiffs recognize that dam safety is a paramount concern and understand that if this concern comes to pass, the Corps should reduce the duration of the drawdown.

58. The Corps expresses several concerns regarding Plaintiffs' proposed measure # 48 – that it would reduce the probability of reservoir refill, limiting the Corps' ability to augment natural flows as needed to meet mainstem minimum flow objectives, and that it could interfere with operation of the adult salmon collection facility.

59. I agree that maintaining low reservoir elevations through mid-April might diminish the project's ability to augment downstream flows during the hot summer months. However, as previously discussed, I consider the current summer (July through September) mainstem Willamette flow objectives to be unsupported by biological needs and thus should not be used to avoid conducting more biologically important measures like providing safe passage. Given the very poor reproductive success of Chinook spawning downstream from Dexter Dam, improving passage survival for fish originating upstream of dams in the Middle Fork sub-basin is the best approach to improving the viability of the Middle Fork Willamette River Chinook salmon population.

60. As for the adult collection facility, Plaintiffs have adjusted their proposal to maintain the reservoir elevation at 728 feet between mid February and mid April, which would put the reservoir 8 feet above the lower fish horn invert that serves as the collection facility feed source. This adjustment should allow the reservoir to stay at that level for the duration of the operation before inflows to the reservoir decrease in summer. Continued operation of the adult fish collection facility as currently occurs is desired. If a problem arose and a different reservoir elevation became necessary to continue operations at the facility, the TAT process could be used to modify this measure while continuing to operate the RO.

61. Plaintiffs' measure is designed to address the biological need of facilitating timely outmigration for spring migrating juveniles. While the current drawdown operation has been highly successful, it only provides safe passage during the fall, meaning juveniles that entered the reservoir during the late winter and early spring mostly remain in the reservoir until late in the fall, which is known to cause high levels of copepod infection. Providing timely passage would allow fish that enter the reservoir in late winter and spring to express their natural life-

history diversity. Such diversity increases the overall resilience of the population, a factor in maintaining viability. Again, I strongly support the provision of lower reservoir levels and RO operation during the late winter and early spring as would be provided by measure 48.

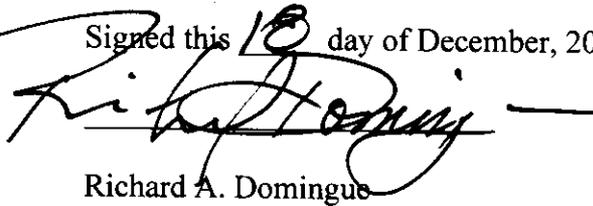
### **Conclusion**

62. Due to the broad array of WVP effects on the environment and UW Chinook salmon and steelhead and the interconnectedness of the system, actions taken to reduce or avoid one adverse effect may lead to other undesirable outcomes. I view the Plaintiffs' proposal as aggressive, but not recklessly so, and as can be seen in the testimony of the Corps' and Plaintiffs' declarants, the potential for conflicts have been considered and addressed. Experience has shown that some unanticipated outcomes are likely when modifying such complex systems as the WVP, and the Plaintiffs' proposal will provide monitoring and adaptive management to deal with them. In the past, such manageable concerns have often led to an unwillingness of the Corps to implement measures likely to improve fish survival, thereby continuing the Projects' unacceptable level of harm to UW Chinook salmon and steelhead.

63. In conclusion, I continue to view Plaintiffs' proposed actions as much more likely to provide measurable improvements in the viability of the species than the Corps' IMIP, particularly due to the more aggressive operations aimed at improving downstream juvenile passage. Further, by being more aggressive, Plaintiffs' proposal is more likely to provide information useful to the development of future WVP operations and configuration that would further reduce the project's limitations on the species' survival and recovery.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

Signed this 18 day of December, 2020 in Oak Grove, Oregon.

A handwritten signature in black ink, appearing to read "Richard A. Domingue", is written over a horizontal line. The signature is stylized and cursive.

Richard A. Domingue