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PRESS RELEASE

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Scientists up their ability to track salmon through DNA 'fin-printing'

(Juneau) – A partnership between the University of Washington and Alaska Department of Fish and Game (ADF&G) has yielded a major breakthrough in DNA 'fin-printing' this spring, improving the ability to conserve diminishing stocks of Chinook salmon. Implementing the new technique will allow scientists and managers to track specific stocks, helping to ensure that no specific stock is overharvested. The results have been published in the journals Canadian Journal of Fisheries and Aquatic Sciences and Evolutionary Applications.

This discovery is timely in that some stocks of Chinook from California to Washington are listed as threatened or endangered, and Chinook salmon in western Alaska have experienced precipitous declines during the past decade. The declines in western Alaska triggered painful restrictions to commercial and subsistence fisheries producing social and economic hardship throughout the region. Increasing the tools available to better manage stocks may help avoid some of these hardships in the future.

Prior to this study, Chinook salmon from western Alaska had been difficult to distinguish from one another using DNA because they are closely related. "Sometimes you just have to swing a bigger hammer to solve a problem like this," said Dr. James Seeb, who led the University of Washington team that solved this problem. They employed innovative genetic techniques that were previously unavailable to screen billions of DNA sequences to discover better markers to help distinguish the various stocks. Scientists have tested these new markers and found they can now distinguish three major groups of fish from western Alaska, a huge improvement that will aid efforts to understand declines in some populations.

Alaska has used DNA markers to track specific salmon stocks and estimate harvests with great success. "This is CSI on steroids" said Bill Templin, director of the Alaska program, referring to the popular television drama. "Each year we analyze 10,000s of fish, using DNA markers, to identify the origins of migrating salmon." These data provide managers with the ability to manage fisheries that harvest multiple stocks while ensuring that no stock is harvested too heavily. These same techniques are also used to identify international harvest of Washington, Oregon, British Columbia, and Alaska stocks as a part of the Pacific Salmon Treaty process.

In response to the recent declines in Alaska, Alaska Department of Fish and Game developed the Chinook Salmon Research Initiative, a program developed to address the decline in salmon. Its aim is to better understand productivity and abundance trends of specific stocks. A major tool of the research plan involves

using DNA to track indicator stocks of Chinook salmon across their various life history stages. The results reported here provide a huge improvement in DNA technology that will help the Initiative efforts to understand declines in some populations.

The team is building on this success and continuing efforts to increase resolution of stock structure. Scientists from Russia and Japan are collaborating as well, providing samples of Chinook salmon collected from the eastern Pacific Ocean and Bering Sea. Through these efforts, Alaska will be better able to trace and monitor salmon stocks through their oceanic migrations and determine the contribution of stocks caught unintentionally in distant fisheries.

This work was initiated by a 4.1 million grant from the Gordon and Betty Moore Foundation. Substantial additional funds were provided by the State of Alaska, Alaska Sustainable Salmon Fund, and NOAA Sea Grant.

The papers described above can be found at:

Single-nucleotide polymorphisms (SNPs) identified through genotyping-by-sequencing improve genetic stock identification of Chinook salmon (*Oncorhynchus tshawytscha*) from western Alaska
http://www.nrcresearchpress.com/doi/abs/10.1139/cjfas-2013-0502
Genotyping by sequencing resolves shallow population structure to inform conservation of Chinook salmon (*Oncorhynchus tshawytscha*)
http://onlinelibrary.wiley.com/doi/10.1111/eva.12128/full

Detection and mapping of QTL for temperature tolerance and body size in Chinook salmon (*Oncorhynchus tshawytscha*) using genotyping by sequencing

http://onlinelibrary.wiley.com/doi/10.1111/eva.12147/full

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