Genetic approaches to integrating hatchery and natural salmon production

Problem Statement

Hatcheries will remain an important part of Pacific salmon production into the foreseeable future, yet studies have demonstrated that hatchery production can genetically harm natural salmon populations. In order to sustainably integrate hatchery and wild production, the genetic effects of hatchery production on wild salmonids must be quantified so that these effects can be mitigated.


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Critical factors

- Hatcheries are widely used to produce fish for commercial and sport harvesting, but there is considerable concern about the genetic effects of hatchery fish on natural salmon populations.
- The Snake River Salmon Recovery Team, the National Research Council, the Integrated Hatchery Operations Team, the Independent Scientific Group, and various *ad hoc* scientific panels have all stressed the need to evaluate empirically the genetic effects of hatchery fish on natural salmon populations.
- Studies of inbreeding, outbreeding, and reproductive success all require systematic sampling of multiple populations or subpopulations for at least several generations to fully understand the genetic basis for differences between hatchery and wild fish.
- Due to the long generation time and complex life cycle of Pacific salmon, studies that can accurately characterize the genetic effects of hatchery fish on natural salmon populations are technically feasible but logistically complex and expensive.
- In order to quantify the genetic effects of hatcheries on wild fish, it is necessary to measure the ability of hatchery fish to successfully spawn and reproduce in the wild.

Status of research

Northwest Fisheries Science Center (NWFSC) scientists are currently involved in several research projects aimed at elucidating the genetics effects of interactions between hatchery and wild salmonids. Current projects include 1) monitoring the genetic characteristics of naturally-spawning Snake River spring and summer chinook salmon and steelhead that show various levels of genetic influence from hatchery fish, 2) quantifying the relative fitness of hatchery vs wild coho salmon in Puget Sound (Minter Creek) and of hatchery vs wild steelhead in the Snake River Basin (Little Sheep Creek), and 3) evaluating the population structure of Clackamas River steelhead in order to find appropriate broodstocks for recovery. In addition, NWFSC scientists are pursuing research projects of other sorts that will provide important insights into this problem (see CB 6104). All of these projects involve considerable collaboration among state, federal, and tribal scientists and management agencies.

Future considerations

Over the next several years, the NWFSC's Little Sheep and Minter Creek studies will provide invaluable information on the rate at which domesticated hatchery fish can readapt to the natural environment. This information will be critical for making informed decisions about the long-term genetic risks of hatchery production on wild stocks.

Key Players

Conservation Biology (CB) Division, NWFSC
Bonneville Power Administration
Long Live the Kings
Oregon Department of Fish and Wildlife
Idaho Department of Fish and Game
Nez Perce Tribe
Umatilla Tribe
U.S. Geological Survey
U.S. Fish and Wildlife Service
Washington Department of Fish and Wildlife

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