

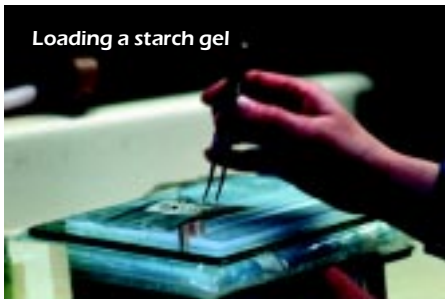
Genetic stock identification (GSI) of Pacific salmon

Problem Statement

When salmon are caught in mixed-stock fisheries, it is necessary to determine their stock composition so that effects on protected stocks can be quantified. Stock identification can also be used to estimate salmon growth and survival rates and to determine patterns of ocean migration.

Critical Factors

- Pacific salmon from many different stocks intermingle in the ocean and rivers.
- To make informed management decisions (e.g., deciding how many fish to harvest), fishery managers must know the composition of these intermingled stocks.
- The Northwest Fisheries Science Center's (NWFSC) Genetics Program uses a molecular technique referred to as Genetic Stock Identification (GSI) to determine the stock composition of fish caught in mixed-stock fisheries.
- GSI is also an essential tool for Endangered Species Act (ESA) evaluations, ESA forensic investigations, and for international stock equity and allocation issues.
- In addition, GSI analyses are useful for understanding basic issues of salmon ecology (e.g., the migration routes of salmon).



Status of Research

The GSI technique utilizes naturally-occurring variation in proteins or DNA to identify salmon stocks. The NWFSC's Genetics Program has a modern molecular laboratory that is producing large-scale genetic data sets for chinook salmon and steelhead in the Columbia River basin. It is the primary West Coast source of protein genetic data for chinook salmon. It also contributes protein genetic data to regional databases for chum, sockeye, and coho salmon, as well as for steelhead and cutthroat trout.

Genetics Program scientists are pursuing several GSI-related research projects which include 1) helping to determine stock allocation between the U.S. and Canada under the Pacific Salmon Treaty, 2) analyzing the composition of chinook salmon fisheries in California to determine the impacts on listed Sacramento River chinook salmon, 3) helping to elucidate the ocean migration patterns of listed salmon stocks by identifying the composition of groups of migrating juvenile salmon captured from California to southern Alaska, and 4) conducting computer simulations to compare different methods of stock identification.

Future Considerations

As long as harvest of mixed-salmon stocks continues and some salmon remain listed under the ESA, managers will need tools that permit them to discriminate precisely among Pacific salmon stocks. Use of the GSI technique for managing non-salmonid marine fish species will also increase as refinements to DNA technology for GSI applications are developed. NWFSC scientists will increase their use of computer simulations and theoretical models to optimize implementation of these techniques in future GSI analyses.

Key Players

Conservation Biology (CB) Division, NWFSC

Southwest Regional Office, NMFS
Northwest Regional Office, NMFS
Southwest Fisheries Science Center
Auke Bay Laboratory, Alaska Fisheries Science Center
Alaska Department of Fish and Game
Washington Department of Fish & Wildlife
Fisheries Agency of Japan

Northwest Indian Fisheries Commission
California Department of Fish & Game
Canadian Department of Fisheries & Oceans
Pacific Fisheries Management Council
Pacific Salmon Commission
Oregon Department of Fish and Wildlife
Pacific Salmon Commission
National Biological Service, U.S. Geological Survey
University of Washington

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