



Conclusions

THE FUTURE OF HATCHERIES

Because of its Congressional mandate, the Hatchery Scientific Review Group (HSRG) has had a unique opportunity over the last four years to intensively study all aspects of salmon and steelhead hatchery management in Puget Sound and coastal Washington.³⁴ As a result, the HSRG has formulated a number of conclusions about hatcheries and how they should be operated:

- Hatcheries do have a role in the future, as **part of an integrated strategy** (alongside harvest management and habitat protection/restoration) to meet conservation and harvest goals on a sustainable basis.
- Hatcheries of the future must be different from those of the past. There is both need and opportunity to make them better by ensuring that they are more consistent with ecological and genetic/evolutionary principles.
- Sustainability of salmon stocks and harvest opportunities in the Pacific Northwest must be based on protection and restoration of natural populations and their habitats. Hatcheries cannot be simply regarded as surrogates for lost habitat.
- Hatchery programs must be planned and operated with consideration of the potential for genetic and ecological interactions with natural stocks.
- Hatcheries are by their nature a compromise, a balancing of benefits and risks to the target stock, other stocks, and the environment affected by the hatchery program. A hatchery program is the right solution only if it is better, in a benefit/risk sense, than alternative means for achieving the same or similar goals.
- A detailed set of operational guidelines for all hatchery programs should be adopted and implemented by the co-managers. These guidelines should address all life stages of propagated fish, be derived from an explicit scientific framework, and be tailored to the specific purpose (conservation and/or harvest) and type (integrated or segregated) of each hatchery program.
- While all hatchery programs are classified by intent as either integrated or segregated, most programs do not achieve the guidelines for proper integration or proper segregation. Plans should be developed and implemented for each program to meet those guidelines.

³⁴ The HSRG met monthly for four years, typically for three days, and systematically reviewed over 200 hatchery programs.



- The performance of each hatchery program should be routinely evaluated and reported. This evaluation should address consistency with resource goals and coordination with other strategies to meet those goals. A system for effective and timely collection, analysis and dissemination of data and information must be implemented.
- A research agenda must be established to guide funding for applied hatchery research in the Pacific Northwest. This agenda must be directed towards an increased understanding of the benefits and risks from hatchery programs. Knowledge and information gained from this research should be incorporated into an explicit and comprehensive scientific framework that informs decision-making.
- Hatchery programs and resource management plans should be consistent with the principles of: 1) establishing well-defined goals, 2) being scientifically defensible, and 3) using informed decision making. Implications of this include:
 - Hatchery programs must have well-defined goals to direct their operations and permit meaningful program evaluation. Once the goals for the resource have been established, a scientific rationale for designing, building and/or operating each hatchery and hatchery program must be developed to guide the hatchery program in achieving its desired outcomes. The use of hatcheries as part of the strategy to meet these resource goals must be scientifically defensible.
 - Integrated hatchery programs are linked very closely to a naturally spawning stock. For these programs, some broodstock must be derived from the natural stock, and broodstock collection and hatchery operations must be consistent with allowing the natural environment to drive the adaptation of the combined natural-/hatchery-origin population.
 - Local adaptation is important for the sustainability of all populations. Thus, stock transfers between watersheds are likely to interfere with local adaptation and should be avoided. Hatchery broodstock should be managed to foster local adaptation.
 - The sizing of hatchery programs (number of fish released) should take into account current and expected future conditions of the available habitat (including habitat limitations), potential genetic and ecological interactions with natural stocks, as well as economic and cultural goals. Hatchery program should always be sized to take into account the potential for negative effects on naturally spawning stocks and the environment.
 - Hatcheries can impair existing habitat and naturally spawning fish, by virtue of their associated structures. In designing hatcheries, particular care should be taken so that water intakes, effluent treatment facilities, juvenile release locations and adult collection structures do not impair habitat or naturally spawning fish.



- Because of inevitable uncertainty, hatcheries should be designed for flexibility and their operations adapted to changing environmental conditions, stock status and new scientific information.
- To be successful, hatcheries must develop and maintain an up-to-date and unified database that allows resource managers to regularly evaluate and adjust hatchery programs, taking into account changes in the status of natural stocks, the carrying capacity of receiving waters, ocean productivity and harvest needs.
- All watersheds are different. Thus, hatchery programs must be designed and operated consistent with current and expected future condition of habitats and the natural stocks that depend on those habitats.
- Hatcheries must take into account the programs of other hatcheries occurring in the same watershed or region, so that they are complimentary to each other and are collectively consistent with resource goals in the watershed or region.
- The value of hatcheries can no longer be judged solely by the number of fish released and returning. Rather, hatchery programs should also be evaluated based on: 1) the degree to which they have taken into account the ecosystems they might effect, 2) their willingness to adapt to changing conditions in those ecosystems, both freshwater and marine, 3) whether they are indeed the “best” strategy for meeting resource goals, and 4) whether they are compatible with (i.e., complementary to, and integrated with) other strategies.

EXAMPLES OF SUCCESSFUL HATCHERY PROGRAMS

During 2001–03, the HSRG reviewed over 200 hatchery programs, in ten identified regions of Puget Sound and coastal Washington. This systematic, science-based review found a number of programs that stand out as examples of hatchery programs that are being conducted in the context of clearly articulated goals for the resource, and are the right tool for helping to successfully achieve those goals, given the particular circumstances. A few of these programs are presented below as examples of hatchery programs that are: 1) helping to recover and conserve naturally spawning populations; 2) supporting sustainable fisheries; or 3) providing other benefits, such as education. This is not to say that these programs are all without flaw or could not be improved. But they are, overall, in keeping with the HSRG’s key principles of operating hatcheries in the context of clear goals, scientifically defensible programs, and informed decision making. The HSRG notes that for all integrated hatchery programs, success will ultimately depend on good habitat being available to both the hatchery- and natural-origin components of the population.



Conservation

White River Chinook

In 1977, fewer than 50 naturally-spawning spring Chinook returned to spawn in the White River. Responding to this crisis, a multi-agency recovery effort by the Muckleshoot Indian Tribe, Puyallup Tribe of Indians, Washington Department of Fish and Wildlife (WDFW), US Fish and Wildlife Service (USFWS), US Forest Service, National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NOAA Fisheries), Nisqually Tribe and Squaxin Island Tribe developed the White River Chinook Recovery Plan. This plan has used captive breeding and multiple juvenile rearing and release strategies to increase the number of adults returning to spawn. As a direct result of this program, nearly 1,000 adults returned to spawn naturally in each of the last two years. Without intervention, this unique stock of Chinook would be extinct today.

Elwha Chinook

This cooperative effort between WDFW, the Lower Elwha Tribe and the National Park Service is a good example of a long-term gene banking program. It is successfully maintaining a naturally spawning population of Elwha Chinook until recolonization of the upper watershed can occur, after the scheduled removal of two dams on the Elwha River that have blocked this unique Chinook stock's access to pristine habitat for nearly 100 years.

Snow Creek Coho

This conservation program, operated by WDFW, is a well-conceived and science-based plan for recovering a threatened, native coho population. Prior to intervention, spawning escapement was below 100 fish (and often as low as 20), per year over a 20 year period. Every adult was captured, artificially spawned and its eggs were incubated in a hatchery. After that, groups of fry were exposed to a variety of rearing and release strategies, to increase the possibility that one or more would prove successful. A five-fold increase in adult survival has been realized from these efforts, thus avoiding imminent risk of extinction for this stock.

Lake Ozette Sockeye

The purpose of this well-designed and efficient program, operated by the Makah Tribe, is to achieve the recovery of this Endangered Species Act (ESA)-listed stock by augmenting the river-spawning component of the population and establishing self-sustaining runs in underused habitat in Lake Ozette tributaries. This stock is all the more valuable because genetics studies indicate it is a native stock, with little or no history of fish transfers into the basin, and no evidence of interbreeding. Reintroductions into the tributaries have been increasingly successful in reestablishing spawning aggregations. Domestication selection risk is reduced by the small size and early life history stage at which the fish are released from the hatchery.



Hood Canal Summer Chum Conservation Initiative

Hood Canal and Strait of Juan de Fuca summer chum experienced a severe drop in abundance in the 1980s, and returns decreased to all-time lows of less than 1,000 spawners. The Summer Chum Salmon Conservation Initiative (SCSCI) is a well-designed, well-conducted program that appears to be achieving its goals of recovering these ESA-listed fish. Adult returns have increased substantially in chum streams across the program area. SCSCI is an example of a successful conservation program and partnership among state, tribal, private, and federal entities. Partners include WDFW, the Point No Point Treaty Council (PNPTC), Hood Canal Salmon Enhancement Group, Long Live the Kings (LLTK), NOAA Fisheries and USFWS. The program, which may serve as a prototype for similar efforts in the future, has met the HSRG's first key principle of beginning with a solid goal setting process. The plan also calls for collecting and analyzing the data necessary to evaluate the program's success. Ensuring complete monitoring and evaluation of this program will be crucial to meeting the HSRG's second and third principles—scientific defensibility and informed decision making.

Hamma Hamma Steelhead

Hood Canal winter steelhead numbers began to show a serious decline two decades ago. The number of naturally spawning adults has remained precipitously low since then. A partnership between LLTK, HCSEG, NOAA Fisheries, PNPTC, USFWS, and WDFW, this well-designed and scientifically-sound recovery program for Hamma Hamma winter steelhead features the only captive brood and two year-old smolt programs in Washington state. Fish for this program are thought to be indigenous, with little or no history of stock transfers, introductions, or artificial propagation. The rearing program includes exercise for the captive brood fish, and smolts are fed on a schedule that mimics nature. Initial results indicate that the program has a good chance of achieving the goals for the stock, though low ocean survival trends for steelhead from this region may make this more difficult. If this program is successful in the long-term, it could serve as a model for steelhead conservation programs.

Harvest

Green River Hatchery Fall Chinook

The Washington Department of Fish and Wildlife's Green River Hatchery has propagated Chinook and provided harvest on these fish for over 100 years. Harvest goals are consistently achieved within Washington waters. Significant numbers of natural-origin adults are used each year for broodstock, integrating this hatchery stock with the natural stock. As a result, the hatchery stock also contributes to meeting natural production goals for fall Chinook in a compromised habitat.



Tulalip Bay Hatchery Chum

This hatchery program, operated by the Tulalip Tribes and directed at a stock that is kept genetically segregated from natural stocks in the region, meets its goal of high harvest rates, without apparent adverse effects on other regional stocks. The hatchery fish are marked and monitored, to ensure that straying into adjacent watersheds does not have an adverse affect on naturally spawning stocks.

Wynoochee Winter Steelhead

This program, operated by WDFW is a mitigation program for the Wynoochee River Dam. Fish for this WDFW program originated from—and are kept genetically integrated with—native Wynoochee River fish, unlike the non-local, segregated stocks that typify steelhead programs in other regions. The program is being operated consistent with short- and long-term stock goals, and is providing harvest benefits. The likelihood of attaining these goals is high, due to relatively good survival of coastal steelhead stocks in recent years. The HSRG recommended that the managers monitor the natural spawning population and take steps to reduce hatchery-origin fish spawning naturally by following HSRG spawning and integrated population management guidelines.

Education

Issaquah Hatchery

This Washington Department of Fish and Wildlife hatchery has become a cherished asset to the urban community in which it is located—Issaquah, Washington. A dedicated group of volunteers called Friends of Issaquah Salmon Hatchery (FISH) provides both casual visitors and organized classes with detailed information about salmon life history, species identification, migration patterns, the importance of functional habitat, and other environmental education topics. Signs, interactive displays, and viewing areas for observing daily operations are used heavily by the public. The hatchery is an integral part of Issaquah's annual Salmon Days festival, when over 300,000 visitors tour the facility during a single weekend.

Pipers Creek Chum, Carkeek Park

Located in a highly urbanized part of Seattle, this is another example of a grass-roots program whose efforts have expanded into a productive, environmental-based cooperative between local community supporters and public agencies. The program began as an effort to reintroduce salmon to a creek where they had been extirpated for several decades. The program has grown into a fully-functional, environmental education center.

Cooperative Programs

The managers are fortunate to have the dedication, energy and resourcefulness of many non-governmental, educational and citizens groups to assist them in meeting conservation, harvest and



other goals for Puget Sound and coastal Washington salmonids. Fourteen Regional Fisheries Enhancement Groups, dozens of Salmon in the Classroom programs, a number of not-for-profit organizations, and hundreds of private citizens and volunteers augment and expand what the state, tribal and federal operators of the hatchery system are able to do on behalf of the area's salmonids. In this way, their efforts go beyond meeting educational goals, to in fact playing an essential role in meeting conservation and harvest goals for the resource.