

Semiannual Progress Report

Project #: F0515
Title: Ice Seal Movements and Stock Structure in a Changing Cryosphere

**Principal Investigator(s)
and Recipient Organization(s):** Brendan P. Kelly
University of Alaska Southeast
brendan.kelly@uas.alaska.edu

Peter Boveng
National Marine Mammal Laboratory, NMFS
peter.boveng@noaa.gov



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Amount of Funding:** May 2005- December 2007 (\$203,644)
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Lead Author of Report: Brendan P. Kelly

Project Summary:

The sea ice ecosystem and subsistence economies in the arctic are threatened by decreases in sea ice cover associated with climate change. Assessing the impacts on the ice-associated seals requires knowledge of their movement patterns and population biology. Understanding the population structure of ice-associated seals will help the NMFS and Alaska Natives to manage and protect these important components of “the ecologically diverse marine ecosystems of the North Pacific, and provide long-term, sustained benefits to local communities and the nation,” a research goal of the NPRB. A primary need is to understand the vulnerability of local subpopulations of seals to extinction. If immigration occurs from other populations, vulnerability is low, but if immigration is absent or very rare, the potential for local extinction is high. We are using satellite-linked transmitters to determine whether ringed seals return to the same breeding locations in successive breeding seasons, an indication that immigration rates are low. We also have begun to collect and analyze DNA samples as a further indication of the frequency of immigration.

Progress Summary:

Tracking seal movements

In May 2007, we attached satellite-linked transmitters to two ringed seals captured in their breeding sites in Kotzebue Sound. In all, we attached satellite-linked transmitters to 25 ringed seals and 2 bearded seals during this project. We have tracked seals tagged near Point Barrow and the Mackenzie River Delta for periods of 7 to 413 days. Tagging in 2005 and 2006 was done in collaboration with the Alaska Ice Seal Committee, the North Slope Borough’s Department of Wildlife Management, the Department of Fisheries and Oceans (Canada), and hunters from Inuvik, Tuktoyaktok, and Holman Island. The 2007 tagging was done in collaboration with the Native Village of Kotzebue and Ross Schaefer of Kotzebue. To date, 11 seals have been tracked long enough to test the hypothesis of inter annual fidelity to breeding sites. Each of those seals remained in (2) or returned to (9) their breeding sites the subsequent year. In between, some seals moved 1,000 or more kilometers in to Canadian and Siberian waters before returning to their breeding sites.

Population genetics

This project successfully tested the hypothesis that skin shed on the ice could be used to sample genetic diversity among ringed seals. To test our hypothesis that ringed seals return to their own birth sites to breed, we have limited our genetic analyses to samples collected during the breeding season. In 2007, we added 264 additional samples to the 151 samples collected in 2005 and 2006. The additional samples came from skin collected from the ice in Kotzebue Sound and near Point Oliktok in the Beaufort Sea as well as archived specimens from Hooper Bay, Shishmaref, and the North Slope of Alaska. Future sampling will include fresh tissue from the Baltic Sea, the Canadian Beaufort Sea, and the Bering, Chukchi, and Beaufort sea coasts of Alaska as well as from archived specimens from Alaska (Aleutian Islands, St Lawrence Island, and Nushagak Bay), Canada (Resolute Passage and Cornwallis Island), and Russia (Magadanskaya oblast). Currently, we are analyzing microsatellite DNA from samples processed at the Applied Technology in Conservation Genetics Laboratory (Central Michigan University) and mtDNA in Dr. David Tallmon's laboratory (University of Alaska Southeast). Additional details are contained in the semi-annual report for our new NPRB project (Project 631 – *Population structure of ringed seals*).

Outreach

Results of this study were presented in 11 fora between January and July 2007:

Alaska Marine Science Symposium, Anchorage, Alaska (*Evidence of philopatry in ringed seals*) – 21 – 24 January 2007

Interview with Associated Press for newspaper article - 22 – 23 January 2007

<http://www.adn.com/news/alaska/story/8671415p-8565319c.html>

Testimony before U.S. Senate Subcommittee on Private Sector and Consumer Solutions to Global Warming and Wildlife Protection, Washington, DC – February 2007

http://epw.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing_ID=7efcd166-802a-23ad-4634-25057d9d08bf&Witness_ID=9ee2e8ca-5581-47c3-a857-66e172ee22e4

Workshop on Monitoring Arctic Marine Mammals, Valencia, Spain – 4 - 6 March 2007

http://sitios.cac.es/microsites/belugas_workshop/docs/Arctic.pdf

Interview with writer for Ocean Conservancy as background for *Snowed in; ringed seals scratch out a life in the harshest of worlds*, – Spring 2007

Provided article (*Rapid climate change and the sea ice ecosystem*) for the World Wildlife Fund's Arctic Bulletin – April 2007. <http://assets.panda.org/downloads/ab0107.pdf> (p. 14 -16).

Juneau high school student, Emily Johnson in Science Fair project – April 2007

Joint Meeting of the Alaska Chapter of the Wildlife Society and the 12th Northern Furbearer Conference, (*Breeding site fidelity and philopatry in ringed seals (Phoca hispida)*), Juneau, Alaska, 16 – 19 April 2007

Classroom presentation at Long Branch Elementary, Arlington, Virginia – 12 April 2007

Presentation to the IRA, Unalakleet, Alaska – 24 April 2007

Interview with Public Broadcasting Service for documentary on climate change – 29 June 2007

Project Personnel and Assistance

Dr. Bradley Swanson, Central Michigan University, is overseeing the extraction and analysis of microsatellite DNA markers. Dr. David Tallmon, University of Alaska Southeast, is overseeing the extraction and analysis of mtDNA. Josh London of the National Marine Mammal Laboratory is assisting in the production and display of satellite tracking data. Brendan Kelly began a two year assignment (Intergovernmental Personnel Act) as Program Director for Arctic Biology in the Office of Polar Programs, National Science Foundation in January 2007. He continues to oversee this project and participated in data collection in Kotzebue Sound as part of his Individual Research/Development Plan agreed to by the NSF.