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*Pro Se*

THE HONORABLE MICHAEL H. SIMON

UNITED STATES DISTRICT COURT
DISTRICT OF OREGON, PORTLAND DIVISION

AMERICAN RIVERS, et al.,

Plaintiffs,

and

STATE OF OREGON

Intervenor-Plaintiff,

v.

NATIONAL MARINE FISHERIES SERVICE, et al.,

Defendants.

and

NORTHWEST IRRIGATION UTILITIES, et al.,

Intervenor-Defendants.

No. 3:01-cv-00640-SI

DECLARATION OF CHRIS A. PINNEY IN SUPPORT OF AMICUS CURIAE BRIEF OF JAMES WADDELL

I, CHRIS A. PINNEY, hereby state and declare as follows:

**Education and Relevant Experience**

1. I earned a Bachelor's of Science Degree in Zoology and a Master's of Science Degree in Biology with specialty in Aquatic Ecology from Northern Arizona University.

2. For 28 years I was a fisheries biologist employed by the Walla Walla District, U.S. Army Corps of Engineers (Corps) from November 1991, when Snake River sockeye were listed under the Endangered Species Act (ESA), through December 31, 2018, when I retired. The Corps hired me to assist with fish passage research and design, operations, statistical modeling, and ESA consultation for the operation of the lower Snake and lower Columbia River dams, in the context of systematic, lifecycle, as well as individual lock and dam projects and their reservoirs, and the Federal Columbia River Power System evaluation for aquatic resources. I also have greater than four years' experience working on trophic dynamic relationships critical and necessary to native and introduced fish population viability and production (including five endemic species listed under ESA), in response to the operation of Glen Canyon Dam on the lower Colorado River through the Grand Canyon. And I have five years' experience as a zone biologist with the Kaibab and Coconino National Forests, responsible for riparian and aquatic inventories and habitat restoration design and implementation, among other various timber, prescribed and wildfire, range, and recreation taskings.

3. I represented the Northwestern Division of the U.S. Army Corps of Engineers on various National Marine Fisheries Services (NMFS) chaired Regional Forum technical working groups, including the Plan for Testing and Analyzing Hypotheses (PATH), and as Co-Chairperson shared with a representative from the Canadian Department of Fisheries and Oceans for the Biological Effects and Research Subgroup of the Transboundary Gas Group.

4. I have served as the U.S. Army Corps of Engineers, Walla Walla District Fishery Biologist Endangered Species consultation and Research, Monitoring, and Evaluation (RM&E) subject matter expert. I was responsible for ecological research and passage survival, recovery, and quasi-extinction risk evaluations, utilizing salmonid stock demographic and lifecycle hypothesis testing for Snake and Columbia River run-of-the-river dams, Dworshak high-head storage dam, and many subbasin diversion and flood control structures and systems.

5. I also served as principal biologist/subject matter expert in the Corps' Dissolved Gas Abatement Studies (DGAS) and Systems Configuration Studies (SCS) programs. Over the course of a combination totally greater than 24 years I traveled for several weeks to a month during each year to the Corps Engineering and Design Research Center (ERDC) hydraulic labs in Vicksburg, Mississippi to work on structural and operational exercising of various size scaled physical models of all the lower Snake and Columbia river's dams, as well as larger scale spillway and spillbay prototyping models for dissolved gas hydraulics and abatement. No reservoir models have ever been constructed for these investigative and verification purposes. The Corps tasked me principally with finding structural and incremental operational means of reducing both total dissolved gas supersaturation (TDGS) and the physiological effects on fish that likely led to mortalities due to spill, bypass system, and turbine passage, both individually and in combination.

6. When first employed by the Corps, I witnessed salmon and steelhead run returns that were composed of more than 85% wild fish, with hatchery fish composing the remaining 15%. By the time I retired in 2018, the returning runs consisted of more than 95% hatchery and default "natural" fish, with wild fish composing the remaining 5%. In addition to the indirect and direct harm caused to wild fish by the lower Snake River dams, another major reason for the wild fish decline has been the hatchery salmon and steelhead production and supplementation programs required to mitigate or compensate for the harm caused by the dams, principally for harvestable fish replacement. This is the opposite of wild salmon and steelhead population viability and recovery that the ESA demands.

7. Most of my work with the Corps involved efforts to sustain the ESA-listed wild salmon and steelhead. Those efforts taught me that hardware and technological fixes to the dams through engineering processes have not and will not work to recover lower Snake River migratory fish. Nor will smolt transportation, spill, or hatchery fish production recover the ESA-listed wild salmon and steelhead. Unless the four lower Snake River dams are breached starting

this year as emergency actions through the next two years, the Snake River salmon Evolutionary Significant Units (ESUs) and steelhead Distinct Population Segments (DPS) defined by NMFS under NOAA will further spiral towards nonviability, and not have even the minimal probability to recover. The Nez Perce Tribes' most recent quasi-extinction analysis points to the elimination of viability of 77% of spawning populations in 2025, the Snake River Chinook salmon's final year to complete the trending-to-extinction threshold. This analysis is just the latest, and most dire, warning since the NMFS' 2008 Biological Opinion that was required by the Court.

**To Date All Mitigation Measures to Recover ESA-Listed Salmon and Steelhead Have Failed**

8. There are a number of reasons why attempts to improve migration through the lower Snake River (sometime hereafter "LSR") dams have been ineffective at increasing the abundance of ESA-listed salmon and steelhead. Most significant is that fixes to or through the LSR dams do not have any significant effects on the reduction or elimination of the direct and latent mortality vectors of the relatively stagnant reservoirs. The reservoirs cause just as much, and more unmitigated harm to migratory salmon and steelhead as the dams, and often more direct and indirect or latent mortality. Any minimal benefit to LSR dam passage cannot compensate for the mortality caused by the reservoirs. Lower Snake River dam breaching is the only action that remedies reservoir effects on migrating fish, since breaching would eliminate the reservoirs and restore the river to a near natural regime, providing geomorphological natural cooling of channelized flow reconnected to springs and subsurface upwelling flows. Breaching would also accomplish the near elimination of potential for toxic algal and cyano-bacterial blooming, the growth of which not only produces and releases methane, but fixes nitrogen to rob the water body of dissolvable oxygen.

9. Ample research proves that bypass system passage has harmful effects to smolt fitness and growth, like reservoir passage obstructions and delays, resulting in multiple avenues

of substantial latent mortality that manifests when smolts transition through their estuary and ocean lifestages.

10. This is similar to the results found in the lower Snake River smolt transportation program research and monitoring. The smolt transportation program is a well-defined nearly 40 year long RM&E project that has proved to provide inconsequential results to increasing smolt-to-adult ratio returns (SARs). Increased SARs are required for population growth and recovery. Both the transport program and the bypass systems have proven to have high latent mortality effects in almost all flow years, with minor inconsequential benefits for a few short-term passing populations

11. Increased spill at the LSR dams is not an action that will recover ESA-listed salmon and steelhead. LSR dam spill has not worked in the past and will not work, or improve enough, in the future, even if it is increased and made flexible. In all of our design and testing experience, the concept of pulsing flow for enhanced smolt density attraction or passing efficiency has not worked or been functionally feasible.

12. No amount of LSR dam spill at any level or magnitude has resulted in reservoir water velocities of 6-9 feet per second (fps) that were seen historically in field studies and mapping of the lower Snake River pre-dam pre-impoundment timelines, and have been confirmed in the upper Lower Granite channel during the 1992 Physical Drawdown Test of Lower Granite and Little Goose reservoirs. In addition, spill response studies have not produced the Snake River and Columbia River reach-wide water and fish travel times recorded in hours and a few days, that were measured for the pre-dam river dynamics record. Instead, spill, regardless of amount, results in post-dam salmon and steelhead smolt travel times that are measured in weeks or months, rather than hours or days.

13. A maximized or near 100% spill system operation is not equivalent to breaching the four lower Snake River dams. LSR dam breaching would drain the reservoirs back to the recovery of 56 rapids and diverse pool complexes that were interspersed geographically with

several deep cooling water canyons fed by aquifer springs that once provided functional critical habitat for spawning and rearing wild salmon. Without breaching the four lower Snake River dams, the detrimental hydraulics remain, as does the routine mechanical leakage pollution and the increased photosynthesizing and ultimate decay of accumulating toxic algae and cyano-bacteria that fix nitrogen and deplete dissolved oxygen on their way to high rates of methane release, especially under increased heating of the reservoir climates.

14. RM&E studies showed that with the multitudes of spill manipulations and ideas, there were only minor increments of variable seasonal, stock specific, and annualized averaged improvements in hydrosystem reach survivals and SARs. Spill has not resulted in Snake River and other salmon and steelhead "trending to recovery." Spill will not work to recover lower Snake River salmon and steelhead, as long as deep reservoirs remain in place with their highly seasonal volatile water temperatures, low water velocity, toxic algal blooms, toxic chemical and fossil fuel leaks from the dam's machinery, all managed under limited corrective operational abilities.

15. Increasing spill erodes the tailwater channel and the concrete faster at Little Goose, Lower Monumental, and Ice Harbor dams. The erosion affects salmonids with some direct mortalities as guidance structures fail and exposed rebar nets become available to abrade and skewer the recirculating salmon smolts and holding adults. Spill induced erosion requires massive and expensive repairs that routinely do not get funded for years and decades, as the priorities on the lists heavily sway to electrical generation needs. Increasing spill also creates strong recirculating eddies within tailwaters that reintroduce or hold smolts into strong TDGS exposure currents. This also leads to increased smolt mortalities, either direct or indirect, both physiologically and through more efficient predation.

16. There are a number of additional reasons why spill has not and will not lead to recovery of lower Snake River ESA-listed fish.

- Spill is not a one-size-fits-all-dams in all seasons. For example, Little Goose was best operated for fish passage maintaining 30% spill across the total inflow. In comparison, Lower Granite was best operated for fish passage by maintaining a constant 20 thousand-cubic-feet-per-second (kcfs), no matter what the inflow dynamics were.
- The indices of spill effectiveness are far too generalized for multiple scientific reasons. They do not capture diel (24 hour period) variability in smolt-to-spill enumeration per operational changes, or for the transitions between operational changes where most salmon stress and undetected mortalities accumulate.
- The indices do not capture harmful effects upon smolts that lead to added mortality in and beyond the tailwater environments, such as fish recirculating in eddies that grow stronger with increasing spill volumes, then exit into high predation zones downriver. By increasing the physical exposure of disoriented and physically compromised juveniles from both bubble trauma and swim bladder deregulation, spill increases predation on juvenile fish by flying and perching avian, and by swimming piscivorous predators. These predators have been trained naturally to hunt and forage in the turbulent, recirculating currents of large acreages associated with the spill outfall zones.
- The RM&E of passage survival is concrete specific and has constantly evolved through various developmental tagging technologies, methodologies and strategies, each having its own problems. The states and tribes have routinely supported the Fish Passage Center's well documented weaknesses of the most recent acoustic tagging technology (Juvenile Salmon Acoustic Tagging, or JSATs) and its misapplications to estimating passage route and dam, or more appropriately concrete, survivals in studies aimed at achieving the smolt passage survival standard metrics at each dam. They conclude in a 2017-2018 critical review of an attempted latent mortality

causative evaluation that JSATs is highly ineffective and incapable of use for spill passage survival evaluations for many of the reasons addressed throughout this declaration. The more recent and perhaps most damning reason is the inability to control, correct, or validate the false positives and false negatives of dead fish distribution, causation, and detection or non-detection.

- Surface spill increases water temperature heating in geographic scope due to the redistributing of the heat sinked upper 60 feet of forebay water.
- Spill causes harmful delay or blocking in the fish ladders for an increasing proportion of adult fish, as salmon, steelhead, and invasive American shad accumulate and die in the ladders' temperature transition zone, and in the adult trap in the Lower Granite ladders. Such passage delays and blocking can last for hours up to several weeks.
- Spill also contributes to recirculating fallback rates over the dams and increased rates of fallout from the ladders below the dams. This requires the fish to re-ascend the ladder or stray, and can itself cause mortality.
- The concept of near 100% spill is not achievable because the Corps' operational and safety plans require at least one turbine to operate to generate electricity for safety and hydro station power. To operate a single turbine, the lower Snake River projects require a flow minimum of about 11 kcfs. At that point the predetermined spill-for-fish rates in the Fish Operational Plan (FOP) routinely is not followed, especially during most all summer month inflow rates of most all recent years when the water temperatures are concurrently at their most extreme. Minimal turbine has been prioritized and implemented over minimal spill-for-fish.
- During the low flows of summer months, the resulting inflows from the Snake River channel are less than 20-30 kcfs. The low flows make it more difficult to move smolts through and past the concrete dams using spill. At low flows, river water heats up faster and holds its heat more effectively at increasing depths of the reservoirs. As a

result, in the summers of 2015-2017, and in most recent years, dam operators have been forced to curtail surface spill and some deeper entrainment spill, in order to try to decrease river heating and the mortality of salmonid smolts.

- Even at maximum spill up to 100% at spillway crest water surface elevation, the subsequent concrete passage survival may end up being ineffective and not sustainable throughout every 24 hours, because diel flows cannot be anthropocentrically stabilized enough within and between seasons.

17. As described above, decades of salmon and steelhead passing the dams through sophisticated bypass systems have established that this technology does not work to improve salmonid abundance sufficiently. Decades of transporting smolts out of the river around the dams have established that transport does not improve salmonid abundance sufficiently to sustain the populations. Decades of hatchery fish operations have established that hatchery fish actually cause harm to wild fish, and do not sustain wild salmonids. Spill at any level has not worked to delist any of the ESA-listed fish populations in the lower Snake River. Nothing the Corps has tried has reversed the steep negative trending to quasi- and permanent extinction, and away from survival viability and recovery. Indeed, all measures attempted by Corps' fisheries management on the lower Snake River have not recovered any ESA-listed fish. Instead, wild fish are in far worse condition than they were 30 years ago when I joined the Corps.

18. The worst case scenario is being realized as more and more lower Snake River stocks are hitting and exceeding the quasi-extinction threshold, as evidenced in the Nez Perce tribe's most recent (2021) reporting that 77% of the Snake River Chinook salmon populations will surpass their quasi-extinction metric by 2025. This defines permanent extinction for Snake River Chinook salmon. Such analyses are not new to salmon and steelhead scientists. And, they have shown that Snake River steelhead are directly in line for extinction in very near time and place. It is now necessary to go to the last means of recovering LSR wild salmon and steelhead. That is breaching the four lower Snake River dams. The highest spill regimes possible for more

optimal smolt passage games must continue in the lower Columbia River dams and reservoirs until some more meaningful reservoir depletion actions can be implemented, particularly during longer, hotter salmon and steelhead migrations.

**Breaching Will Recover ESA-Listed Lower Snake River Salmon and Steelhead**

19. A wealth of federal and academic research indicates that critical habitats of geomorphologically diverse rivers with intact ecological functions and hydraulic dynamics that are necessary for salmonid population survival and growth cannot be provided in a hydrosystem that operates without any free flowing reaches between the dams and their reservoirs. The orientation of each of the lower Snake River dams, especially Little Goose dam, significantly changed the channel's hydraulics to the detriment of salmon lifestage productivities for each of the life histories, for each salmon and steelhead species. RM&E clearly shows that the degraded hydraulic habitats do not provide salmonids with the biological requirements they need to replace themselves with the next generation. As a result, it became necessary by 1990 for the Corps to study the feasibility of lower Snake River dam breaching.

20. The Corps released the Draft Lower Snake River Juvenile Salmon Migration Feasibility Study/Environmental Impact Statement around the end of the year 1999.[1] At that time the Walla Walla District Corps assigned lead study team recommended to the decisionmakers and NMFS that the process of decommissioning the four lower Snake River dams for breaching the earthen fill abutments of each of the four dam projects, i.e., Alternative 4 in the LSRJSM DFR/EIS, should begin so breaching could be implementable within one to two salmon life cycles. Breaching would be necessary to not only return Snake River salmon and steelhead to vitality and sustainable levels, but necessary to comply with the survival and recovery requirements clearly outlined in the ESA. The assigned team included the lead design engineers

[1] 1999 Draft Lower Snake River Juvenile Salmon Migration Feasibility Study/Environmental Impact Statement (LSRJSM DFR/EIS), U.S. Army Corps of Engineers, Walla Walla District. Walla Walla, WA.

and the overseeing policy lead for the citizen program, as well as several Northwestern Division Corps Planning and Economic collaborators and policy reviewers, and the NMFS Hydro Office on up to their Regional Administrator.

21. The Corps declined to sign off on their team's Draft Record of Decision and Draft FR/EIS or follow the NMFS Draft Biological Opinion recommendation to breach, even though the fisheries science pointed clearly to breaching in order to avoid lower Snake River ESA-listed salmonid quasi-extinction within 24 years, which would be the year 2024 at the time of the Draft FR/EIS and supporting documents. That is a little over two years from now, a timeframe that is consistent with the latest Nez Perce Tribal analysis finding that by 2025, over 77% of the ESA-listed Chinook populations will surpass the population level quasi-extinction threshold of less than 50 spawners within each population comprising the stock.

22. The quasi-extinction threshold means single spawners, not pairs of spawners, or even successful reproducing pairs or redds (nests constructed). The Nez Perce analysis includes "natural" spawners. The term "natural" can designate a hatchery origin fish that returns to spawn in a river, regardless of its origin or genetic domestication. It does not mean the fish are genetically wild or fecundity fit enough based on their connections to their habitats to keep the population viable. "Natural" fish result from the mitigation and production hatchery influx or supplementation that are allowed to spawn in the river.

23. NMFS' research confirms the Nez Perce extinction analysis. In 2008 NMFS established the extinction threshold metrics and the opposing recovery metric criteria. The NMFS' criteria establishes that extinction will happen when roughly two-thirds, rounded out to 70%, of the populations have declined to the less than 50 spawners for one last singular lifecycle term.

24. Based on my experience and research, it is my opinion that breaching the four lower Snake River dams will recover the ESA-listed salmon and steelhead. My first project with the Corps was biological design and monitoring during implementation of the 1992 Physical Test

of Drawdown of the Lower Granite and Little Goose Dams and reservoirs.[2] Specifically, I was charged with evaluating the aquatic organism populations' responses to evacuating a reservoir to free flowing river hydraulic functions and tailwater total dissolved gas supersaturation generation, caused by spilling through all spillbays, with fully opened tainter gates, down to the spillway crest elevation. This project gave me firsthand knowledge of 100% spill operations for reservoir evacuation. The test drawdown provided a means for evaluating how to breach the dams and return the river to historical Snake River normative functions for which salmon and steelhead evolved.

25. To the Corps engineers' surprise, the drawdown test did not reveal any showstoppers to breaching the lower Snake River dams to restore the river's ecological and geomorphological health and function. Among other things, the plunge depth of the spilled water became less instrumental in TDGS generation, once the thickness of the water column increased while coming over the spillbays. The water rapidly became free flowing in condition and composition. The water velocity in the upper half of Lower Granite channel returned to that of free flow velocities of 6-9 feet per second (fps), instead of the less than one fps in the existing full reservoir. The test drawdown also did not produce problems with sedimentation evacuation and redistribution, such as extreme turbidity concentrations above safe standards for fish and the other aquatic dependent organisms.

26. Cumulative breaching through the earthen fill embankment sections of each of the four lower Snake River dams would drain the reservoirs back to their historic pre-project free flowing diversity. That diversity would include critical habitats consisting of 56 rapids and diverse depth pool complexes that were intermixed sinuously with two long and deep geologic canyons that would cool the river with springs and hyporheic flow connections.

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[2] 1992 RDT LGR&LGO; referenced as Wik, S.J., et al., 1993, Lower Granite and Little Goose Projects: 1992 Reservoir Drawdown Test Report, U.S. Army Corps of Engineers, Walla Walla District., 141 pp.

27. Breaching the four lower Snake River dams would provide more than 84 miles of suitable spawning habitats and more than 140 miles of total channel width suitable rearing and migration habitats. Breaching would also restore the diversity of over 35 interconnected food web species, utilized by salmonids and other native fish, such as white sturgeon Pacific lamprey and Northern pikeminnow, instead of the one to two species the Corps found in decades of dredge spoil placement studies. Reconnection to critical habitats and their functions is required to rapidly increase productivity to fitness levels needed within every salmon and steelhead lifestage.

**Data Contained in the CRSO EIS Proves that Breaching Will Recover ESA-Listed Fish**

28. The Federal agencies' reliance on analyses using a continually decreasing and degrading baseline of the most recent 10 year averaging of adult salmonid count indexing data, diagnostically misrepresents the mortality and rate of decline in ESA-listed salmon and steelhead stock populations. The eroding baseline incorrectly informs analyses for salmon and steelhead spawner abundance, SARs, and hydro passage survivals. This has led to an increased masking of the salmon and steelhead extinction threat.

29. Lower Snake River salmon and steelhead demographic responses to habitat improvements from dam breaching, that would significantly increase chinook salmon spawning and rearing acreage and improve migration hydraulics, have not been incorporated into any lifecycle, or probability of recovery, or risk of quasi-extinction modeling. Had this modeling been completed and incorporated in the existing NMFS and Fish Passage Center Comparative System Survival (CSS) frameworks, it would have revealed that breaching the four lower Snake River dams not only provides the best opportunity to increase the spawner and progeny numbers and densities to the required carrying capacities needed for stock viability of each of the lower Snake River ESA-listed stocks, but would do so in less than one-half the time as estimated previously.

30. The COMPASS modeled reach survival results in the Appended Tables of Raw Data of Appendix E in the 2020 Columbia River Systems Operations Environmental Impact Statement (CRSO EIS) (see paragraphs beginning 31 below) are consistent with the National Oceanic and Atmospheric Administration Northwest Fisheries Science Center modeling. The annual reporting of the PIT-tag detection modeling shows 50-70% Snake River reach survivals, and 40-60% Columbia River reach survivals. The PATH modeling statistical exercises for breach Alternative 4 in the 2002 Final Lower Snake River Juvenile Salmon Migration Feasibility Study/Environmental Impact Statement for Snake River juvenile salmon migration are consistent. They show Snake River reach survivals of 85-96%, while Columbia River survival variability stays nearly the same, hovering below 50-60%.

31. Incorporation of the restored habitat component calibrations would move the recovery rate by at least an additional two to three times increase in spawner return abundance. This would be above that already estimated four to six times (quasi-stable SARs above 10%) model estimates generated for the Multiple Objective 3 (MO3) Breaching Alternative by the CSS framework that was submitted to the CRSO EIS deliberations, and briefed to Washington state Governor Inslee's Orca Task Force in 2019.

32. Data available in the CRSO EIS shows that lower Snake River dam breaching will recover the threatened and endangered lower Snake River ESA-listed salmonids, and that each of the other alternatives results in declining fish runs while exhibiting higher variability, hence more uncertainty, in stabilization of the run estimate responses into the future.

33. The critical question of spring-run chinook salmon and steelhead dam, reservoir, and subsequent reach survivals, that are used to inform the lifestage compounding SARs, are documented in Appendix E, Tables 4-1 through 4-12, deeply buried in the CRSO EIS. These tables show that the breaching option, MO3, results in a consistent Snake River reach survival improvement to near 98%, from the current 60-70%. This is across all 80 years of flow record. On the other hand, all passage routes in the No Action Alternative and Multiple Objectives 1, 2,

and 4, and the Preferred Alternative have some level of latent mortality that leads to insufficient ocean survivals and critically low SARs. Significantly the Preferred Alternative was not modeled.

34. The data set forth in Tables 4-3 through 4-12 in the CRSO EIS clearly expose the negative impact on the listed species of each of the alternatives, except the breach alternative, MO3.

35. The tables are long and complicated. They contain the raw data outputs of the biologically important metrics from the COMPASS model for each Multiple Objective and the No Action Alternative. Most important is the individual subbasin reach survival and travel time estimates for each year of the 80 year inflow record (1929 through 2008). Data and analytical evaluation for the proposed Preferred Alternative is not included. In COMPASS, if the Preferred Alternative data were run, it would be a negative in reach survivals, based on the COMPASS results of the similar MO alternatives for status quo, 2016 operating conditions, and increased power output. Even statements in the Records of Decisions (RODS) admit that the Preferred Alternative qualified description evaluation would result in a negative trend for survival under that of the status quo.

36. Tables 4-3 through 4-12 were created to document the analysis for the juvenile fish passage model-calibrated/simulated effects of the dams on reach survival estimates for spring-run chinook and steelhead for each alternative (MO). This was not only for the averaged aggregated total eight dam hydrosystem of the Columbia and Snake rivers, as presented in the text, but also for the disaggregated reaches of the Snake River, versus the Columbia River dams and reservoirs that are operated as distinct parts affecting of the whole. Modeling the rivers dam by dam has been used throughout the region as a more diagnostically useful and accurate exercise in that one can see where each project may need to be modified in order to stay to standards of fish passage and survivals. The tables in Appendix E include the response data results for four different versions of COMPASS calibrations (statistical sensitivity analyses) for

the breach alternative, MO3. The similarity in near-100% Snake River systemwide reach survivals for MO3 in all four sensitivity calibrations significantly reduces the claimed uncertainties of salmon and steelhead recovery with dam breaching.

37. Although the tables were included in Appendix E, the juvenile fish passage model-calibrated/simulated effects of the dams on reach survival estimates for each alternative were written up poorly in the CRSO EIS body and Appendices. Therefore, I used the raw data outputs to evaluate if the breach calibrations had enough significant differences to calculate different outcome statistics for reach survival. I was able to determine that the correct routines, files, surrogates and reaches appear to have been used and tested within the four COMPASS dam breaching (MO3) calibrations.

38. The column for Snake River reach survival of spring-run only chinook is consistently 88-99%, with only one or two results down in the 70 percentiles for all iterations of the dam breaching calibrations. NOTE: THESE ARE NOT individual disaggregated dam survival rates for the "dam/concrete only" tests that BPA and the Corps often use to misinform the public forums. These are the survival rates for spring-run chinook through all four lower Snake River dams and reservoirs—Lower Granite Dam through Ice Harbor Dam to McNary Dam.

39. The reach survival rates through all the Snake River dams indicates that the MO3 breaching alternative analyses are scientifically sound and statistically robust enough for decision. Breaching clearly outperforms all of the other alternatives in the CRSO EIS for lower Snake River salmon and steelhead stock reach survival that would be necessary to lead to recovery level SARs. This also shows that the COMPASS runs in Tables 4-3 through 4-12 are consistent with CSS model evaluations, even though the applied statistical method derivations are quite different (mechanical COMPASS versus process CSS). The PIT-tag detection calibrations evidence similar results.

40. Regarding spill, the raw data of the mechanistic model COMPASS outputs show that incrementally increased spill up to 125% TDG in MO4 does not exceed its expected and perceived or assumed survival effectiveness for passing smolts over the more optimizing spill regimes, because it subjects the fish to lethal exposure of TDG% concentrations and distributions, hence regulating dam survival down.

41. In addition, over 30 years of RM&E in dam passage and reach survivals can be used to estimate the limits of spill to fish condition and survival. For example, the higher spill of 2018 resulted in a nearly 11% lower Lower Granite to Bonneville reach survival estimate, based on PIT-tags.[3] Survival was down to 43% from 53%. This is evidence that more spill does not equal more fish survival. The data shows that decades of experimenting with increasing spill volumes and rates specific for each seasonal lower Snake River salmon and steelhead life history has only worked for inconsequential increments in perceived benefits in direct salmonid passage survival, but is limited in achieving the necessary productivity for spawner recruitment required in the subbasin, and applying yet another increment of higher spill will not recover the ESA-listed salmonids in the future.

42. Results for steelhead show the same trends, although the survival calculations are a few percentage points lower than those for spring-run Chinook. The Bottom line: Tables 4.1 through 4.12, obscured in the CRSO EIS Appendix E, at pages 4-1 to 4-85, fully support breaching the four lower Snake River dams.

43. The FPC's breach alternative analyses with the CSS models informed the early coordination for the CRSO EIS. The analyses showed with dam breaching, there would be up to a fourfold increase in Snake River Chinook salmon spawner abundances, along with more

[3] Widener, D.L, J.R. Faulkner, S.G. Smith, T.M. Marsh, and R.W. Zabel. 2019. Survival estimates for the passage of spring-migrating juvenile salmonids through Snake and Columbia River dams and reservoirs, 2018. Fish Ecology Division, Northwest Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Seattle, WA, for Division of Fish and Wildlife, Bonneville Power Administration, U.S. Department of Energy, Contract 40735, Project 199302900.

optimizing spill still required over the Columbia River mainstem dams for Columbia River origin salmonid populations. If the FPC had incorporated the population growth benefits of restored critical habitats (84 plus miles of spawning habitat and over 140 miles of shore to shore rearing), then the FPC's fourfold increase in lower Snake River salmon spawner abundances, with SARs exceeding 10% would likely be even double or triple that shown in the FPC analysis.

44. As shown with breaching, the functional carrying capacity of the ESA-listed species and their life history forms would be significantly expanded in a relatively short time span of less 10 years, consisting of two lifecycles or generations. Without breaching, lower Snake River salmon and steelhead stocks will continue to extinction, most likely evident within the next few cohorts making up the salmon ESUs and the steelhead DPSs lifecycle period of four to six years, or less.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Executed on 14 October 2021.

Chris Pinney

CHRIS A. PINNEY