Restoring Sockeye Salmon to the Yakima River Basin.

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Stray Sockeye at Roza Dam, Yakima R., July 17, 2002

Abstract

Prior to 2008, returns of sockeye salmon to the upper Columbia Basin numbered 50,000 or fewer in 14 of 22 years. Of the historic sockeye nursery lake habitat in the Upper Columbia, only about 4% is presently utilized with only two (Wenatchee and Osoyoos) of 12 historic nursery lakes presently producing fish. Four nursery lakes in the Yakima River Basin, which historically produced an estimated annual return of about 200,000 sockeye, were removed from production in the early 1900s when irrigation storage dams were constructed without passage. Work conducted by the National Marine Fisheries Service from 1987 to 1993 in Lake Cle Elum returned from 4 to 20 sockeye adults to the base of Cle Elum Dam demonstrating that sockeye restoration was feasible with sufficient passage modifications. In 1994 the Yakima River Basin Water Enhancement Project Act was passed providing for increased storage capacity in Cle Elum reservoir including provisions for developing fish passage alternatives. In 2006-2007, the Yakama Nation and the Bureau of Reclamation conducted additional feasibility work using a temporary juvenile passage flume and coho salmon as surrogates. Over 25% of the coho smolts released into Lake Cle Elum successfully migrated using the flume and 1.5% of the known 2006 outmigrants returned as adults to Prosser Dam in 2007. Based on the success of this prior work, the Yakama Nation negotiated an agreement with the *U.S. v Oregon* parties to transplant adult sockeye from Priest Rapids Dam to Lake Cle Elum contingent on run size. One thousand adult sockeye were transplanted in the summer of 2009 and 2,500 in 2010 . The sockeye successfully spawned in tributaries above the Lake in both years becoming the first sockeye to spawn in the Yakima Basin in over 100 years. Juveniles from the 2009 brood were observed migrating downstream at Roza and Prosser Dams in 2011. Preliminary data from trapping operations at Prosser indicated a 2011 smolt outmigration of approximately 100,000 sockeye. The Yakama Nation intends to continue this effort, and with restoration of adult passage to Lake Cle Elum, the region could see a self-sustaining sockeye population returning to the Basin within 25 years.

Need for Additional Populations and Restoration Efforts

Since the listing of Snake River sockeye salmon in 1991, the Columbia Basin's sockeye restoration efforts have consisted primarily of a captive broodstock program focused on restoring sockeye to Stanley Basin. In 2006, the Independent Scientific Review Panel (ISRP) concluded this effort was unlikely to succeed (ISRP 2006-6).

In a January 2007 memorandum discussing the role of large extirpated areas in recovery, the Interior Columbia Technical Recovery Team noted that "Snake River sockeye are currently restricted to a single extant population. The probability of long-term persistence of the [evolutionarily significant unit] ESU will be greatly enhanced with additional populations. In fact, the ESU cannot meet the minimum ESU biological viability criteria established by the TRT without multiple viable populations." The National Research Council's "Upstream" report (1996) concluded that "maintaining a metapopulation structure with good geographic distribution should be a top management priority to sustain salmon populations over the long term."

The Subbasin Plan for the Upper Middle Columbia River Mainstem cited the Northwest Power and Conservation Council's (NPCC) 2000 Fish and Wildlife program in establishing the vision for that subbasin: "There is an obligation to provide fish and wildlife mitigation where habitat has been permanently lost because of hydroelectric development. Restoration of anadromous fish into areas blocked by dams should be actively pursued where feasible." Clearly, restoring sockeye to additional Columbia River nursery lakes is consistent with regional mitigation obligations and the best available science on Columbia River salmon recovery.

Restoration Potential in the Yakima Subbasin

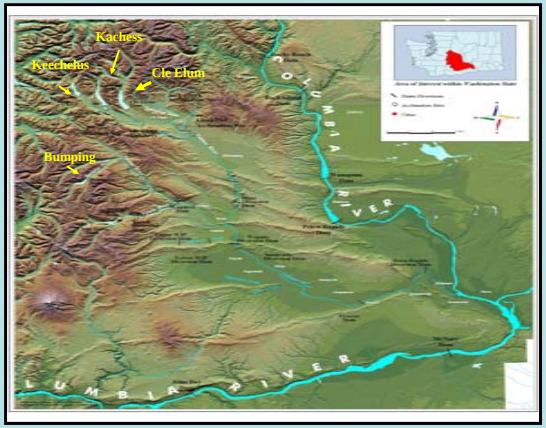

Fig 1. Location of Historic Sockeye Nursery Lakes in the Yakima River Basin.

Four nursery lakes in the Yakima River Basin (Fig. 1), which historically produced an estimated annual return of about 200,000 sockeye, were removed from production in the early 1900s when irrigation storage dams were constructed without passage.

Between 1987-1993, the National Marine Fisheries Service (NMFS), Northwest Fisheries Science Center, annually outplanted about 100-350,000 sockeye salmon juveniles at Cle Elum Lake to study the feasibility of restoring sockeye salmon to the Yakima River Basin (Flagg et al. 2000). Merwin trapping efforts in Lake Cle Elum during spring 1990-1993 indicated that in most years juvenile sockeye salmon outplanted to the lake survived and grew well. Investigation of fish passage from the tailrace of Cle Elum Dam through the Yakima River system during 1989-1993 suggested there were no severe blockages to migration of sockeye salmon in the Yakima River system downstream of Cle Elum Dam during the normal late-March to early-May period of smolt outmigration for sockeye salmon in the Columbia River Basin. However, fish passage studies at Cle Elum Dam during spring 1989-1993 suggested a fish passage problem at the dam during much of the outmigration period. The results of the studies suggested that, if mechanical traps and fishways were constructed at Cle Elum Dam, sockeye salmon could be restored to Cle Elum Lake.

Current Restoration Effort

As part of water storage improvements under Section 1206 of the 1994 Yakima River Basin Water Enhancement Project Act, Title XII of Public Law 103-434, the Yakama Nation, with the cooperation of the U.S. Bureau of Reclamation, is now actively pursuing the restoration of anadromous fish passage above Cle Elum Dam. The BOR estimated sockeye smolt production potential of 400,000 to 1.6 million fish in the Cle Elum Lake watershed (Fig. 2), with a projected return of 30,000 to 50,000 adult spawners assuming average survival and median pool elevation (Grabowski 2007). Based on this and other feasibility work, a temporary juvenile fish passage flume (Fig. 3) was constructed at Cle Elum Dam in 2006. The Yakama Nation tested passage through this flume in 2006-07 using coho salmon (*O. kisutch*) as surrogates. Approximately 10,000 coho smolts were released annually and passive integrated transponder (PIT) tags were used to evaluate survival. Over 25% of the smolts released into Lake Cle Elum in 2006-2007 successfully migrated using the flume and 1.5% of the known 2006 outmigrants returned as adults to Prosser Dam in 2007.

Fig 2 (L). Lake Cle Elum Watershed and Fig. 3 (above) Temporary Passage Flume.

Based on the results of this feasibility work, the Yakama Nation worked with co-managers to implement a sliding scale plan to collect adult sockeye (Wenatchee and Okanogan R. [Osoyoos] populations) at Priest Rapids Dam. Researchers believe a strategy that includes the genetic and environmental backgrounds of both upper Columbia populations offers the greatest opportunity for success in the Yakima River Basin. In July of 2009 and 2010, 1,000 and 2,500 adult sockeye respectively were collected at Priest Rapids Dam, transported, and released in Lake Cle Elum. Biologists tracked fish to the spawning grounds, observed abundant spawning activity (Fig. 4), and documented redds. In 2011, smolt outmigrants were observed at the Roza (Fig. 5) and Chandler (Prosser) juvenile sampling facilities. Biologists projected the 2011 Yakima Basin sockeye smolt outmigration could number 100,000 fish. The transfer program is expected to continue for several years with localized returning adults collected at Roza Dam also transported and released above Cle Elum Dam. The Yakama Nation will continue to work with the BOR and other Basin partners to ensure that permanent juvenile and adult passage facilities are constructed at Cle Elum Dam so that this restoration effort will eventually result in a self-sustaining population.

Fig 4. Adult Sockeye spawning in the Cle Elum R. near Cooper Lake Bridge for the first time in over 100 years.

Fig 5. A brood year 2009 Sockeye smolt migrating downstream at Roza Dam, May 10, 2011. Photo courtesy of Gordon King, Yakima Herald-Republic.

References

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