



Introduction

BACKGROUND

In 1999, in response to a request from Washington state's Congressional representatives, a group of leading scientists presented its recommendations to the US Congress in a report entitled *The Reform of Salmon and Steelhead Hatcheries in Puget Sound and Coastal Washington to Recover Natural Stocks While Providing Fisheries*. The report determined that the potential exists for hatcheries to provide benefits to the recovery of naturally spawning salmon. The report called for a comprehensive hatchery reform effort to conserve indigenous genetic resources; assist with the recovery of naturally spawning populations; provide for sustainable fisheries; conduct scientific research; and improve the quality and cost-effectiveness of hatchery programs. The effort was to be led by an independent panel of scientists called the Hatchery Scientific Review Group (HSRG).

Congress adopted and funded these recommendations in fiscal year 2000, launching the Puget Sound and Coastal Washington Hatchery Reform Project, also known simply as the "Hatchery Reform Project." This project has taken a systematic, science-driven approach to evaluating hatcheries and providing recommendations for how hatcheries can be used to help:

1. conserve naturally spawning salmon and steelhead populations; and
2. support sustainable fisheries.

The appropriations language provided funding to:

- Establish an independent scientific panel to ensure a scientific foundation for hatchery reform;
- Provide a competitive grant program for needed research on hatchery impacts;
- Support state and tribal efforts to implement new hatchery reforms; and
- Provide for the facilitation of a reform strategy by an independent third party.

The role of independent science in the Hatchery Reform Project is to advise fishery managers, agency scientists, legislators, and the public about the benefits and risks of alternative actions that could be undertaken to meet goals for salmonid resources, including the consequences of inaction. This report results from the HSRG's four-year evaluation of the Puget Sound and coastal Washington hatchery system, from 2000-03 and documents their products, processes, recommendations and conclusions.



THE NEED FOR REFORM

There are approximately 100 hatchery facilities in Puget Sound and coastal Washington operated by the Washington State Department of Fish and Wildlife (WDFW), Puget Sound and coastal Indian tribes and nations, and the US Fish and Wildlife Service (USFWS). Some of these hatcheries have been operating for nearly 100 years. Most hatcheries were built to produce fish for harvest, compensating for declines in naturally spawning salmon populations. Funding for these hatchery programs comes from a variety of sources, including federal, state, tribal, local and private sources.

Hatcheries now provide over 80% of Washington's resident trout, over 90% of the inland catch of resident salmonids, 70% of the salmon harvested in Puget Sound, approximately 75% of all coho and Chinook harvested, and 96% of all steelhead harvested state-wide. In 1995, 157 million salmon and 8.9 million steelhead were released into Washington's waters. In the Hood Canal and Puget Sound areas, more than 88 million Chinook, chum, coho, sockeye and pink salmon and steelhead trout were released. Washington gets an annual direct benefit of over \$850 million from recreational fishing (which ranks eighth nationally).¹

Hatcheries also play an important role in meeting tribal treaty harvest obligations. Federal court rulings have affirmed tribal treaty harvest rights and established the tribes as co-managers of the salmon resource. State and federal governments must ensure that there are salmon available for the tribes to harvest. As naturally-spawning salmon stocks declined over the years, the tribal, state and federal governments became dependent on hatcheries to provide a meaningful level of harvest for Indian and non-Indian fishers.

Although hatcheries have generally been successful at providing fish for harvest, societal goals, priorities and circumstances have changed during the 100 years in which hatcheries have been in operation, particularly in the past 30 years. For example:

1. Artificial production programs must be consistent with the sometimes conflicting objectives of various legal mandates relating to fish production and protection throughout Puget Sound and coastal Washington. Resolving these potential conflicts requires legal, policy, and biological judgment. These legal mandates include:
 - Treaty fishing rights of Indian tribes under *US v. Washington* and *Hoh v. Baldrige* and the development of a co-management relationship between the state and the tribes;
 - The US/Canada Salmon Treaty;
 - The responsibility of the State of Washington to preserve, protect and enhance fish populations;

¹ *Washington State Hatcheries (brochure); Washington Department of Fish and Wildlife September 1997 Final Environmental Impact Statement for the Wild Salmonid Policy; John Kerwin; Washington Department of Fish and Wildlife, 600 Capitol Way North, Olympia, WA 98501.*



- The U.S. Endangered Species Act (ESA); Numerous mitigation obligations in law and agreement.
2. As better and more complete scientific information has become available, a more complex picture has emerged about the interdependency of natural ecosystems and their respective components. Hatchery production and facilities, including the harvest of hatchery-propagated fish, have been identified as one of the factors contributing to the overall decline of naturally-spawning populations.
 3. Population growth and resulting human land use activities have resulted in a continued loss of habitat and a decline of naturally spawning salmon. This has led to different management goals and objectives, including conservation goals.
 4. Three Puget Sound stocks are currently listed under the ESA. As part of a larger recovery process, state, tribal and federal managers of Washington's salmon and steelhead must ensure that their hatcheries do not present a risk to listed species.
 5. A major change is currently taking place in the economics of fisheries. Aquaculture, including salmon farming, is growing rapidly and competing with commercial fishing in many markets.

Within this context, the Hatchery Reform Project was developed as a cooperative effort to reform a decades-old hatchery system, to meet new purposes. The intent was to let science direct the process of ensuring today's hatchery system matches current circumstances and goals.

PROJECT OVERVIEW

The elements of the Hatchery Reform Project include a unique combination of independent science, coordination by managers, political support, and third-party facilitation. These components are described below.

Independent Science: The Hatchery Scientific Review Group

The Hatchery Scientific Review Group is the scientific panel established and funded by Congress to independently review hatchery programs in Puget Sound and coastal Washington. The objective of the HSRG is to assemble, organize and apply the best available scientific information available to provide guidance and recommendations to the policy makers and technical staff who are responsible for implementing hatchery reforms.

The HSRG is composed of five independent scientists (selected from a pool of candidates nominated by the American Fisheries Society) and four agency scientists designated by WDFW, the Northwest Indian Fisheries Commission (NWIFC), National Oceanic and Atmospheric Administration Fisheries/National Marine Fisheries Service (NOAA Fisheries) and USFWS. Like



the independent scientists, the agency scientists are responsible for evaluating scientific merits and are not to represent agency policies. The nine scientists serving on the HSRG have a broad range of experience and expertise, including salmon biology, genetics, ecology, fisheries, fish culture, fish pathology and biometrics. Members have included:

- John Barr, NWIFC (Vice Chair)
- Lee Blankenship, Northwest Marine Technology (Vice Chair)
- Donald Campton, PhD, USFWS
- Trevor Evelyn, PhD, retired, Department of Fisheries and Oceans Canada
- Tom Flagg, NOAA Fisheries Manchester
- Conrad Mahnken, PhD, retired, NOAA Fisheries Manchester
- Lars Mobrand, PhD, Mobrand Biometrics (Chair)
- Robert Piper, retired, USFWS
- Lisa Seeb, PhD, Alaska Department of Fish and Game
- Paul Seidel, WDFW
- William Smoker, PhD, University of Alaska

Policy-Level Involvement: The Hatchery Reform Coordinating Committee

The managers have established a Hatchery Reform Coordinating Committee (Coordinating Committee) as a vehicle for cooperative management and implementation of this reform effort. The purpose of the committee is to ensure a successful working relationship between the HSRG, the managers' decision-makers and their own hatchery reform science teams, and other staff. The Coordinating Committee's immediate adoption of the project's twin goals was an important early sign of leadership, their commitment to the process, and the role of the HSRG. The establishment of the Coordinating Committee also served to recognize the co-manager relationship and the responsibility of the managers to develop policy and ultimately implement hatchery reform.

Committee members include:

- Billy Frank Jr., Chairman/Spokesman, NWIFC
- Jim Anderson, Executive Director, NWIFC
- David Troutt, Natural Resources Director, Nisqually Tribe
- Terry Williams, Commissioner of Fisheries and Natural Resources, The Tulalip Tribes
- Jeff Koenings, Director, WDFW



- Larry Peck, Deputy Director, WDFW
- Dan Diggs, Assistant Regional Fisheries Director, USFWS
- Chuck Dunn, USFWS
- David Stout, Manager for Fisheries and Watershed Assessment, USFWS Division
- Bob Lohn, Regional Administrator, NOAA Fisheries
- Rob Jones, Hatchery and Inland Programs Branch Chief, NOAA Fisheries
- Pete Bergman, former member of the Congressional Hatchery Science Advisory Team
- Frank Haw, former member of the Congressional Hatchery Science Advisory Team
- Terry Wright, NWIFC and former member of the Congressional Hatchery Science Advisory Team
- Barbara Cairns, Executive Director, Long Live the Kings

Support from Elected and Appointed Officials

Many factors have come together to create this opportunity to reform hatchery practices and improve the contribution from hatcheries to salmon conservation and sustainable fisheries. As mentioned above, an important factor has been the support of strong and creative leaders at the fisheries management agencies. Just as important has been the backing of federal, state, tribal and local elected officials. The project has received bipartisan support from many regional leaders, including:

- US Representative Norm Dicks (D-WA)
- Washington Governor Gary Locke (D)
- US Senator Patty Murray (D-WA)
- Former US Senator Slade Gorton (R-WA)
- US Representative Jennifer Dunn (R-WA)
- Billy Frank, Jr., Chair, NWIFC
- Jeff Koenings, Director, WDFW
- William Ruckelshaus, Chair, Washington State Salmon Recovery Funding Board

Agency Science Teams

A portion of the Congressional funding dedicated to supporting state and tribal efforts to implement new hatchery reforms has been used to establish agency science teams. These teams have undertaken a variety of activities that support the hatchery reform process. One of these has



been helping the facilitation team (see below) acquire, assemble and make available to the HSRG regional briefing information about the hatcheries, individual hatchery programs and the ecosystems in which they operate. This ensured that the HSRG made its evaluations and recommendations based on the same data the co-managers use to establish their goals and operate programs.

Other valuable functions being provided by the agency science teams include conducting risk analyses on hatchery programs to meet hatchery ESA requirements; conducting and overseeing agency research on hatchery effects and practices that complements the HSRG's research grant program (see below); coordinating the implementation of early reforms; reporting agency activities for Congressional reports; acting as points of contacts for the project within the agencies; interpreting technical literature for hatchery managers; and otherwise providing technical support to the HSRG, the Coordinating Committee, and the regional staff that are participating in the review process.

Project Management, Facilitation and Communications

The third party facilitator for the project, specified by Congress, is Long Live the Kings (LLTK), a private, non-profit organization whose mission is to restore wild salmon to the waters of the Pacific Northwest. LLTK's role includes providing facilitation and project management to the HSRG and the Coordinating Committee; and helping the managers communicate hatchery reform progress to Congress, state legislators, stakeholder groups and the public. LLTK retained Gordon, Thomas, Honeywell to serve with LLTK staff on the facilitation team. The HSRG and LLTK are responsible for annual reporting to Congress on progress made in implementing hatchery reforms. The Regional Hatchery Review chapter describes the role of the facilitation team's project management, facilitation and communications efforts in more detail.

REPORT OVERVIEW

This report provides a detailed description of the HSRG's scientific framework, tools and resources developed for evaluating hatchery programs, the processes used to apply these tools, and the resulting, principles, system-wide recommendations, and program-specific recommendation for reform. It also includes conclusions about the future of hatcheries and a summary of successful hatchery programs.

Foundation for Hatchery Reform

At the beginning of the project, the HSRG recognized that their review process would set a new standard for considering under what circumstances hatcheries can help achieve salmon and steelhead resource goals. Under this new model, productive, available habitat is essential to an effective hatchery program. In addition, managers have to consider whether a hatchery program is the best means to help achieve the stated resource goal, once the risks and benefits from the program are considered. To accomplish this level of evaluation, the HSRG recognized the need for



a scientific foundation for its work and tools and resources to conduct an evaluation of the Puget Sound and coastal hatchery system.

Scientific Framework

That scientific foundation was developed in the project's first year from a collation and review of the scientific literature, and by reviewing current analytical tools and operational protocols, and decision making processes used by the state, tribal and federal fisheries managers and scientists. The resulting *Scientific Framework for the Artificial Propagation of Salmon and Steelhead*² underlies and informs all of the HSRG's tools, processes and recommendations.

The scientific framework organizes the current state of knowledge, about how actions associated with hatcheries affect the environment and fishery resources, around six key topics:

1. Hatchery Programs: Definitions of Purpose and Type
2. Hatcheries in the Ecosystem Context: The Regional Approach;
3. Hatcheries in the Populations/Species Context;
4. Effects of Hatchery Operations on Harvest and Conservation of the Target Stock; and
5. Effects of Hatchery Fish on Harvest and Conservation of Other Stocks and Species.
6. Monitoring and Evaluation: Managing Hatchery Programs for Accountability and Success

Emerging Issues in Hatchery Reform

These papers are authored by individual HSRG members, task teams or the HSRG as a whole. They are as simple as a few paragraphs or as detailed as an article for a peer-reviewed journal. They represent some of the emerging topics concerning the role and operations of hatcheries in conserving natural populations and supporting fisheries and are intended to serve as an extension of the scientific framework and encourage new thinking and actions in applied science for hatchery management.³

Research Grant Program

The HSRG's competitive grant program has funded over two million dollars in projects. These projects are helping to answer questions such as how to reduce the impact of harvest on naturally-spawning fish, avoid adverse genetic effects of hatchery fish on naturally-spawning stocks, avoid adverse ecological interactions, improve hatchery practices, and monitor and measure success. The need for answers to these questions became apparent in the first year of the project as the HSRG drafted a scientific framework to guide the region-by-region review

² See summary in the *Foundation of Hatchery Reform* chapter and the full framework in *Appendix A*.

³ See summary in *Foundation of Hatchery Reform* chapter and *Appendix B*.



process (discussed below). Grantees have reported their findings to the HSRG and other scientists at annual research review meetings, and the results have often answered questions and further identified or validated a wide range of research needs for hatcheries. This section of the report provides a description of the research program and a table summarizing each funded research project.⁴

Applied Hatchery Reform

From 2001–03, the HSRG used the tools described previously to systematically review all hatchery programs in Puget Sound and the Washington coast. As a result of this experience, the HSRG produced 3 principles, 18 system-wide recommendations, and over 1000 program-specific recommendations. Success of the hatchery reform effort, will ultimately be measured by effective and on-going implementation of these principles and recommendations by the state, tribal and federal managers in their effort to reform hatcheries toward the twin goals.

Regional Review Process

Early in the process, the HSRG and Coordinating Committee agreed that hatchery programs must be evaluated in the context of (a) the watersheds in which they operate and (b) the goals set for them by the managers for each stock in the watershed. To accomplish this level of evaluation, the scientists and managers worked together to divide Puget Sound and the coast into ten regions. This approach provided an opportunity to make region-by-region recommendations based on: 1) regional management goals for conservation, harvest and other purposes; 2) the status of each stock within a region (biological significance and population viability); 3) the status of the habitat that supports each stock (current and future); and 4) the operational details of each hatchery program.

The HSRG used the scientific framework to develop a series of tools for use in the regional review process and for the managers to use into the future. These included operational guidelines, a benefit/risk tool, and monitoring and evaluation criteria.

For each regional review, the HSRG toured the hatchery facilities, conducted interviews with operators and managers, considered stock and habitat information provided by the managers, applied this information to the benefit/risk tool, met with the managers to discuss the findings, and then produced specific recommendations for reducing the risks and maximizing benefits from each program. This chapter summarizes the review process and the role of the facilitation team.

⁴ See Appendix H for details of each grant by year.



Principles and System-Wide Recommendations

In order to provide a complete picture of what was needed to achieve hatchery reform, the HSRG concluded that both program-specific recommendations within the context of the goals set by the managers and system-wide recommendations for hatcheries generally that allowed for regional differences were needed. The 18 system-wide recommendations were developed as a direct result of the HSRG's experience in the applying the tools in a regional context. The HSRG has organized these system-wide recommendations under three basic principles of good natural resource management. These principles in the context of hatcheries are: well-defined goals, scientifically defensible programs, and informed decision making.

In order to achieve reform, whereby the hatchery system is a functioning part of an integrated strategy to achieve recovery of naturally spawning populations and provide sustainable fisheries, the HSRG has concluded that these principles and system-wide recommendations must set the standard for successful implementation of hatchery reform. This chapter outlines each principle and system-wide recommendation.

Program-Specific Recommendations by Region

In each of the regions reviewed, the HSRG found significant differences in the quality of the habitat, stock status, the goals the managers have prescribed for each region's salmon and steelhead stocks, and the purposes of each region's hatchery programs. The HSRG's regional review process produced roughly 1,000 program-specific recommendations addressing these specific circumstances. Recommendations ranged from changes in broodstock management, to addressing water quality concerns, to removal of fish passage impediments, and many others. Some program-specific recommendations referenced system-wide recommendations; others were unique to the program.

After each year of reviews, a report was published containing recommendations for each hatchery program reviewed that year. The results of this three year regional review process are summarized in Chapter 3. The program-specific recommendations for each region are available as appendices to this document in three companion volumes.⁵

Conclusions

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. As a result, the HSRG has formulated a number of conclusions about hatcheries and how they should be operated. This chapter outlines these conclusions and gives examples of successful hatchery programs.

⁵ See Appendix I, *Program-Specific Recommendations by Region*.



NEXT STEPS

Through four years of creating a scientific framework, tools and recommendations under the Hatchery Reform Project, the HSRG has outlined new ways to apply science to hatchery management. Recognizing this, the managers of Washington's fish resources have asked the HSRG to stay empanelled beyond the recommendations phase, as the manager's design mechanisms for implementation, monitoring and evaluation, and feedback loops that ensure that new information leads to continuing improvements in decision making, policy and operations.

The HSRG and the managers have agreed that achieving the implementation of hatchery reform must be viewed in the long-term. This approach is necessary because hatchery reform should be an on-going process that continues to change as new information is gained. Additionally, it will take time to secure funding to implement all of the elements of hatchery reform. There is also agreement that implementation of many important elements of hatchery reform can take place in the short-term as well. The manager's efforts to develop an implementation database to track longer term trends and results is critical to successful hatchery reform.

For 2004, the HSRG, the managers, and the facilitation team have developed a work plan to:

- ensure an exchange of knowledge, information and ideas between the HSRG and state, tribal, and federal managers in the hatchery, harvest and science divisions;
- track and communicate implementation progress and significant scientific findings from the project.
- develop a long-term monitoring and evaluation strategy;
- provide facilitated co-manager discussions that address unresolved regional implementation issues;
- hold follow-up workshops in all 10 regions with case studies for how the regional hatchery managers can use the principles, recommendations and tools to continue reviewing hatchery programs in the context of regional goals into the future; and
- encourage further research that addresses significant uncertainties about the uses of hatcheries.

The result of this work plan are intended not only ensure successful implementation of the HSRG's recommendations for Puget Sound and the coast, but should also provide a working model that can be replicated elsewhere in the Pacific Northwest.

Additionally, the Washington state Governor's Office, the Shared Strategy for Salmon Recovery in Puget Sound, and others are relying on the Hatchery Reform Project's results for direction on how hatchery reform can be integrated with habitat recovery at the watershed level. This watershed approach is an essential piece of the recovery plans that those parties have pledged to provide NOAA Fisheries for Puget Sound Chinook salmon, listed as threatened under the ESA in 1999.



It is important to note that the tools and recommendations contained in this document are based upon current goals and the best scientific information available at the time the reviews were conducted. In keeping with the tenets of adaptive management,⁶ it will be necessary to review and adapt these tools and recommendations as new scientific information arises and/or goals change.

This and all other Hatchery Reform Project-related publications are available from the project's web site (www.hatcheryreform.org) or by contacting Long Live the Kings at (206) 382-9555.

⁶ See HSRG System-Wide Recommendation on adaptive management.