New Neighbors: Shifts in the Seabird Community of the Chukchi Sea Over the Past 35 Years

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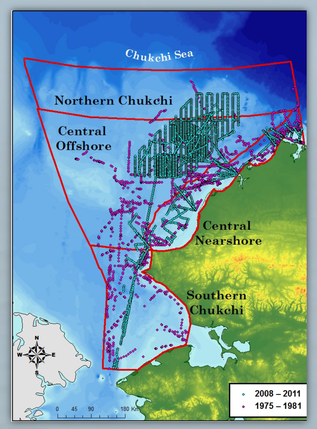
Introduction

Effects of climate change on seabirds are indirect , operating through changes in local and regional food webs and habitat. Sea ice cover of the Chukchi Sea has declined over the past 35 years (Plotnikov and Pustoshnova 2012) and this decline is anticipated to have effects on multiple trophic levels of this ecosystem. An understanding of the changes to ecosystem function in this region is needed to assess any potential impacts of oil and gas exploration activities.

Objective: Examine temporal and spatial variation in composition of the seabird community in the Chukchi Sea during a period of changing Arctic ice conditions

Methods

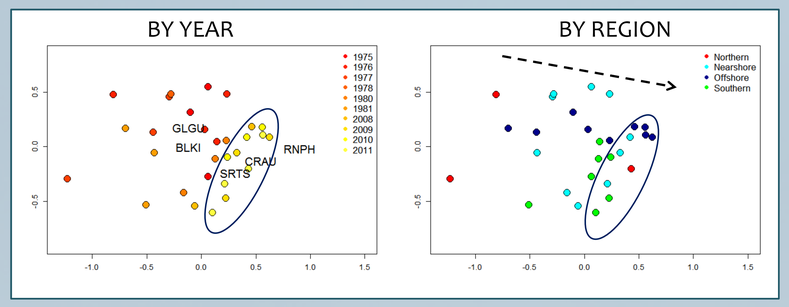
We compiled data from 3 recent (2008–2011) boat-based surveys of the seabird community and compared species composition with historical data collected during the Outer Continental Shelf Environmental Assessment Program (OCSEAP 1975–1981). We also summarized sea-ice data from Special Sensor Microwave/Imager (NASA) to quantify ice cover. We present historical years that overlap with the bird data and recent years that represented the earliest ice retreat (2009) and latest ice retreat (2008) during 2008–2011.



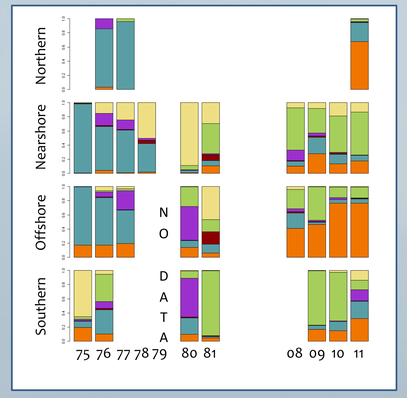
- OCSEAP 1975–1981
- CSESP 2008–2011
  Chukchi Sea Environmental Studies Program
- AKMAP 2010–2011
  Alaska Monitoring and Assessment Program
- USFWS 2009–2010
  United States Fish and Wildlife Service
- SSM/I 1979–2011

Results

Multidimensional scaling describes and compares community structure among years and regions. Distance between points indicates similarity between samples.



- Community structure of the historical data were more variable than that of recent samples, which are clustered and shifted from the historical data.
- This shift in community composition was evident in every region.

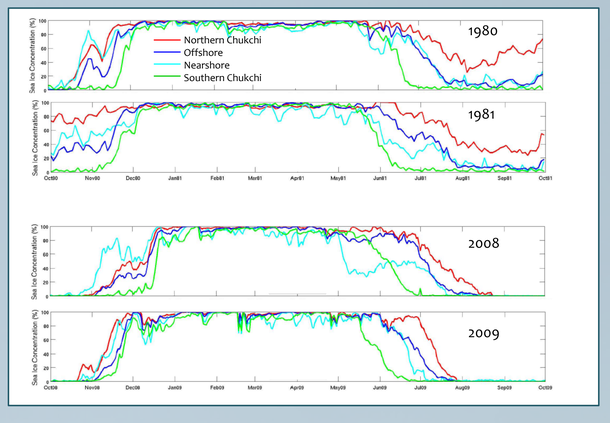


- Proportions of larids decreased and proportions of alcids and procellariids increased over time.

- Plankton-eating seabirds have replaced eiders and Arctic Tern in the list of 10 most-abundant species.

Abundance	Historical	Recent
1	Short-tailed Shearwater	Crested Auklet
2	Black-legged Kittiwake	Short-tailed Shearwater
3	Glaucous Gull	Black-legged Kittiwake
4	Phalarope spp	Thick-billed Murre
5	Long-tailed Duck	Least Auklet
6	Spectacled Eider	Long-tailed Duck
7	Common Eider	Phalarope spp
8	Arctic Tern	Northern Fulmar
9	King Eider	Glaucous Gull
10	Thick-billed Murre	Ross's Gull

Sea Ice



When compared with conditions 30 years ago, sea ice now seems to form later, melt earlier, and melt completely in all parts of the Chukchi Sea.

Conclusions

- Community composition varied among years
- Historical samples were dominated by larids
- Change in all regions suggests an ecosystem-wide shift in the seabird community toward planktivory
- Earlier ice retreat may create an environment that is more amenable to zooplankton production

Acknowledgments

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REFERENCE
Plotnikov , V.V. and V.I. Pustoshnova. 2012. Variability and conjugacy of ice conditions in the system of east Arctic seas (the Laptev, East Siberian, and Chukchi seas). Russian Meteorology and Hydrology 37: 468–476