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More Pieces of the Puzzle to the Life Cycle of Idaho Salmon and Steelhead

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The sight of wild spawning salmon racing across the shallows of a pristine Idaho wilderness stream is a rare sight in the 21st century.

My first opportunity to witness this primordial spawning ritual was in the late summer of 1984. As I was on staff of the Idaho Fish and Game (IDFG) McCall Summer Chinook Hatchery, we had the opportunity to assist other biologists with spawning ground surveys. First, we attended training in Bear Valley on Marsh Creek, a tributary of the Middle Fork of the Salmon River, near Stanley, Idaho. Following the training we would walk along and through several miles of remote mountain streams looking for active spawning pairs of salmon or completed Redds. A Redd is the site where salmon have spawned. The Redd is quite visible as a 4ft to 8ft circular clean spot on the darker colored mossy stream bed. The moss is cleaned from the river cobble as the female pounds her tail on the gravel to cover the eggs she has just deposited on the streambed.

Several years later, I had the opportunity to look over several miles of Alaska spawning grounds. The river bottom was so thickly covered with the spawned out carcasses of salmon that the river current had lined them up on the bottom, from shore to shore, like shingles on a

roof. This was the scene of an adequate annual replenishment of nutrients to a healthy and nourishment-rich spawning ground and early rearing area. I returned home to my new duty station IDFG Clearwater Fish Hatchery with an idea of how we could add nutrients to the spawning streams to help wild spawning salmon. We worked with our IDFG fish pathology staff developing a protocol to return the spawned-out carcasses from our Powell and Red River salmon spawning facilities to the historic spawning grounds in those drainages. IDFG research biologists evaluated these efforts along with releasing live salmon adults from our hatchery trap to spawn naturally in these areas. The evaluation was titled “Idaho Supplementation Study”[1]. After almost 20 years the study showed that our efforts were inadequate to reestablish sufficient nutrients to support a self-sustaining natural origin salmon population in the Clearwater River study areas.

The discussion of removing the four Lower Snake River dams to save Idaho salmon and steelhead has increased to a pulpit-pounding fervor. The message being given to the public is that the dams are the ONLY problem and breaching is the ONLY answer. Saving Idaho anadromous fish runs is a puzzle that is much more complex than breaching four dams.

During my aquaculture career, I worked at four salmon and steelhead hatcheries in the Fisheries Bureau of IDFG. I gained my knowledge of the life cycle of fish and fish health needs while spawning adults, monitoring egg development, rearing and transportation of over 33 million steelhead and 65 million Chinook smolts. To me it seems like

the proverbial cart is being put in front of the horse to press for the destruction and breaching of Lower Snake River hydroelectric dams to save salmon and steelhead. The highest numbers of salmon and steelhead ever counted over Bonneville dam and eventually arriving in Idaho occurred in 2001 to 2015 while all 8 dams downstream of Idaho were in place. Let me repeat that important statistic. The highest numbers of salmon and steelhead ever counted over Bonneville dam and eventually arriving in Idaho occurred in 2001 to 2015 while all 8 dams downstream of Idaho were in place. From my 36 years of first-hand experience of raising salmon and steelhead in Idaho Fish and Game hatcheries, I believe the public is being misled and convinced that the Lower Snake River dams are the only reason why wild fish populations are having difficulties recovering. We do have hundreds of miles of pristine waters in Idaho for anadromous fish spawning. These waters have been starved of nutrients and blocked for many decades from salmon and steelhead spawning access, by dams without fish ladders.

Oregon Fish Commission reports show that as early as 1866 these spawning waters have been starved of nutrients that are carried back to Idaho from the ocean by spawning adults. All salmon and the majority of steelhead adults die after spawning; leaving the nutrients they carried from the ocean in their bodies to decompose, adding essential nutrients to the ecosystem of the early rearing streams. This last ditch effort by the adults completes their life cycle supplying nutrients for their progeny. This loss of nutrients began even prior to the 1938 construction of Bonneville dam. Bonneville is the first dam

encountered by Idaho salmon and steelhead on their way home to their spawning grounds. Idaho Fish and Game's Clearwater Regional Fish Manager, Joe DuPont, explained during an eye-opening Salmon history presentation that prior to 1938 the processing at lower Columbia River salmon canneries peaked in 1883 when they removed over 42,799,000 pounds of Chinook salmon from the river. Joe's presentation showed us that as much as 60% of the Columbia River salmon run were bound for Idaho spawning grounds. This converts to Idaho spawning grounds being deprived of 25,200,000 lbs of nutrients that year.

Using this 60%, and the Oregon Fish Commission Reports beginning in 1866, *prior* to the 1938 completion of Bonneville dam, over 1.6 billion pounds of Salmon, destined to pristine spawning grounds of Idaho, were removed from the Columbia River and processed for human food[7].

This Chinook harvesting peaked with 42.7 million pounds in 1883 and 42.2 million pounds in 1884. Anthony Netboy author of " The Salmon, Their Fight for Survival" recorded this following statement:

> [In 1911, the catch peaked again at 46,629,000 pounds, with the other salmon species making up a large portion of the catch because the Chinook destined for the upper basin tributaries had been severely over fished.][7]

Annual takes of Chinook Salmon from the Columbia River finally fell below 20 million pounds around 1928, an entire decade prior to

construction of Bonneville dam. A steady decline in annual take continued until it fell to less than 7 million pounds in 1970.

According to the Oregon Fish Commission Reports from 1866 to 1970 a total of 1.73 billion pounds of Chinook Salmon destined for Idaho waters were removed from the Columbia River creating a sterile ecosystem to rear salmon and steelhead smolts. The word smolt refers to a part of the life cycle of salmon and steelhead juveniles (Spring Chinook average length 133 mm and Steelhead average length 182 mm) when they are ready to leave freshwater and migrate to the ocean.

It is staggering to try to comprehend this quantity of nutrients robbed from the spawning grounds, literally starving the ecosystem of the early rearing areas of the Salmon and Steelhead. This 157 years of nutrient depletion from 1866 until now has absolutely ***nothing*** to do with Lower Snake River dams. It is the results of the lust for the taste of Salmon and the greed for money. The removal of the four Lower Snake River dams **will not** add one Square foot of spawning habitat and nutrients for natural spawning and rearing of Spring/Summer Chinook and Steelhead in Idaho.

The next piece of the puzzle of the salmon and steelhead story is the Lower Snake River Compensation Plan (LSRCP) which funds the operation of ten salmon and steelhead hatcheries and 16 satellite facilities in Idaho, Oregon, and Washington. As part of the Water Resources Development Act of 1976 this compensation was for some

of the lost adult salmon and steelhead as a result of construction and operation of the four dams on the lower Snake River in WA[8]. These hatcheries provide spawning operations, incubating eggs, rearing juvenile salmon and steelhead to the smolt stage, and then transporting the smolts to the pristine headwaters and historic spawning grounds where they begin their trip to the ocean. These hatcheries and the hard work of hundreds of dedicated staff are the stop-gap measure to provide a missing piece of the puzzle from the life cycle of Idaho salmon and steelhead. This substitute for the missing piece is the hatcheries. They are the replacement for the missing essential nutrients that have been depleted in the early-rearing waters.

As an example of their stop-gap measure, the five Idaho hatcheries fed 357,807 lbs of feed to Brood Year 2005 Salmon and 896,951lbs of feed to Brood Year 2006 Steelhead. A total of 1,254,758 lbs. of feed was fed to the out-migrating smolts of 2007. [2, 3, 4, 5, 6]

During a Salmon / Dam Removal symposium held in Clarkston, WA, an Army Corps of Engineers (COE) representative was asked if the funding of the LSRCP hatcheries would continue if the dams were removed. The answer at that time was that the COE would no longer provide funding for the hatcheries since the funding was mitigation for operating the dams and, since the dams would no longer exist, the payment of mitigation dollars would end.

The removal of the four Lower Snake dams, along with the loss of funding and closing of the LSRCP hatcheries in Idaho, would be

catastrophic and lead to the demise of Idaho salmon and steelhead. Without the *full* restoration of the missing nutrients and providing access for spawning adults to utilize the pristine early-rearing waters of Idaho; *prior t*o closing hatcheries; the recovery of historic numbers of natural spawning salmon and steelhead populations in Idaho would be unlikely.

People who are insisting that the act of breaching the Lower Snake River dams alone will recover the numbers of salmon and steelhead returning to Idaho are providing misleading information. The recovery of historic numbers of salmon and steelhead to Idaho will require a *much* more complex solution than removing four dams.

The effect of the hydroelectric dams on salmon and steelhead returning to Idaho is only *one* piece of the puzzle of their life cycle and current situation.

With all of this said, concerning removal of Lower Snake River hydroelectric dams to save fish returns to Idaho, this " present emergency" seems like a distraction. Although this action is presented by some as important, removing the cleanest /greenest method of power generation **before** having it's replacement in *full* operation, AND failing to provide restoration of nutrients to Idaho salmon and steelhead spawning/early rearing streams, amounts to reckless abandonment of nutritional needs of the juvenile salmon and steelhead, and the social-economic welfare of the northwest.

Recently I was asked, “ To what do you attribute the tremendous success of the 2001 salmon and steelhead return ?”

- From 1980 to my retirement in 2016 anadromous aquaculture staff were working on research every year to increase the quality of the smolts, perfecting transportation and best timing for release of the smolts just to name a few.
- At the same time the C.O.E. and their fisheries Biologists and technicians at the dams were conducting research and striving to perfect the survivability of the smolts to the estuary. Their discoveries lead to fish friendly modifications and operations of spillways, power generation turbines and fish ladders. They consulted with water quality specialists to develop giant transportation barges to safely and efficiently transport young smolts through unhealthy environmental conditions and predator filled waters.
- For the smolt outmigration of 1998, 1999 and 2000 everything was firing on ALL cylinders to produce the adult return of 2001.
- I believe it’s that same old puzzle….many, many pieces ….. **SOME** pieces man can do something about **SOME** pieces man can not. We should focus on the ones you can affect.

The recovery of historic numbers of Salmon and Steelhead to Idaho will require a *much* more complex solution than any one single action.

In closing, I would like to repeat that the highest number of Chinook and Steelhead ever counted over Bonneville dam occurred in 2001 while ALL 8 dams were in place. Let's focus on what we were doing at that time and repeat the success.

From my observation it is ***past*** time for people to take a deep breath, step back and determine ***all*** the details of what contributed to the historic number of salmon and steelhead returning to Idaho from 2001 to 2015.

WE SHOULD DO ALL WE CAN TO DUPLICATE THESE ACTIONS AND SAVE OUR FISH AND DAMS.

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