Applying Genetic Data to Management Needs: Sockeye Salmon Returning to Bristol Bay Drainages

Christopher Habicht, Joseph Miller, Lowell Fair, Carol Ann Woody, Kristina M. Ramstad, Michael Link, Gina R. Johnston, Katia L. Pronzati

Introducing: Alagnak River

- Fishermen benefit from understanding stock composition in mixture samples.

- Target fishing on abundant stocks.
- Estimating run-tom-spawner to calculate escapement goals for maximum sustained yield.
- Genetic data is capable of providing stock composition estimates.
- Here we highlight three on-going projects using genetic data to solve management needs (see figure 1).

- Updating and refining the baseline: Alagnak River as an example

- Genetic data distinguishes between four stocks within the Alagnak drainage (figure 4).

Estimating stock composition in adults returning to Bristol Bay before they enter commercial fishing districts

Introduction/Methods: The test fishery conducted off Port Moller captures fish at 6 stations that are 20 miles apart. This fishery samples fish 5 to 7 days before fish enter commercial fishing districts. Stock composition of the catch provided fishery managers, fisheries, and processors with confirmation of or alerts to deviations from preseason forecasts of stock-specific abundance. In 2005, nine in-season estimates were provided within a 48-hr turn around from the time samples arrived in the lab.

Results: Cumulative stock compositions over nine sampling periods grouped by station show some segregation by stock occurring at sea—a new finding (figure 2). Stocks are ordered by geographic position—counter-clockwise starting from the North Alaska Peninsula and ending in the Kuskokwim Bay. Note that fish closer to spawning tributaries (stocks on the left-hand side) are closer to shore (stations 20 to 40 miles off-shore) than those destined for tributaries farther east. Predicted stock strengths of the fishery in 2005 were generally consistent with observed stock strengths.

Method: Alagnak River drainage consists of two lake drainages. Previous data indicates that there are three stocks present in this drainage: Moraine Creek and Battle and Kulik rivers. These stocks are distinct from each other and from other Bristol Bay stocks. New collections include Nanuktuk Creek and early and late beach-spawning collections from previously sampled tributaries. Genetic data (13 microsatellites and 4 SNPs) are able to distinguish among the 16 stocks represented by different colors. Locations of projects highlighted in this poster are circled in red and arrows lead to further explanation.

Methods: Alagnak River drainage consists of two lake drainages. Previous data indicates that there are three stocks present in this drainage: Moraine Creek and Battle and Kulik rivers. These stocks are distinct from each other and from other Bristol Bay stocks. New collections include Nanuktuk Creek and early and late beach-spawning collections from previously sampled tributaries.

Results: Genetic data distinguishes between four stocks within the Alagnak drainage (figure 4).

- Note the tight clustering of collections at the four primary spawning sites. No variation was detected between years or between collections made early and late within years or between beach and tributary spawners. The finding of three genetically identifiable stocks with similar life histories within one nursery lake is unusual for sockeye salmon.

Future Work

- Determine the stock composition of distinct fisheries.
- Determine the effect of moving district boundaries on stock composition.
- Identify the migration patterns of stocks on the high seas.

Acknowledgments

Funded by the North Pacific Research Board grants R205 and R0303; U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Study # 04-411; a National Park Service, Cooperative Conservation Initiative Project; and the Bristol Bay Salmon Processors.