HATCHERY IMPACTS TO CR BASIN SALMON HARVEST AND CONSERVATION

Presented For Consideration to the CBC – Hatcheries & Harvest Workgroup

By Brad Halverson, Past Chair OHRC Board

FOREWORD:

We have relied on hatchery production in the Northwest for more than 150 years to mitigate for unstainable commercial harvest initially, then for lost habitat due to human population growth and finally mortality impacts from hydropower projects in the region.

While hatcheries were first introduced to mitigate for declining salmonid populations, they are now often implicated in sustaining this decline. Studies have associated ***ecological*** risks of hatchery production causing greater predation on wild stocks and greater competition for rearing and spawning habitat; in addition to the ***genetic*** risks of lost productivity and diversity due to interbreeding in the wild between hatchery origin (HO) and natural origin (NO) fish.

Several peer reviewed studies are generally accepted showing causal linkage between interbreeding and lost fitness in future generations of NO fish. However, alternate but equally compelling scientific scholarship demonstrates that diminished fitness may be non-existent, or there may be drivers (ecological) other than genetic of this decline. Further, strict adherence to select scientific research may lead to ambiguous policy, due to variance in experimental designs, base assumptions, and methodology used to interpret the data. One isn't right. One isn't wrong. They're just different and must be embraced as equally worthy for policy consideration. Optimum solutions are derived by consensus and compromise from competing interests. We must ask ourselves, though, what consensus looks like when people dispute the science.

This challenge is unlikely to be resolved until large scale actions are implemented and monitored over long periods of time to inform adaptive management. But, the urgency of our task hinders such a delayed resolution. Rather, we are obliged to strive for more immediate optimal rather than perfect solutions to influence CR basin salmonid recovery. And, with regard to hatchery program size, optimization occurs when **harvest opportunities** are not inefficiently reduced in the pursuit of **conservation effects**.

The Columbia Basin Partnership identified seven factors limiting salmon recovery: tributary habitat; estuary habitat; hydro system impacts; blocked migration corridors; predation; harvest; hatcheries. Even for those ESA-listed stocks in the greatest peril, the two least limiting factors to recovery are harvest and hatcheries – both of which are presently being managed for conservation.

HATCHERY IMPACTS IN THE CR BASIN:

1. For Harvest:

The influence of hatchery production for harvest in this region is profuse. Over 75% of harvestable fish in the basin are HO. The target recovery abundance for NO stocks is that level necessary to sustain "healthy and harvestable fisheries," which is a substantial increase from present day

abundance. Therefore, we must rely on ***hatchery production*** to sustain ***harvest opportunities*** if and until that threshold is crossed.

Harvest is essential to sustain the engagement and support of the sports and commercial angling communities as well as fulfill the sovereign nations' treaty rights. A substantial element of Oregon's, Washington's and Idaho's state fish and wildlife agency budgets is funded from angler license fees, ex-vessel values on commercial catch, and excise taxes on all gear sold for both of these fisheries. The Columbia River Endorsement alone (just under $10/licensee) has provided millions of dollars in revenue to the Oregon agency budget since 2013. It is credulous to surmise as harvest opportunities diminish so too will angling participants.

Guy Norman stated "harvest is managed for conservation." Several charts of data from the CBP Phase 2 Report substantiate that. Tucker Jones stated that fisheries do not impart the mortality impact as some perceive, and that as stated above we need harvest for engagement to insure an essential source of revenue. So, if we can build consensus that harvest is crucial to the health of the resource, and it is dependent on hatchery program scale, we can conclude *hatchery impacts on harvest in the Basin are substantially positive*.

2. <u>For Conservation:</u>

However, the intersection of hatchery production and conservation is a different discussion, and produces diverse conclusions based on the science used to influence policy. Hatchery management is risk management. And, the leading risk metric for hatchery programs is pHOS (percentage of hatchery origin spawners). This assumes there are risks in using hatcheries to augment harvest or supplement stock status. It further assumes the crucial risks are genetic. Again, there is credible evidence neither of those assumptions is entirely accurate. However, because of ESA impositions and conforming federal mandates from HGMP's to fashion hatcheries compatible with ESA listings, we must accept them as the basis of our effort, rather than debate their merits in this forum.

Here, it is important to differentiate between ***segregated*** programs and ***integrated*** programs, because different levels of genetic compromise are associated with different levels of pHOS for each. We are managing gene flow with both. pHOS is the marker for gene flow from the hatchery to the wild, while pNOB (proportion of natural origin broodstock) is the indicator for gene flow from the wild into the hatchery. The intent with segregated hatchery programs is to establish two separate populations with zero or limited gene flow between them. Here pNOB is zero and pHOS is limited (to ≤ 10%) by controlling spatial and temporal interactions, and straying. Integrated programs, on the other hand, strive to create a single population that exists in both environments (hatchery and wild). Risk is mitigated by achieving a specific PNI (≥ 50%), which stands for proportionate natural influence, and is manipulated by increasing pNOB, decreasing pHOS or both. With a greater use of NO fish in the brood, pHOS levels as high as 30% have demonstrated little compromise to the desired gene flow between the two environments.

Managing hatcheries for conservation in light of ESA mandates requires that we manage the risk metric of pHOS. Program size is traditionally the easiest lever to pull to manage pHOS. But, it's not the only one. And, to achieve the optimal scale of hatchery production whereby harvest opportunities are not abridged in order to achieve conservation targets, they merit equal scrutiny. Other manipulators of pHOS to consider therefore are:

(a.) regulating the composition of the broodstock between HO and NO spawners;

(b.) limiting the returns of HO fish to the wild by greater use of marked-selective fisheries, and efficient use of diversion dams and weirs at the facility site;

(c.) effectual acclimation and release protocols of juveniles to restrict suboptimal spawning locations for adult hatchery returnees.

PROPOSAL:

1. Consider the highest priority stocks from the NOAA white paper ***Rebuilding Interior Columbia Basin Salmon and Steelhead***, and prioritize rebuilding actions for those populations.
    a. Using Table 4b we can view the intersection of low stock status populations and those corresponding stocks where hatcheries are considered Priority 1 or 2 for recovery.
    b. Thus, we observe that three populations require prioritized hatchery management:
        (i.) Upper Columbia Spring Chinook
        (ii.) Upper Columbia Steelhead
        (iii.) Upper Columbia Summer Chinook
2. Next, identify and evaluate those hatcheries associated with these three stocks and prioritize those levers of hatchery risk management listed above (other than program size where possible) that will sustain favorable recovery objectives for these select populations, and implement them.

CLOSING COMMENTS:

While we as the Hatcheries and Harvest Work Group of the Columbia Basin Collaborative are certainly tasked with the obligation to offer consensus action steps to aid wild salmon recovery as it might be influenced by hatchery and harvest practices, we may, however, pragmatically consider only a limited scope of actions for implementation because the Columbia Basin Partnership Data identifies hatcheries and harvest as somewhat limited in constraining recovery, and both disciplines are presently being managed for conservation due to constraining legal requirements.

What might be a prudent expenditure of our energy would be to explore alternative sustainable sources of revenue to fund hatchery facility maintenance and modernization and the endeavors of Monitoring and Evaluation (M&E) needed to inform adaptive management into the distant future.