



Independent Scientific Review Panel
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Memorandum (ISRP 2009-16)

April 30, 2009

To: Tony Grover, Fish and Wildlife Division Director, Northwest Power and Conservation Council

From: Eric Loudenslager, ISRP Chair

Subject: Review of the Lake Roosevelt Fisheries Guiding Document

Background

On March 19, 2009, the ISRP received a request from the Northwest Power and Conservation Council to review the *Lake Roosevelt Fisheries Guiding Document* dated March 2009 and prepared by the co-managers of Lake Roosevelt: the Spokane Tribe of Indians, the Colville Confederated Tribes, and Washington Department of Fisheries and Wildlife. Development of the guiding document was a requirement included in the Council Recommendation for Fish and Wildlife Program projects Spokane Tribal Hatchery 1991-046-00, Sherman Creek Hatchery 1991-047-00, Chief Joseph Kokanee Enhancement Project 1995-011-00, and Ford Hatchery 2001-029-00. Council instructions to the fisheries managers of Lake Roosevelt were specific: *“Require that the Spokane Tribe, Colville Confederated Tribes, and Washington Department of Fish and Wildlife finalize their joint guidance document for review by the ISRP and Council by September 2008. The managers should develop a coordinated and scientifically justifiable approach as part of the guidance document. Production goals and objectives must include standards for survival, harvest, and escapement, and not just pounds of fish produced and released from a hatchery.”*

These requirements from the Council were a consequence of the ISRP’s last review of the Lake Roosevelt Kokanee Program ([ISRP report 2007-10](#)), that concluded: *“there is no scientific justification to continue artificial production of kokanee for stocking Lake Roosevelt or programs to develop and support naturally produced kokanee. However, the ISRP believes that if it could be conclusively demonstrated that the entrainment problem was controlled or significantly reduced, if the walleye population was significantly reduced and managed, and if drawdown levels were reduced or managed, then artificial production and/or support of natural production of kokanee could be re-initiated.”*

This review evaluates whether managers have successfully addressed these three elements. We also evaluate whether the Guiding Document contains biological

objectives for kokanee releases and a timeline setting an end-point to artificial production if the project goals are not met.

ISRP Recommendation

Does Not Meet Scientific Review Criteria

The ISRP finds that the Lake Roosevelt Guiding Document does not provide scientific justification for continuation of the kokanee hatchery program.

An adequate guiding document would include:

1. a summary of comprehensive biological information on the fish population dynamics, trophic relationships, food webs, and nutrient processes that determine kokanee life-stage survivals, abundance, and fishery yields in Lake Roosevelt;
2. the fishery program goals for kokanee and a timeframe for closing the gap between the current state and desired state of the resource;
3. using the life-stage survival information from (1) above, development of a strategy to reduce mortality attributed to each limiting factor sufficient to achieve the program goals (the adaptive management experiment); and
4. an outline of a monitoring plan sufficient to estimate the importance of biological and environmental parameters thought to determine kokanee abundance, escapement, and fishery yields in Lake Roosevelt.

Review Summary

Factors Limiting Kokanee in Lake Roosevelt

The 2007 ISRP review suggested that if entrainment, walleye predation, and reservoir water levels effects on kokanee were adequately understood and addressed, releasing hatchery kokanee to provide a fishery might be feasible. The Guiding Document does not directly address these major limiting factors (i.e., entrainment, walleye predation, and drawdown) that may be impeding establishment of a successful kokanee fishery in Lake Roosevelt. It does, however, outline objectives and strategies for reducing the impact of several of them. A discussion of whether each limiting factor is adequately addressed by the Guiding Document is presented below.

1. Entrainment

The conclusion that entrainment was a significant source of loss for juvenile kokanee seems to be based largely on the past observations that large numbers of kokanee end up below Grand Coulee Dam. Acting on the likely supposition that entrainment was a significant cause of loss, managers have tested various strategies that would reduce these entrainment losses, mostly involving alteration of the size, location, and date of release of hatchery kokanee juveniles. The sponsors observed some increase in adult escapement but no increase in harvest of hatchery fish when the date of release was shifted from the

period when the reservoir was drawn down to the time when the reservoir was refilling, and yearlings were released rather than fry. The managers' conclusion is that increased escapement resulted from reduced entrainment loss, although there does not seem to be direct evidence of actual changes in entrainment loss prior to and after institution of a new release strategy. The managers' supposition certainly would be strengthened if this crucial information was obtained.

The sponsors, as yet, have not directly addressed entrainment losses through modification of operations of Grand Coulee Dam. They propose to do so as a strategy in the Guiding Document, but they did not suggest what operational modifications would be enacted. Grand Coulee is used for flood control as well as hydroelectric production and is drawn down in the late winter through early spring to accommodate spring flows. Water releases in the summer are done to facilitate outmigration of salmon smolts in the lower river, and for irrigation and other uses. Given these needs and uses, coupled with an incomplete assessment of entrainment losses, it seems uncertain that managers and stakeholders will accept major modifications in dam operations to increase kokanee survival in Lake Roosevelt. In the Guiding Document the sponsors do not discuss how they would achieve buy-in for hydro modifications from other river users to benefit kokanee if they have the potential of seriously jeopardizing other river uses. This may limit options for hydro modifications available to Lake Roosevelt managers.

2. Walleye Predation

The sponsors are rightly concerned about the potential threat that walleye predation poses for kokanee survival. The walleye population in Lake Roosevelt has shown continual increases concurrent with decline in kokanee, suggesting indirectly that walleye predation is a serious problem. However, the direct evidence that walleye predation is a major source of mortality of juvenile kokanee in Lake Roosevelt is not extensive. Little appears to be known about walleye population size, seasonal distribution of walleye in the reservoir, recruitment, and size-specific predation rates on kokanee. The importance of predation relative to other possible sources of mortality apparently also is unknown. Thus, important information that would guide, justify, and be used to assess management actions was lacking, and is required.

To reduce predation of walleye on kokanee the walleye bag limit was increased from five to eight fish per day beginning in 2006. The regulations target smaller fish and allow only one fish over 22 inches to be harvested. Little evidence is provided to support the contention that the proposed increase in walleye harvest would significantly reduce predation mortality on kokanee. The amount of reduction in walleye population density needed to substantively increase kokanee survival was not given and apparently is not known. Without detailed knowledge of walleye population dynamics in Lake Roosevelt and predation rates (and simulation modeling of trophic dynamics as was done for northern pike minnow in the lower Columbia reservoir, followed by adaptive management experiments, examination of results, and further modeling/experimentation) it would be difficult to determine how much the walleye population would need to be reduced to substantially benefit kokanee. This crucial information is lacking and

consequently the belief that the changes in harvest regulations that were instituted for the purpose of reducing walleye predation on kokanee remains to be verified.

Walleye support an important fishery in Lake Roosevelt at this time. The sponsors indicate that ~40% of anglers target walleye, and these fish were 40 to 63% of the catch. The sponsors imply that viable fisheries for both walleye and kokanee can be maintained in the reservoir and at the same time walleye populations can be reduced to levels that will decrease predation on kokanee enough to substantially increase their survival. These goals may be in conflict; achieving both the goals may not be possible. The sponsors provide little convincing evidence that both goals can be achieved simultaneously.

3. Drawdown

The ISRP's concern about drawdown is in many ways similar to the concern about entrainment. Data on the actual effects of drawdown on kokanee survival and recruitment of naturally spawning populations is limited. Specific modifications of the hydrosystem to reduce mortality are not discussed and buy-in by rivers users and downstream managers was not considered in the Guiding Document.

Justification for Continuation of Kokanee Hatchery Program

The Guiding Document asserts that “the post-smolt program has successfully created a put-and-take fishery in the middle reservoir from fish released from the Fort Spokane boat launch...” (page 32). However, only 30 kokanee were caught in a derby in 2006, and the overall catch of kokanee reported in Pavlik-Kunkel et al. (2008) remains low. The statistics reported need to be expanded to annual reservoir-wide estimates of harvest. This estimate can then be compared to the 35,000 harvest goal so an evaluation of how much gain is needed to achieve the program's desired endpoint can be performed.

The Guiding Document would be easier to follow and provide better justification for the Lake Roosevelt program if the sponsors had summarized the life-stage survival of kokanee, data on the carrying capacity of the reservoir to support released fry, and yield to fisheries in Lake Roosevelt and compared these to both natural and hatchery supported kokanee fisheries in other U.S. lakes and reservoirs. The summary should also identify the changes in abundance and survival of kokanee in some of the other kokanee programs. This background would establish the assumptions about the kokanee life-cycle and fisheries yields that could then serve as justification for the Lake Roosevelt program. It is noteworthy that there is not a single citation of success or failure of kokanee fisheries in other lakes and reservoirs and the document does not refer to the scientific literature.

Post-release Biological Objectives and Decision Path for Kokanee Artificial Production Program

In the 2007 report the ISRP also noted that *“The kokanee component of the Lake Roosevelt projects has yet to establish explicit post-release biological objectives. Further, the projects have yet to establish a timeline and decision path to determine when to continue or discontinue the efforts to produce a kokanee fishery using artificial production.”*

The sponsors provide numerical harvest and escapement goals and, to their credit, a timeline for assessing success. Some of the specifics are deficient, however. For example, one of the Harvest Goals in section VI. includes an annual harvest of 25,000 yearling hatchery origin kokanee. There is no schedule for incrementally reaching this goal or indication that this part of the program will be suspended if these goals are not met. The harvest of kokanee stocked as fry will terminate by 2020 if the harvest goal is not met. While numerical goals and a timeline are highly desirable, the sponsors provide little information or rationale for why these targets were selected. For example, how were the extremely low harvest goals of only 5% of yearling origin fish and 0.5% of fry origin fish determined? The analytical methods for determining the numerical harvest goals and timeline were not discussed extensively, as they should have been, and consequently there is a question about how reasonable and meaningful the goals are and whether there is any chance of achieving them.

The Guiding Document would be improved if targeted trends in abundance (e.g., percent increase in escapement per generation) as well as specific escapement and harvest goals were given. If a significant positive trend in escapement and harvest were demonstrated, even if specific targets weren't reached within the given time frame, an argument that the program was on the pathway to success would be strengthened.

Another part of the hatchery plan is to “supplement the Sanpoil River with kokanee.” The proposal includes releasing up to 500,000 kokanee fry (elsewhere in the proposal this is indicated as an eyed egg release) into the Sanpoil River, with the intent that those fish will migrate to the reservoir, remain there throughout their development and return as adults to the Sanpoil River. The assumptions for this release strategy are that the fish will be less susceptible to entrainment out of Lake Roosevelt following their migration from the Sanpoil River, and that they will distribute to and reside in the portion of reservoir that offers the best habitat and survival opportunities for kokanee.

Supplementation of the Sanpoil River should not require annual ongoing fry or eyed egg plants. Success at creating a spawning migration should be achieved within two generations. Locations like the Metolius River in Oregon, Taylor Creek (Lake Tahoe) in California, and Fish Hook Creek (Redfish Lake) in Idaho produce sufficient kokanee juveniles for seeding lakes and reservoirs. If the Sanpoil watershed is adequate for spawning, egg incubation, and juvenile production, and Lake Roosevelt has capacity and environmental conditions for survival of juveniles to adults, establishing a self-sustaining population should be accomplished within a decade. This program should use existing

culture facilities. Termination dates should be established for the Sanpoil supplementation program.

Conclusions

The ISRP appreciates the forthrightness with which the sponsors discussed the successes and failures of the program to restore kokanee in Lake Roosevelt. The kokanee hatchery program in Lake Roosevelt has shown only limited success, despite many years of attempts to improve adult recruitment and return to harvest. The apparent causes of the decline are complex, interconnected, and not well understood. Dealing with these problems in a substantive way may require major actions by managers (e.g. significant hydro modifications and/or substantial reductions in walleye abundance that would require continual efforts to maintain). Managers have sought a solution to the problem by assessing various release strategies involving variations in kokanee size and location and time of release in the hopes that one of the variations would improve escapement and return to harvest. The sponsors propose to test one more strategy - another variation of previous release strategies based on altering size, date, and location of release - and assess it over a ten year period (until 2020). The ISRP would be more convinced that these efforts were worthy of experimentation if simulation modeling of the reservoir ecosystem, its operations (with regard to entrainment and drawdown), and kokanee/walleye interactions, suggested there may be some benefit. Such modeling might also be useful in identifying information gaps and monitoring requirements for the future.

The approach taken by managers to date – testing various release strategies, each with limited or no success – seems almost “trial-and-error,” although there were legitimate hypotheses to justify testing. Information from rigorous biological studies to evaluate management alternatives is limited. The management approach to recover kokanee would be better justified if these studies had begun when the potential causes for the decline in kokanee were first observed and solid data were available to support management conclusions and suggest viable approaches to resolution of the problem. The success of the most recent strategy that the sponsors propose to test is highly uncertain. The ISRP concludes that a new ten-year assessment of yet another strategy with highly uncertain results is unwarranted, given the limited success to date.

The management goals and objectives of the project, to develop a kokanee hatchery program that will meet escapement and harvest goals while maintaining a viable walleye fishery and, it seems, with few or no modifications to hydroelectric operations at Grand Coulee is highly ambitious and may not be attainable. The objectives of maintaining both viable and harvestable kokanee and predator populations could easily be conflicting. The ISRP advises that serious consideration be given to substantially modifying fishery management goals for Lake Roosevelt. A reservoir management simulation modeling approach that included limnological and population dynamics aspects of kokanee and walleye would be of benefit towards identifying gaps, allow probing questions on tactics, suggest useful experimental approaches, and help define monitoring requirements.