Fish Facts & Fancies

Saving The Salmon: DNA Hooks Salmon Crooks On The High Seas

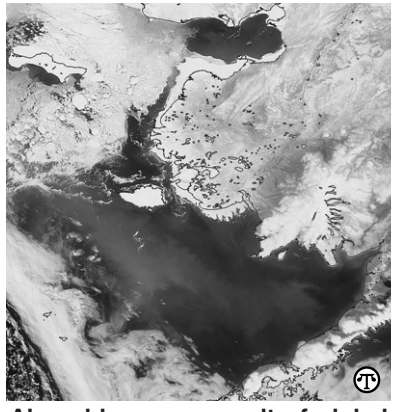
(NAPSA)—If all goes well for Pacific salmon, they begin and end their lives in shallow rivers and streams. First, however, these migratory fish must travel two to three years on the high seas—a time of potential peril due to environmental hazards, global climate change, rogue commercial fishermen who illegally use drift nets or "curtains of death" to catch the high-priced wild salmon and intermixing with less desirable farmed stocks.

Based on a multinational treaty banning fishing of Pacific salmon off the waters surrounding Canada, Japan, Korea, the Russian Federation and the United States, coast guards from member nations have been charged with patrolling the waters and intercepting fishing vessels suspected of catching banned salmon. Large populations of Pacific salmon in certain regions nevertheless continue to be over fished and endangered.

Fishery managers across the Pacific Ocean are now turning to the latest DNA technologies to maintain robust populations of Pacific salmon and even save some from nature and rogue fishermen.

These fishery managers use DNA to determine if a fisherman's catch includes banned stocks, track current numbers of Pacific salmon species and trace their migration patterns.

The DNA sequence provides a type of "fingerprint" in identifying specific salmon stocks. A small piece of salmon fin gives scientists a DNA sample they can use to identify the country from which a salmon stock migrated.



Algae blooms, a result of global climate change, threaten salmon stocks by depleting salmon food sources and starving fish trapped beneath. Image courtesy of SeaWiFS and NOAA.

Using a genotyping technology developed and manufactured by Applied Biosystems, these collected DNA samples are turned into specific DNA identification markers called SNPs and catalogued in a multi-national database. When coastal guards intercept suspicious boats on the high seas, they make use of these DNA markers to determine the legality of a salmon catch and the origin of the salmon.

"One of the things we do is to identify the origin of the fish when boats like that are caught," says Dr. Jim Seeb, co-director of the Gene Conservation Laboratory, Alaska Department of Fish and Game. "We can tell major aggregations of stocks when they're intercepted on the high seas."

Some sockeye salmon populations, for example, can cycle from highs of nearly fifty million to lows under a million, Dr. Seeb says. Optimally harvesting individual stocks in coastal fisheries where stocks mix is a challenge, especially when some stocks are in the ebb of a cycle. DNA testing using SNP markers provides information allowing us to shift between protecting depleted stocks and targeting stocks with a surplus.

SNPs, patterns of single base variations found in the DNA of all salmon stocks, are easier to standardize across multinational laboratories than are other kinds of DNA identification markers.

At a recent workshop hosted by the American Fisheries Society in Anchorage, Alaska, fishery managers from member nations, Canada, Japan, Korea, Russia and the U.S., discussed how they intend to use SNPs to regulate fishery salmon harvests, while maintaining the health of wild salmon populations through cooperative databases of salmon SNPs.

"In an effort to optimize the harvest of each individual stock without putting a single stock at risk from over-harvesting, we need to rely on a lot of information," notes Dr. Seeb. "With the latest DNA technology today, we can offer Pacific salmon safer passage through the high seas on their journey back to fresh water."