

BEST-BSIERP

Bering Sea PROJECT

UNDERSTANDING ECOSYSTEM PROCESSES IN THE BERING SEA 2007-2013

Seabird Diets and Reproductive Success in the Pribilofs

INSIGHTS FROM A 35-YEAR KITTIWAKE DATASET

2008-2010 were three cold years on the Bering Sea shelf, characterized by cold ocean temperatures and high ice extent. The reproductive success of black-legged kittiwake (*Rissa tridactyla*) was well below average in 2008-2009 and slightly above average in 2010. A look at our long-term datasets on diet and reproductive success helped us put these years in perspective. Except for

a relatively high year at St. Paul in 2009, when there was a patch of age-1 pollock to the north-west of the island, the proportion of pollock in kittiwake diets has decreased since 1975, while that of sand lance has increased. Long-term, kittiwake diet was correlated with some broad-scale climate variables (Arctic Oscillation and regional summer sea surface temperature) but not with local

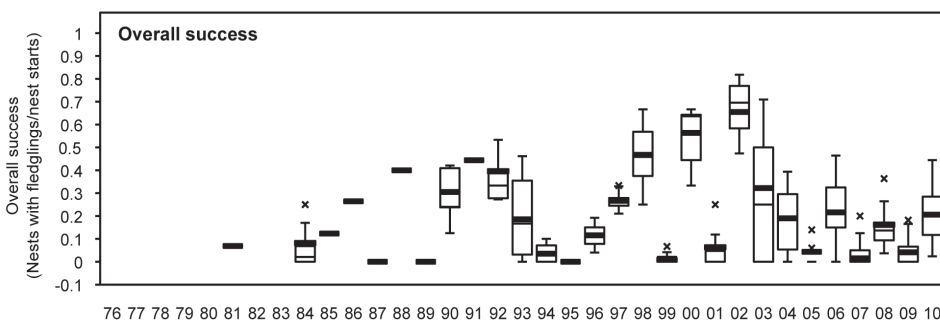


Stephanie Walden holds a kittiwake captured for diet and survival studies. (To prevent disturbing the same bird multiple times, researchers apply a dye that wears off in about a week.)

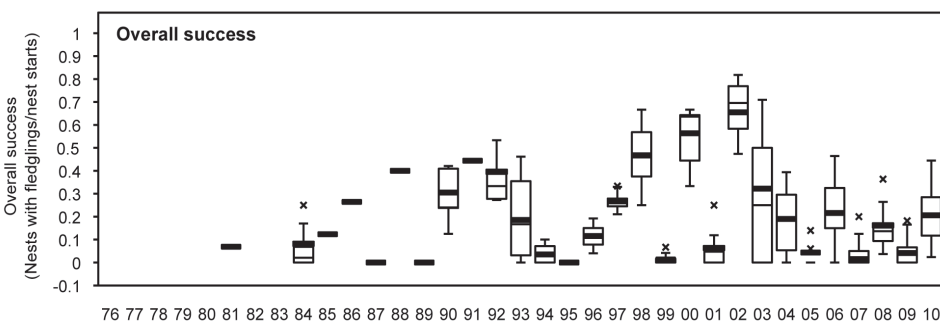
Brie Drummond

Fig. 1

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St George black-legged kittiwake reproductive success, 1975-2010



St Paul black-legged kittiwake reproductive success, 1975-2010

The Big Picture

The seabird colony-based studies of BSIERP relied heavily on intensive diet, foraging trip, and reproductive success data collected during 2008-2010, the three field seasons of the project. However, understanding relationships among climate variables, seabird diet, and reproductive output requires many more years of study. Otherwise, how would we know what is a good year or a normal year? The seabird cliffs in the Pribilofs are part of the Alaska Maritime National Wildlife Refuge, which has an ongoing annual seabird monitoring program at eight sites around the Alaskan coast. This long-term dataset helps us place in context the detailed diet, foraging behavior, body condition, reproductive success and survival data collected as part of the Bering Sea Project.

physical variables. When we separated reproductive success into its sequential components, we found that success in earlier parts of the nesting cycle and the previous year were more important predictors of overall productivity than any climate variables. Timing was also an important predictor of laying success for kittiwakes. These relationships suggest a cascade effect, in which adult condition carrying over from the previous year plays a large role in

reproductive success. An increase of prey from deeper waters beyond the shelf break (mediated by travel distance required to access prey) and small invertebrates in diets negatively affected fledging success, which may indicate low availability of high quality prey near the colonies.

How We Did It

Most summers since 1975, field crews have spent three months shivering on the fog-shrouded seabird

cliffs of both Pribilof Islands, monitoring individually-numbered nests to determine success or failure. For diet studies, adults are captured bringing food back to the nest sites after the chicks have hatched.

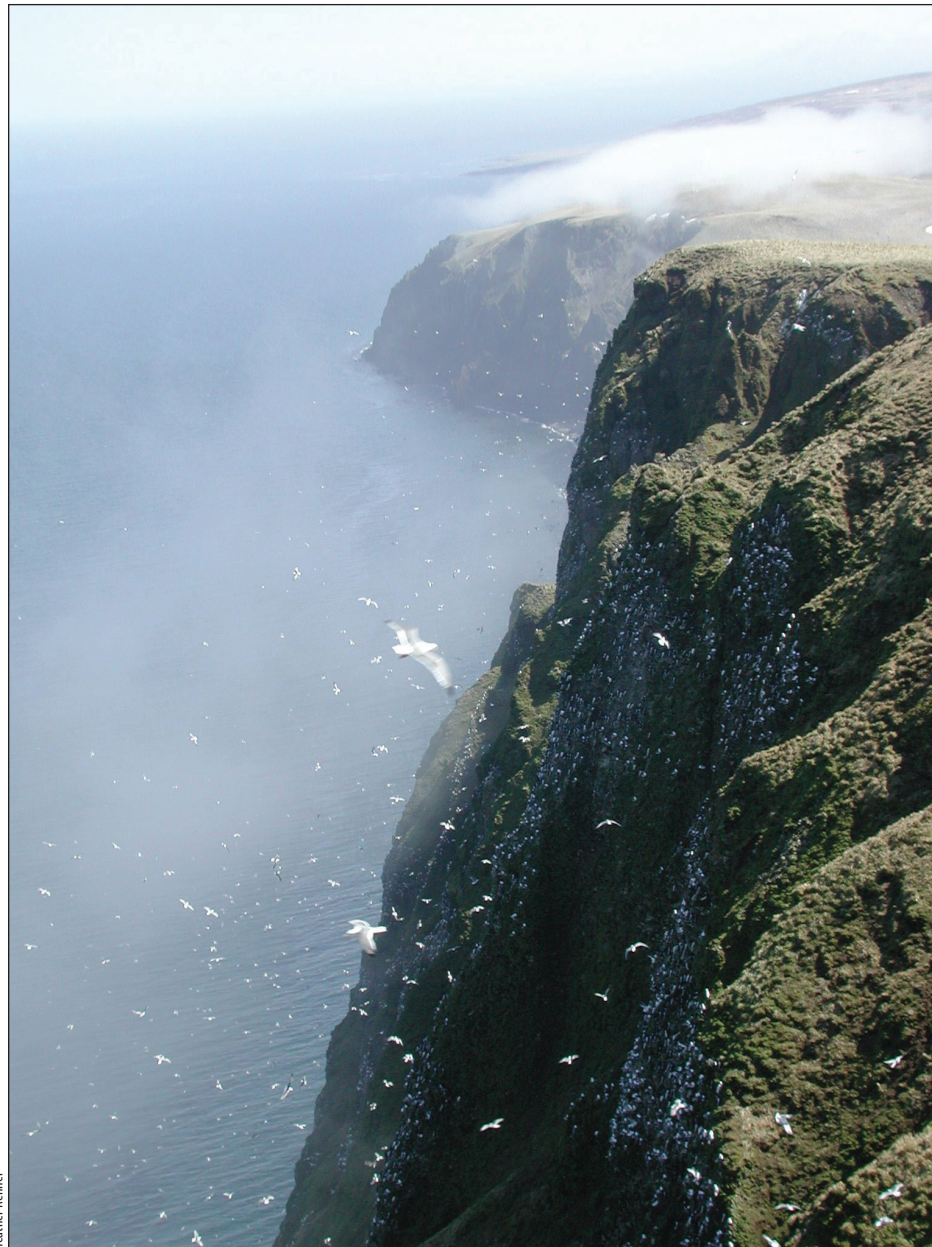
Why We Did It

As upper level predators in the marine ecosystem, seabirds reflect fluctuations in the marine environment that influence their prey supply. Studies of seabird diets and reproductive success thus provide insight into the physical and biological mechanisms that potentially drive population changes in both predators and their prey. The eastern Bering Sea shelf, among the most productive marine ecosystems in the world, has undergone significant restructuring in recent decades that is likely to continue in light of anticipated climatic change.

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The Bering Sea Project is a partnership between the North Pacific Research Board's Bering Sea Integrated Ecosystem Research Program and the National Science Foundation's Bering Ecosystem Study. www.nprb.org/beringseaproject

Kittiwake nesting habitat at the Pribilof Islands



Heather Renner

SEABIRD COLONY-BASED STUDIES

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