Breaching the Four Lower Snake River Dams to Recover Wild Salmon, Orcas and an Entire Ecosystem Is the Right Thing to Do

You can always count on Americans to do the right thing - after they've tried everything else. ~ Winston Churchill

- Salmon are keystone species, critical to preserving the Snake River ecosystem.
- Together the Snake and Columbia Rivers once produced more Chinook salmon than any other river system in the world.
- The Snake River Basin produced about half of these salmon.[1] Today, 1% of the historical number of salmon returns to the Snake River watershed to spawn.
- All four Snake River wild salmon runs are listed as threatened or endangered under the Endangered Species Act. The four lower Snake River dams are a major cause.[2]
- Snake River salmon recovery under the Endangered Species Act (ESA) is based on *wild salmon* surviving and recovering.
- Wild populations have not experienced gains since they were listed under the ESA.
- All recovery efforts for Snake River wild salmon have failed.
- Wild salmon are not meeting survival objectives, much less recovery goals, despite a decade of favorable ocean conditions. [3]
- The touted "record" Snake River Fall Chinook salmon runs for the last several years consist of more than 80% hatchery fish, not the endangered or threatened wild salmon.
- In 2015 only 96 sockeye survived out of an estimated 4000 fish in the Snake River population that had entered the Columbia River. *Lethally warm water in the Columbia and Snake Rivers killed up to 90% of the Snake River sockeye.*[4]
- The slack water reservoirs created by the dams kill as many salmon as the dams themselves.
- The reservoirs have flooded out the natural river flows and riparian habitat, destroyed spawning grounds and rearing habitat, decreased river flow to almost nothing, and exposed juveniles to a host of aquatic predators and pathogens that thrive in the reservoirs.
- Problems inherent in the reservoirs cannot be fixed, except by breaching.
- Salmon are the biological foundation of the Snake River ecosystem and are a "keystone" species, supporting the survival and reproduction of other species.
- Salmon runs function as enormous pumps that transfer huge amounts of marine nutrients from the ocean to the headwaters of otherwise low productivity rivers.
- Salmon nutrients are incorporated into food webs in rivers and surrounding landscapes, enhancing surrounding forests and the growth of streamside trees that shade and protect

stream banks.

- After spawning, salmon die.[5] Their decomposing carcasses provide essential food and nutrients for the entire river ecosystem, including the next generation of salmon.
- Without marine nutrients from salmon, river ecosystems cannot thrive. Species diversity declines, trees wither and can no longer exchange CO_2 as effectively, forests become more susceptible to wild fires that emit enormous amounts of CO_2, and as the carbon sinks in the watershed disappear, they emit greenhouse gases. In contrast, healthy river ecosystems combat climate change by sequestering CO_2.
- The effects of the Snake River ecosystem destruction extend out to the waters of the Pacific Ocean. The dams have eroded the prey base of iconic marine mammals such as Southern Resident orcas who are starving periodically due to the lack of abundant Chinook salmon from the Snake River.[6]
- Despite the number of salmon that enter the Columbia River and are counted at Bonneville Dam, the salmon that make it to the spawning grounds and spawn in the Snake River or its tributaries number in the tens, hundreds, or a few thousand, depending on the species, river or stream. Only a small percentage of these spawning fish are of wild origin.
- Because there is a scarcity of wild salmon returning to spawn on the Snake River, genetically inferior hatchery fish are being released to spawn with wild salmon, which can result in less resilient offspring.[7] The gene dilution cycle is accelerating as some salmon spend only months or a year in the ocean, before returning to spawn.
- The offspring of hatchery and wild salmon are termed "natural" fish. The inferior genetics of the "natural" fish are passed on to wild fish, when the "natural" fish return to spawn.[8]
- Juvenile outmigration fared poorly in 2015. In September 2015, NOAA issued preliminary estimates of survival of PIT-tagged juvenile salmon and steelhead passing from the Snake River trap at the head of Lower Granite reservoir to the Bonneville Dam tailrace, during the spring outmigration.[9] The results were dire.
    - For *hatchery and wild combined* juvenile Snake River yearling Chinook salmon, the estimated survival was 39.7%.[10] This is the third lowest survival rate since 1999 and the lowest estimate for Chinook since 2004.[11]
    - For Snake River steelhead (hatchery and wild combined), NOAA estimated the survival rate at 36.1%.[12] This is the fourth lowest estimate since 1997.[13]
    - For ***wild*** Snake River steelhead, NOAA estimated the survival rate at just 30.1%.[14]
    - The estimated survival of juvenile Snake River sockeye salmon (hatchery and wild combined) from the tailrace of Lower Granite Dam (*below the dam*) to the tailrace of Bonneville Dam was 37.3%.[15]

Snake River Salmon Are Not Recovering because the Snake River Dams Kill Salmon

- **Dams flood out salmon habitat.** Fall Chinook salmon spawn on the mainstem of the Snake River. The dams have flooded out about 85% of the 140 miles of mainstem spawning habitat.[16]
- **Dams kill or stun juvenile salmon as they pass through or over the dam structures.** [17] Stunned fish are easy prey for predators.

- **Fish ladders impede adult salmon moving upriver.** Fish ladders have narrow entrances that are difficult to find. They delay return migration. Once salmon have climbed the ladders, they must avoid being swept back over the spillway or into the turbines where they can be torn apart.
- **Dams increase water temperatures and disease.** The Snake River dams heat up the river by decreasing river flow. The stagnant lakes behind the dams soak up the sun and become heat reservoirs. Salmon stress at temperatures in the mid-60's F, and die at temperatures in the low-70's F. The four Snake River dams can add 6 to 12 degrees Fahrenheit to water temperatures.[18] Large salmon die-offs occurred in 2015 due to overheated river water.
- **Dams provide ideal conditions for predators.** The dams have changed cool, swift waters to deep, warm, stagnant pools that favor certain native species, such as the northern pike minnow.[19] The longer the migration in the warmer slack water reservoirs, the higher the loss of salmon to predators such as pike minnows.
- **Dams interfere with juvenile salmon physical development, which, in turn, interferes with their ability to adapt to the marine environment and can result in delayed mortality**.
- **Dams lengthen the juvenile downriver migration time**, **a large factor in juvenile salmon mortality.**

Dam "Solutions" Don't Work

- **"Fish Passage System Improvements" haven't worked.** Many expensive dam modifications and surface passage structures costing taxpayers nearly $900 million have been designed and installed, yet wild populations still are not meeting minimum survival objectives.[20]
- **Habitat improvements haven't worked**. Habitat improvement in the tributaries, without significant flow increases in the mainstem lower Snake River, will not permit salmon to recover. Indeed, "NOAA Fisheries acknowledges that the benefits associated with habitat improvement may not accrue for many years, if ever."[21]
- **Expensive hatcheries haven't worked to recover wild salmon.**
  - **Hatchery fish dilute wild salmon genetics, causing them to be less resilient.** This makes the hybrid fish less able to adapt to environmental challenges such as climate change, poor ocean conditions, high water temperatures, and parasites or pathogens.
  - **The pervasiveness and magnitude of hatchery production in the Snake Basin is a direct cause of the decline of the wild populations.**[22] Hatchery production now dwarfs natural production. Approximately **92%** of all salmon and steelhead smolts leaving the basin, and **85%** of adults returning to the basin, are hatchery origin.[23]
  - **Hatchery fish further harm wild salmon by competing for a finite supply of food and habitat and by transferring diseases.**[24] The millions of juveniles released from hatcheries seriously diminish the food supply available for wild juvenile salmon.
  - **Due to the influx of jacks and the dilution of the wild gene pool by hatchery fish, the overall size of individual fish returning to the Snake River and its tributaries has been declining.** As a result, it is becoming increasingly unusual to observe Chinook salmon in the 20-50 pound range.

- **Barging and trucking juvenile salmon around dams harms wild salmon populations and causes delayed mortality.**
- **Severe reductions in commercial and sport fishing have not stopped the decline of wild salmon populations.**
- **Increasing "spill" over the Lower Snake River dams to aid smolt migration downriver has not recovered the wild salmon runs.**

Breaching the Lower Snake River Dams Would Recover Wild Salmon

- **Breaching the dams would restore the natural Snake River ecosystem.** Hydropower would no longer create problems on the Snake River. Phasing out hatcheries would eliminate the dangers posed by hatchery fish. A natural flowing river would restore habitat. As hatcheries are phased out, hatchery jobs could be switched to habitat restoration jobs. Harvest restrictions would remain until not needed.
- **The mainstem fall Chinook spawning habitat would be recovered quickly, as would improved access to more than 5300 miles of prime spawning and rearing tributaries and streams.**
- **Water would be cooler, without the added heat of reservoirs and slower running water.**
- **A naturally flowing river would filter water more efficiently, creating better water quality.** Columbia River salmon, as well as Snake River salmon, would benefit from the increased natural flows and significantly better water quality.
- **Survival of juveniles and adults would increase, since their migration timing would no longer be thrown off.**
- **Quicker migration times would expose juveniles to fewer predators and pathogens.**
- **The adult salmon marine pump that transfers marine nutrients to the freshwater rivers would return, generating more food diversity**.

The Elwha River on Washington State's Olympic Peninsula is an excellent example of how rapidly a free flowing river can restore its watershed, and how rapidly salmon and other wildlife will return to an undammed river, if doubts remain about whether dam removal can restore an ecosystem.

Conclusion

The four lower Snake River dams must be breached in 2016 to provide wild salmon runs on the Snake River the best chance to recover. The more than $600 million that the federal agencies spend annually on salmon recovery measures have not worked. There are no fixes for the four deadly slack water reservoirs behind the dams. The options have run out. Dam breaching makes both economic and ecological sense. It will bring back to health the ecosystem that depends on this keystone species. It also provides the West Coast's iconic Chinook eating Southern Resident orcas the best chance at avoiding periodic starvation and extinction. The past decades have shown that throwing money at the dams in the hope that wild salmon will recover does not produce results. To continue to do so simply would be a waste of tax and ratepayers' money.

[1] *Draft Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement*, (1999), Appendix M, pp. M4 3-7, http://nctc.fws.gov/Pubs1/Eis/salmonmigration_snakeriver_draft99.pdf.

[2] See *e.g.*, *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 839 F. Supp. 2d 1117, 1131 (D. Or. 2011) ("[T]here is ample evidence in the record that indicates that the operation of the FCRPS causes substantial harm to listed salmonids. . . . NOAA Fisheries acknowledges that the existence and operation of the dams accounts for most of the mortality of juveniles migrating through the FCRPS.")

[3] Bonneville Power Administration, et al., *Federal Columbia River Power System Improvements and Operations under the Endangered Species Act –a Progress Report* (2013), pp. 2-3, 40-41, 51, https://www.salmonrecovery.gov/docs/FinalHydroSynthesisWithReview9-20-13.pdf.

[4] Columbia Basin Fish & Wildlife News Bulletin, *Snake River Sockeye: Lowest Return Since 2007, Captive Broodstock Program Increases Spawners*, September 11, 2015, https://www.cbbulletin.com/434944.aspx.

[5] While steelhead have the ability to migrate multiple times before dying, the potential for them to make a round trip through the dams more than once is assumed to be near zero. *Draft Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement, supra,* fn. 5, at M4-7.

[6] See Giles, D.A., et al., *Letter to the Honorable Jo-Ellen Darcy, Recovering Federally Endangered Killer Whales by Breaching the Four Lower Snake River Dams*, 1/14/15, https://srkwcsi.files.wordpress.com/2015/10/lettertodarcy.pdf.

[7] See NOAA Fisheries, West Coast Region, *Proposed ESA Recovery Plan for Snake River Fall Chinook Salmon* (*Oncorhynchus tshawytscha)* October 2015, pp. 34-36, http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/interior_columbia/snake/proposed_snake_river_fall_chinook_recovery_plan.pdf.

[8] Wild Fish Conservancy Northwest, *Scientific Evidence on Adverse Effects of Steelhead Hatcheries,* http://wildfishconservancy.org/what-we-do/advocacy/steelhead-hatchery-reform/scientific-evidence-on-adverse-effects-of-steelhead-hatcheries.

[9] Much of the juvenile loss occurs in the Lower Snake River hydrosystem. In 2015 the mortality rate for wild stock alone was 49%. For hatchery and wild Chinook salmon combined, the mortality rate through the Snake River dams was 32%. Further evidence that juvenile outmigration mortality through the Snake River dams has not decreased over time is NOAA Fisheries' acknowledgment in 2013 that, "Chinook survival through the hydropower system has remained relatively stable since 1999 with the exception of lower estimates in 2001 and 2004."The true juvenile mortality rates are much higher than the Corps, BPA and lobbyist groups' oft-repeated assertions of no more than 1%-5% mortality per dam.

[10] NOAA Memorandum, Zabel, R., *Preliminary Survival Estimates for the Spring-migrating Juvenile Salmonids through Snake and Columbia River Dams and Reservoirs*, 2015, 9/10/15, p. 2, http://www.nwd-wc.usace.army.mil/tmt/agendas/2015/1021_Preliminary_Survival_Estimates_Memo_2015_1021.pdf.

[11] *Id.,* pp. 2-4.

[12] *Id.,* pp. 3, 5.

[13] *Id.,* p. 5.

[14] *Id.,* p. 3.

[15] *Id.,* p. 4.

[16] U.S. Fish and Wildlife Service (USFWS). 2009. *Dworshak, Kooskia, and Hagerman National Fish Hatcheries: Assessments and Recommendations Appendix B: Briefing Document; Summary of Background Information. Final Report, June 2009,* Hatchery Review Team, Pacific Region. U.S. Fish and Wildlife Service, Portland, Oregon, pp. 10-11, http://www.fws.gov/pacific/fisheries/hatcheryreview/Reports/snakeriver/LowerSnakeNFHReview.AppendixB.June2009.FINAL.pdf.

[17] Miracle, A., et al., *Spillway-Induced Salmon Head Injury Triggers the Generation of Brain αII-Spectrin Breakdown Product Biomarkers Similar to Mammalian Traumatic Brain Injury*, (2009), http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0004491.

[18] Federal Agencies Break the Law: Dams Create Lethally Hot Water and Fish Kills, 7/31/15, p. 2, http://columbiariverkeeper.org/wp-content/uploads/2015/07/2015.07.31-temp-dams-press-release-final.pdf.

[19] *NOAA Fisheries, Invasive Species and Salmon: Interactions in the Pacific Northwest (2014),* http://www.nmfs.noaa.gov/stories/2014/07/7_21_14invasive_species_and_salmon.html.

[20] See fn. 2, *supra.*

[21] *NWF v. NMFS*, 839 F. Supp. 2d 1117, 1125 n. 3 (D. Or. 2011).

[22] *Idaho MU Recovery Plan—Draft Hatchery Discussions Snake River Spring/Summer Chinook Salmon and Steelhead*, pp. 2-4, http://www.westcoast.fisheries.noaa.gov/publications/recovery_planning/salmon_steelhead/domains/interior_columbia/snake/Idaho/Revised ID MU docs as of 10-22-14/4.3_hatchery.pdf*Id*., pp. 2-4.

[23] *Id*., p. 2.

[24] *Id*., p. 19.