Long-Term Climate Change

SINCE THE COMPLETION OF THE NPRB *SCIENCE PLAN* IN 2005, CLIMATE CHANGE HAS INCREASINGLY BECOME A KEY ISSUE IN STUDIES OF ECOSYSTEM PROCESSES IN ALASKA WATERS.

Long-term climate change in the marine habitat, causing reduced ice cover in the Bering Sea and Arctic Ocean, is altering the distribution and availability of prey species, which may in turn affect the behavior and population dynamics of breeding or migrating seabirds. A clearer understanding of long-term climate change impacts on seabirds will have many benefits. For example, seabird populations of particular concern, such as threatened or endangered species like the spectacled eider, or species of particular subsistence or cultural value like common and thick-billed murres, can be better managed if predictions about climate change impacts can be modeled and tested. Also, integrated models of ecosystem dynamics, such as our Bering Sea Integrated Ecosystem Research Program, will be strengthened if the interaction of climate change and seabird foraging and population dynamics is better understood.

The Board has invested in two projects that address the impacts of long-term climate change on seabird prey availability and demographic consequences.

SEABIRDS :: Long-Term Climate Change

Seabirds, Climate Change and the Bering Sea

Project 609

PROJECT 609 BUILDS ON THE NORTH PACIFIC PELAGIC Seabird Database (NPPSD) in a retrospective study that investigates whether the pelagic distribution of seabirds in the Bering Sea is driven by climate change. Researchers are incorporating additional pelagic seabird data collected by George Hunt and others in the southeastern Bering Sea during the 1980s and 1990s into the recently developed NPPSD, and then using the expanded database to map the distribution of seabirds in the eastern Bering Sea.

To move beyond observed data, investigators are using characteristics of seabird marine habitats to produce a predictive model of seabird distribution relative to fixed physical characteristics over the entire study area. They're analyzing changes in pelagic seabird communities in the Bering Sea related to climate indices, and looking at annual deviations from the distribution patterns predicted by the model to detect how seabird distribution reacts to climate change.

Dustin Phillips

Black-legged kittiwakes feed on small fish.

FEATURE PROJECT

SEABIRDS :: Long-Term Climate Change

Auklet Survival in the Face of Climate Change

Project 638

BY EXAMINING THE TEMPORAL AND GEOGRAPHIC PATTERNS OF SURVIVAL in least auklets, crested auklets, and whiskered auklets, researchers participating in Project 638 are examining the relationship between variability in climate and ocean productivity. Auklets consume copepods and euphausiid zooplankton, and are more closely linked to oceanic primary productivity than other fish-eating or mixed-diet seabird species. Auklets can also be captured and individually marked, letting investigators determine survival rates relatively easily. Scientists in this study want to determine whether region-wide climate conditions or local conditions (e.g. oceanography, climate, predators, etc.) near breeding colonies are the main drivers in explaining auklet survival.

Unfortunately, the usual challenges of fieldwork were dramatically increased at one of the field sites when the Kasatochi volcano unexpectedly erupted on August 7, 2008 (http://www.avo.alaska.edu/activity/Kasatochi.php) and the field crew had to immediately evacuate the island.

Francis Wiese