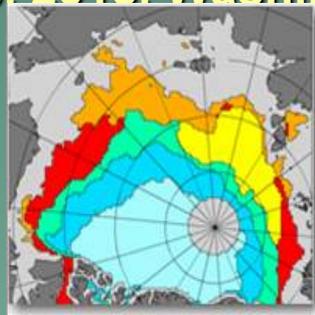


Marine Mammals and Diminishing Arctic Sea Ice

(with special emphasis on polar bears and Pacific walrus)

Impacts of an Ice-Diminishing Arctic on Naval and Maritime Operations
July 16-18, 2013. Washington, D.C.



Objectives of Presentation

- Overview of the most common sea ice-associated marine mammals of Alaska
- Provide a conceptual model of the impacts of diminishing sea ice on marine mammals of Alaska
- Characterize sensitivities of U.S. Arctic marine mammals with case histories
- Review status of Alaska sea-ice associated marine mammals with special reference to the ESA

Why are Arctic marine mammals important?

- Arctic undergoing rapid change - sea ice loss is faster than forecasted - many species associated with sea ice
- They are iconic symbols of the Arctic and important cultural and subsistence resources
- They integrate change at lower trophic levels (polar bear & ringed seal – pelagic ecosystem; walrus and bearded seal – benthic ecosystem)
- Co-management
- Complex jurisdictions and changing legal status



Arctic and Sub-arctic marine mammals of the U.S. Arctic

- Ringed seal *
- Bearded seal *
- Spotted seal *
- Ribbon Seal *
- Killer whale
- Beluga *
- Bowhead whale *
- Fin whale
- Minke whale
- Gray whale
- Humpback whale
- Polar bear *
- Pacific walrus *

Bearded Seal

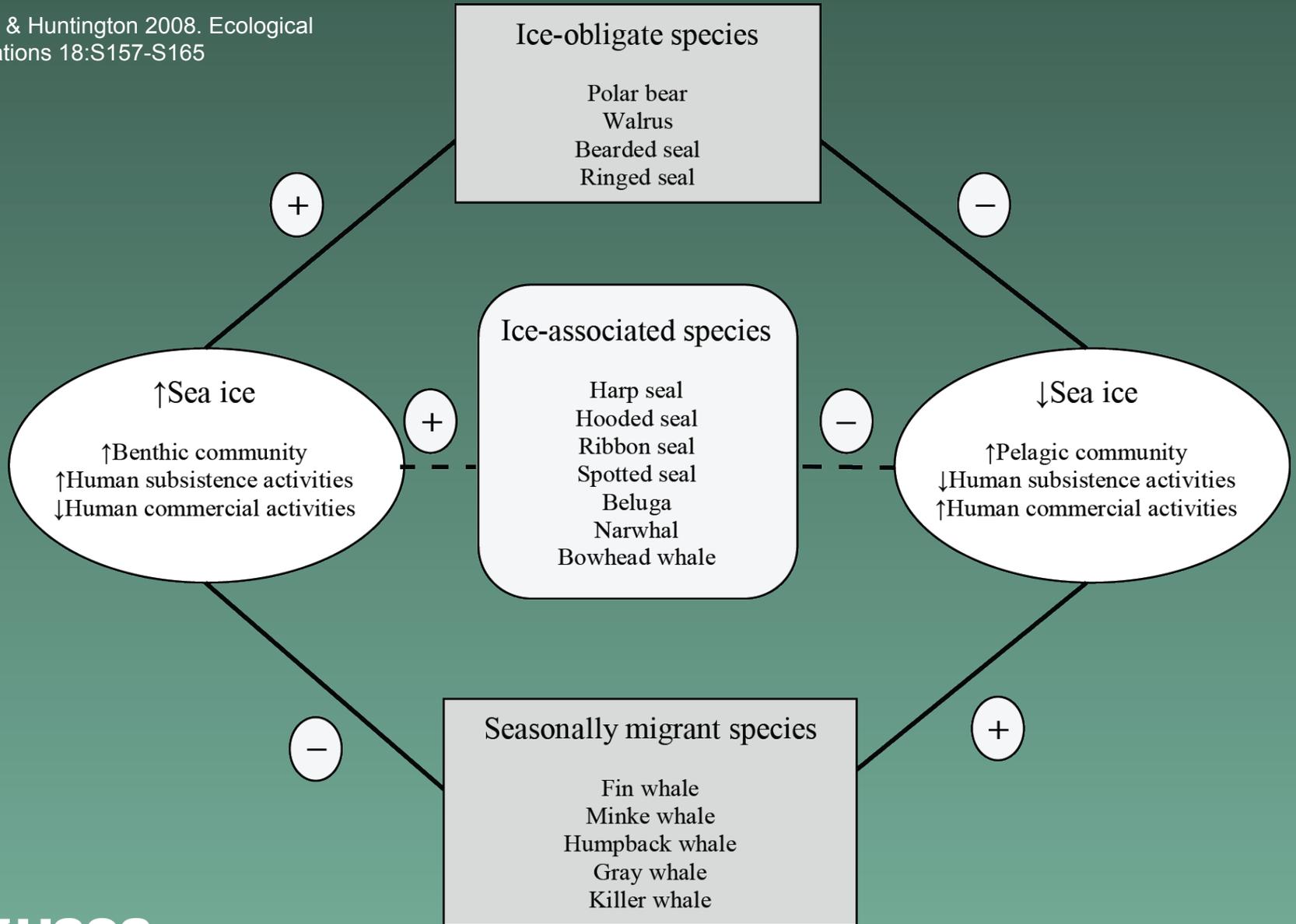


Erignathus barbatus

Ringed Seal



Phoca hispida



Bearded Seal



Erignathus barbatus

Ringed Seal



Phoca hispida

Spotted Seal



Phoca largha

Ribbon Seal



Histiophoca fasciata

- Effects of Climate Change on ice seals are increasingly clear
- Sensitivities include:
 - Reduced sea ice extent upon which to give birth, nurse pups, mate, and molt their coats on sea ice
 - Ringed seals create sub-nivean (under wind-blown snow) lairs to nurse pups, have relatively long lactation period, and tend to follow sea ice
 - Bearded seals are benthic feeders – access the sea floor from sea ice over the continental shelf
 - Increased levels of predation
 - Ocean acidification especially for bearded seal prey

Beluga Whale



Delphinaptera leucas

Bowhead Whale



Balaena mysticetus

Photo by K. Laidre

- **Effects of Climate Change on “ice” whales are unclear**
- **Potential sensitivities include:**
 - For bowhead whales potential competition with other whales, particularly grays, if latter move into Beaufort Sea
 - Modifications to trophic pathways – competition for zooplankton with invading fish species?
 - Vessel strikes from large vessels in narrow leads?

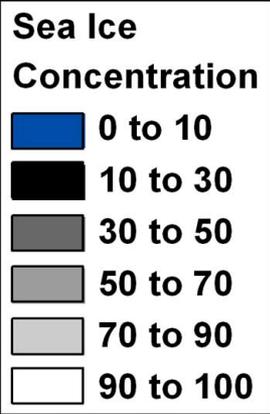


- **Emerging clarity on effects of diminishing sea ice on polar bears**
- **Effects include:**
 - Lack of ice = lack of access to primary prey, ice seals
 - Longer time spent on land and on sea ice far from shore
 - Reduced survival of old and younger animals and cubs of the year
 - Reduced size and condition
 - Smaller population size in western Hudson Bay and in Southern Beaufort Sea

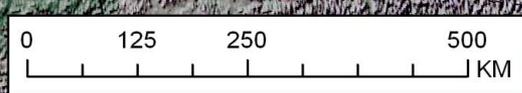
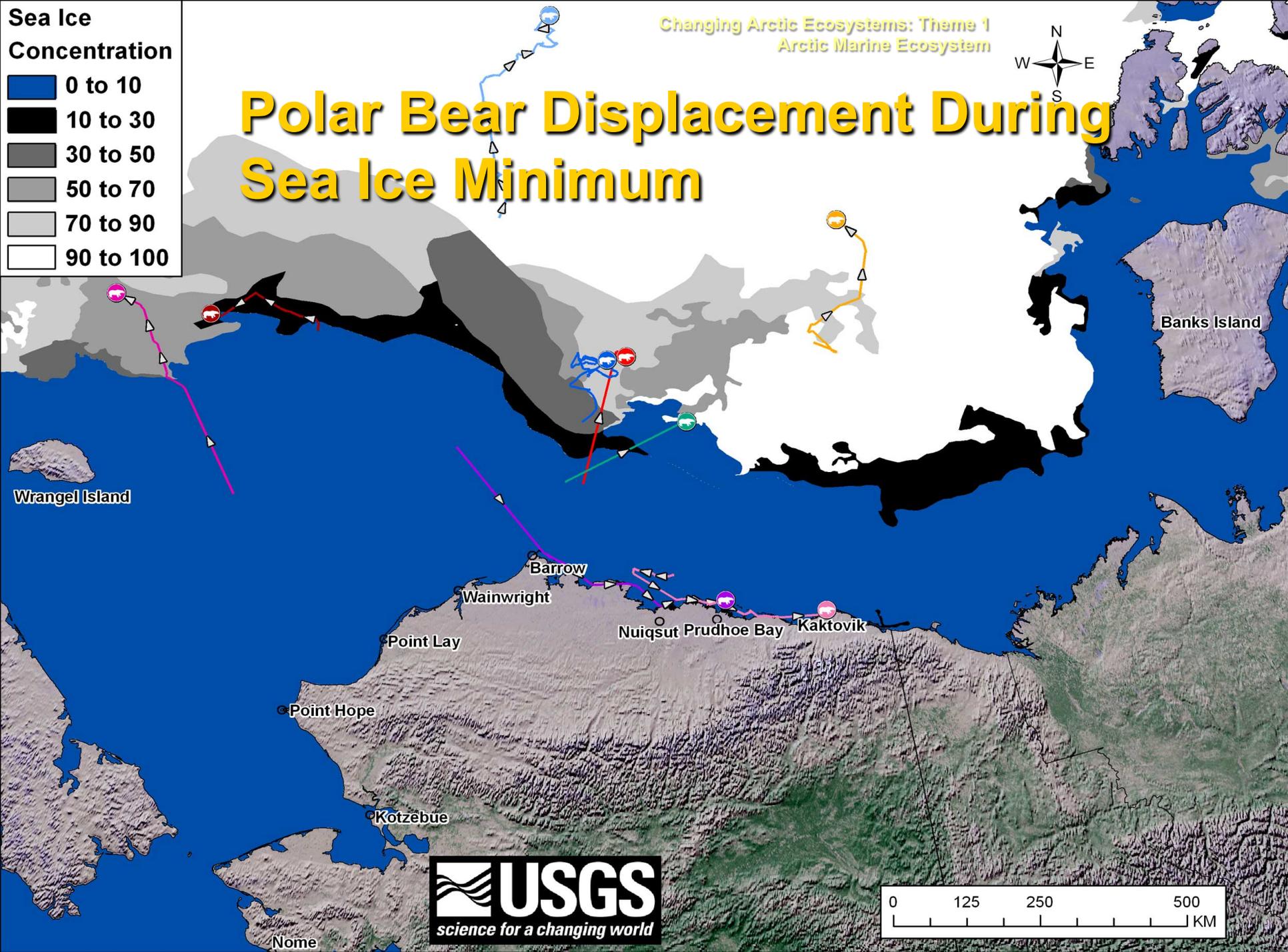
Change in Sea Ice Breakup in Hudson Bay



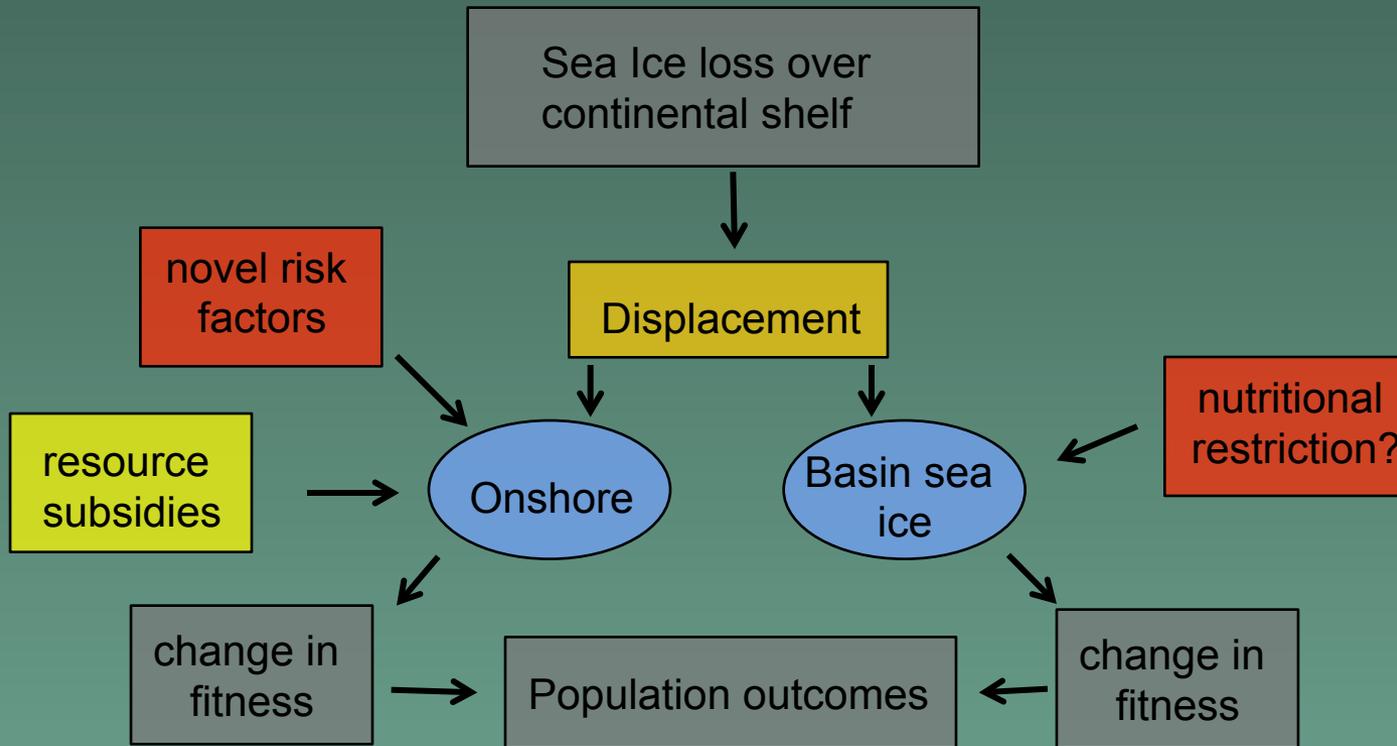
1. Shift in timing of sea ice breakup: 3 weeks earlier
2. Shift in arrival of bears on shore: 3 weeks earlier
3. Decline in condition: e.g., 18% decrease in mass
4. 22% population decline



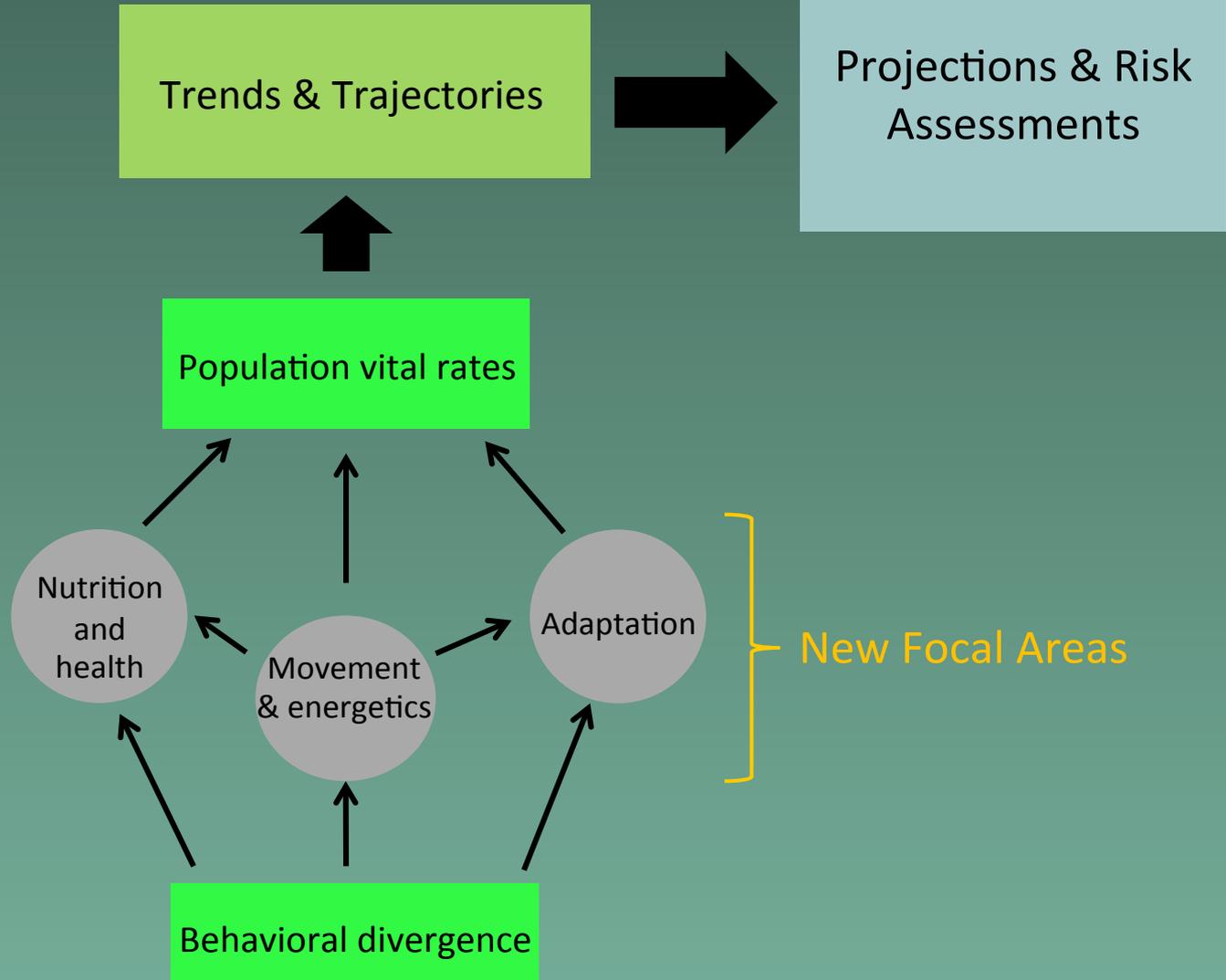
Polar Bear Displacement During Sea Ice Minimum

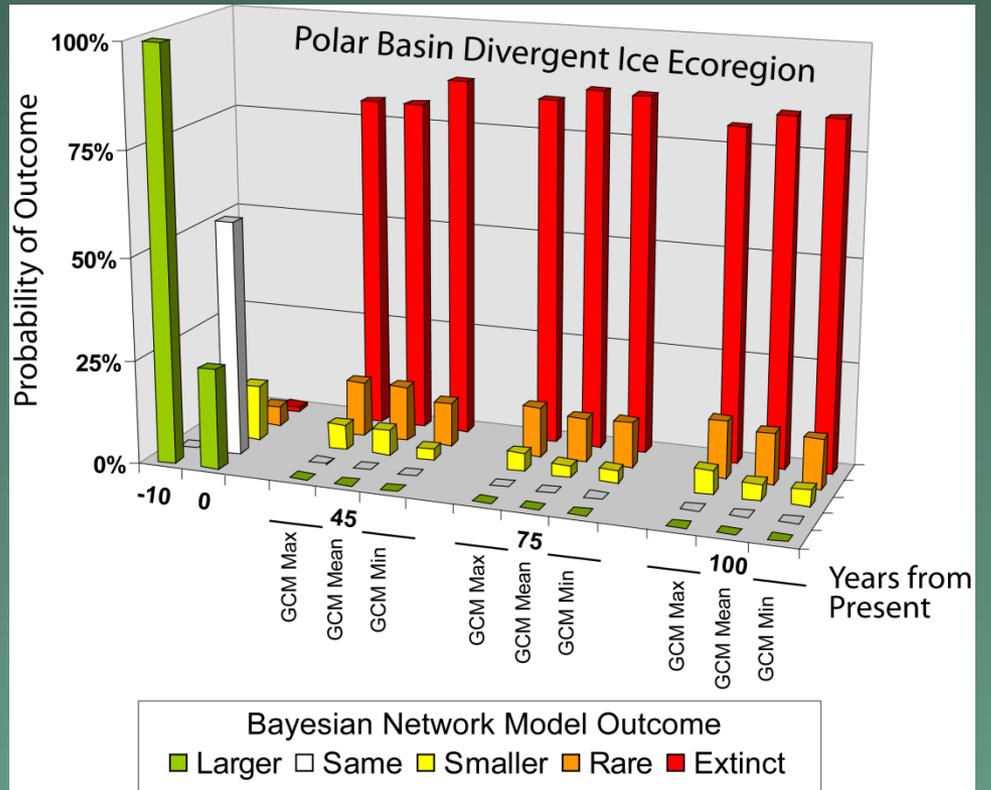
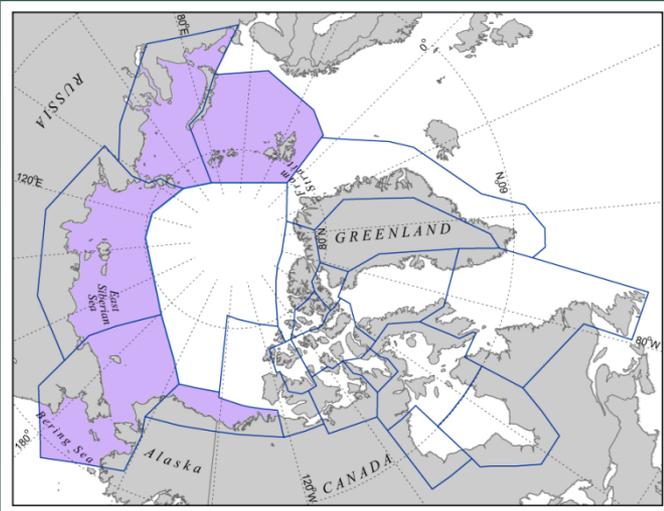


Cascading Effects of Sea Ice Loss



Strategic Approach







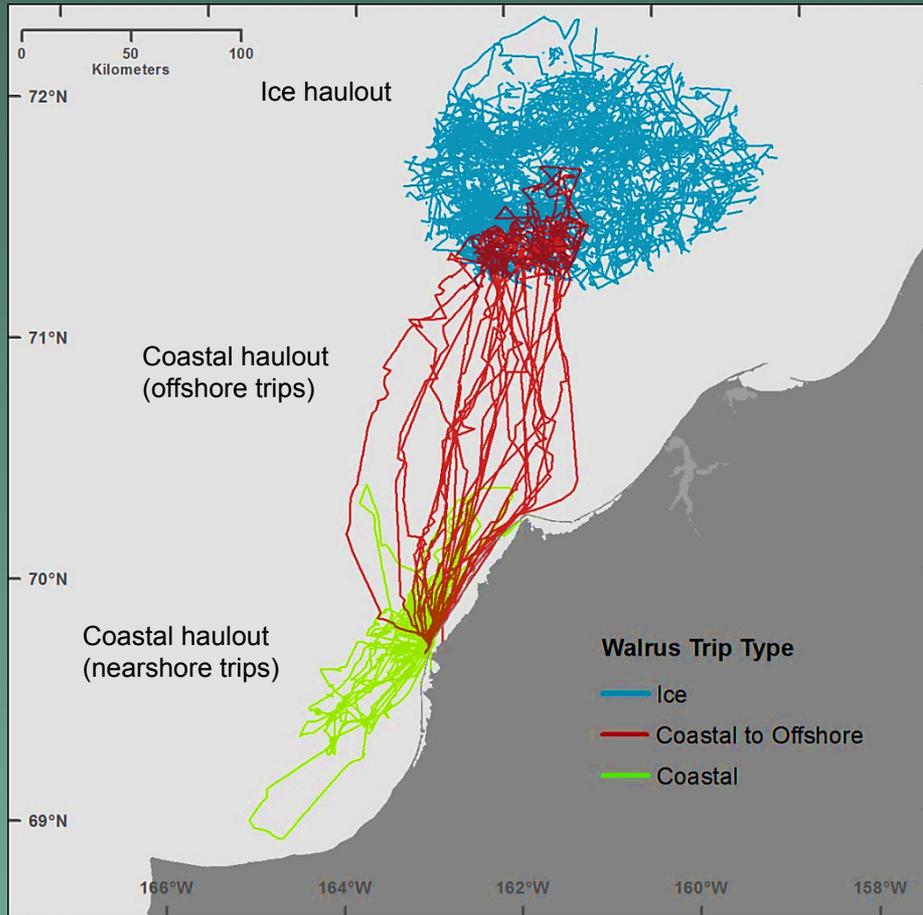
- **Uncertainty about effects of diminishing sea ice on Pacific walrus**
- **Potential effects include:**
 - Increasing numbers of walrus onshore in Alaska and Chukotka during summer and fall
 - Reduced carrying capacity because of increased competition in nearshore zone for benthic prey
 - Energetic costs result in reduced fitness
 - Increased trampling of calves during disturbances of shore haul-outs
 - Coupling of pelagic-benthic systems compromised resulting in reduced benthic productivity

Walrus have come ashore in Northwest Alaska during 4 of last 6 years in August and September



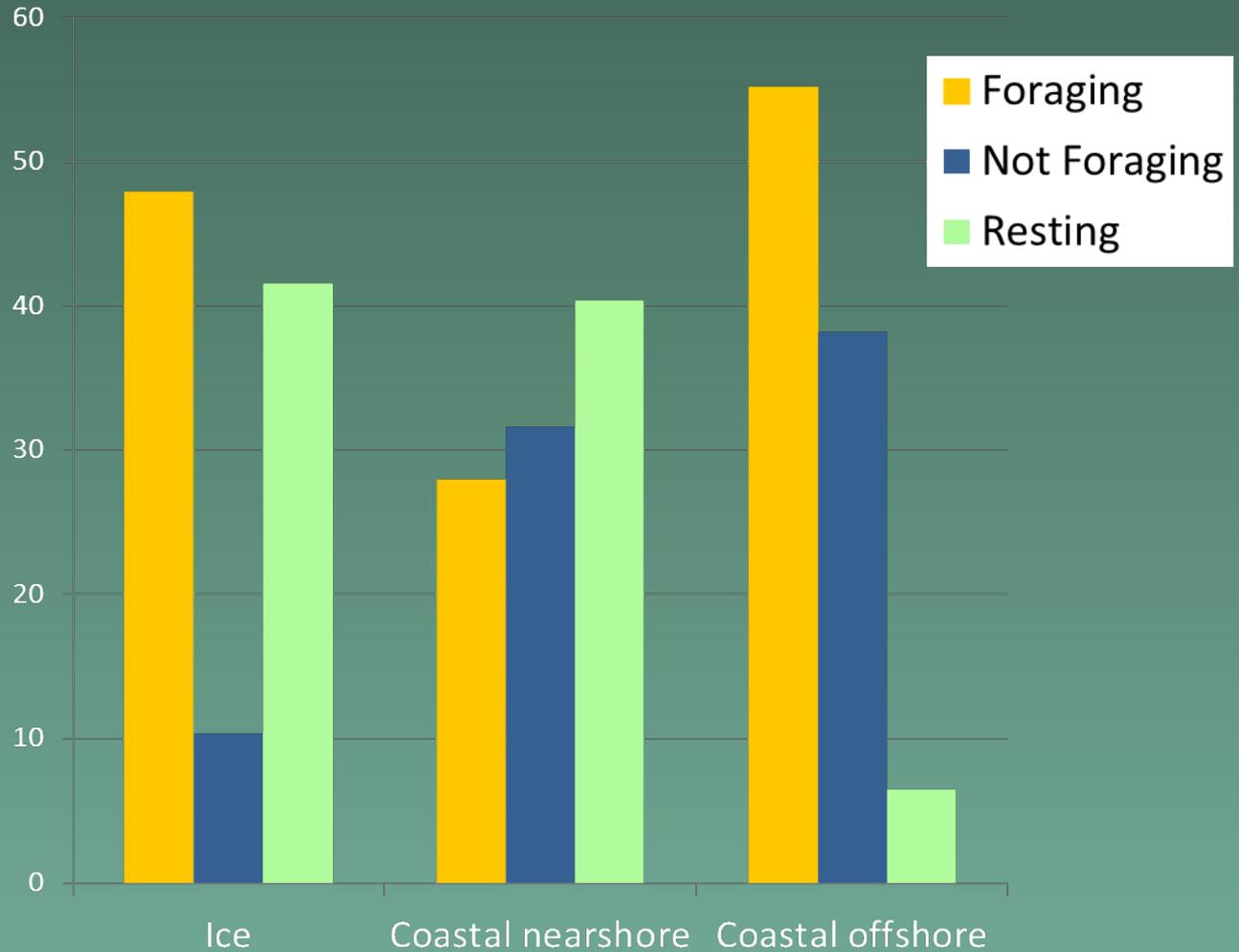
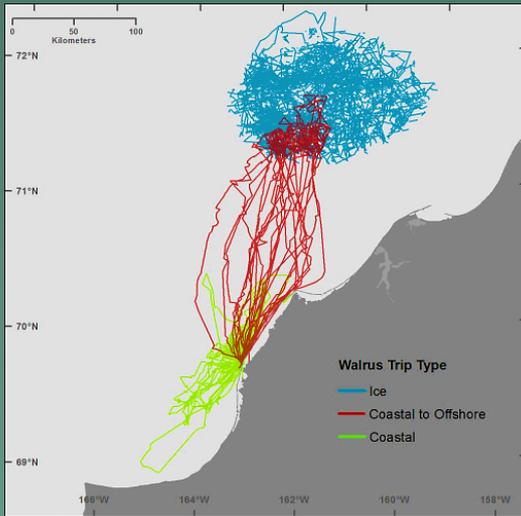
Photo by Cynthia Christman
NOAA Fisheries Service
AFSC, Natl Marine Mammal Lab
FFW Permit No MA212570-0

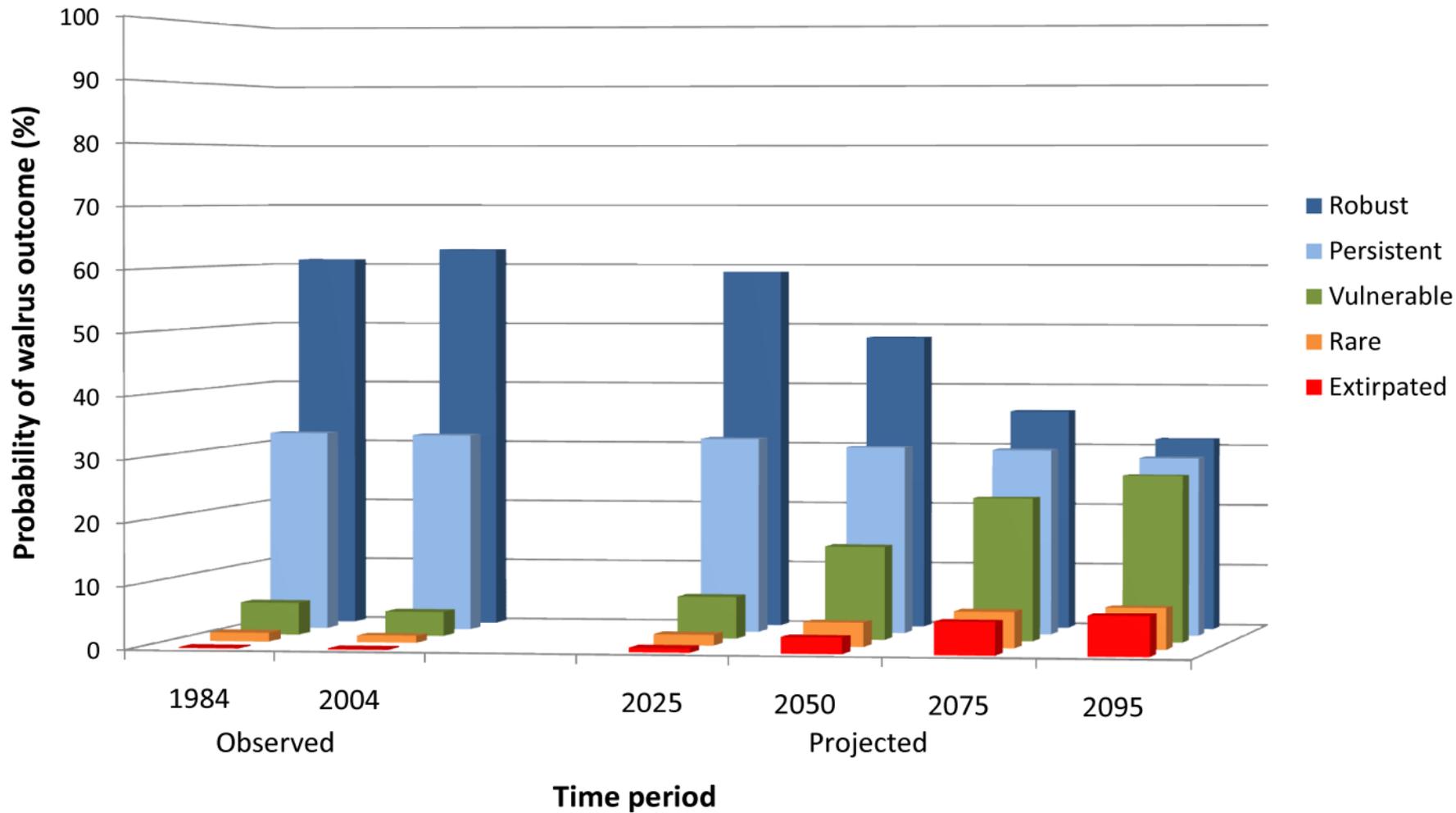
Trip Cycle Duration in presence and absence of sea ice



Origin of Trip	Trip cycle duration (Average days)
Ice (n = 94 walrus)	1.7
Coastal offshore (n = 6 walrus)	14.2
Coastal nearshore (n = 45 walrus)	2.2

Activity budgets in presence and absence of sea ice





Status under U.S. Endangered Species Act

- Polar bears – petitioned to list; listed range-wide as threatened 5/08
- Pacific walrus – petitioned to list; Warranted but precluded finding 2/11; final decision by FWS in 2017
- Ribbon seal – petitioned to list; not warranted findings in 12/08 and 7/13
- Bearded seal – petitioned to list; Beringia and Okhotsk Distinct Population Segments listed as threatened 12/12

Status under U.S. Endangered Species Act

- Ringed seal – petitioned to list; Arctic, Okhotsk and Baltic subspecies listed as threatened 12/12; Lagoda subspecies listed as endangered 12/12;
- Spotted seal – Bering Sea and Sea of Japan and Okhotsk Sea DPSs not warranted 10/09; Southern DPS (listed as threatened 10/10)
- Bowhead whale – endangered
- Fin and Humpback whales - endangered

Closing Thoughts

- Diminishing sea ice likely to have negative consequences to polar bears, walrus and some ice seals
- Less certain about impacts to other marine mammals although transient species could benefit
- Diminishing sea ice could result in increased ship traffic, development and tourism
- These in turn could impact marine mammals thru noise, strikes, disturbance and pollution
- Increasing legal complexity because of ESA listings and litigation

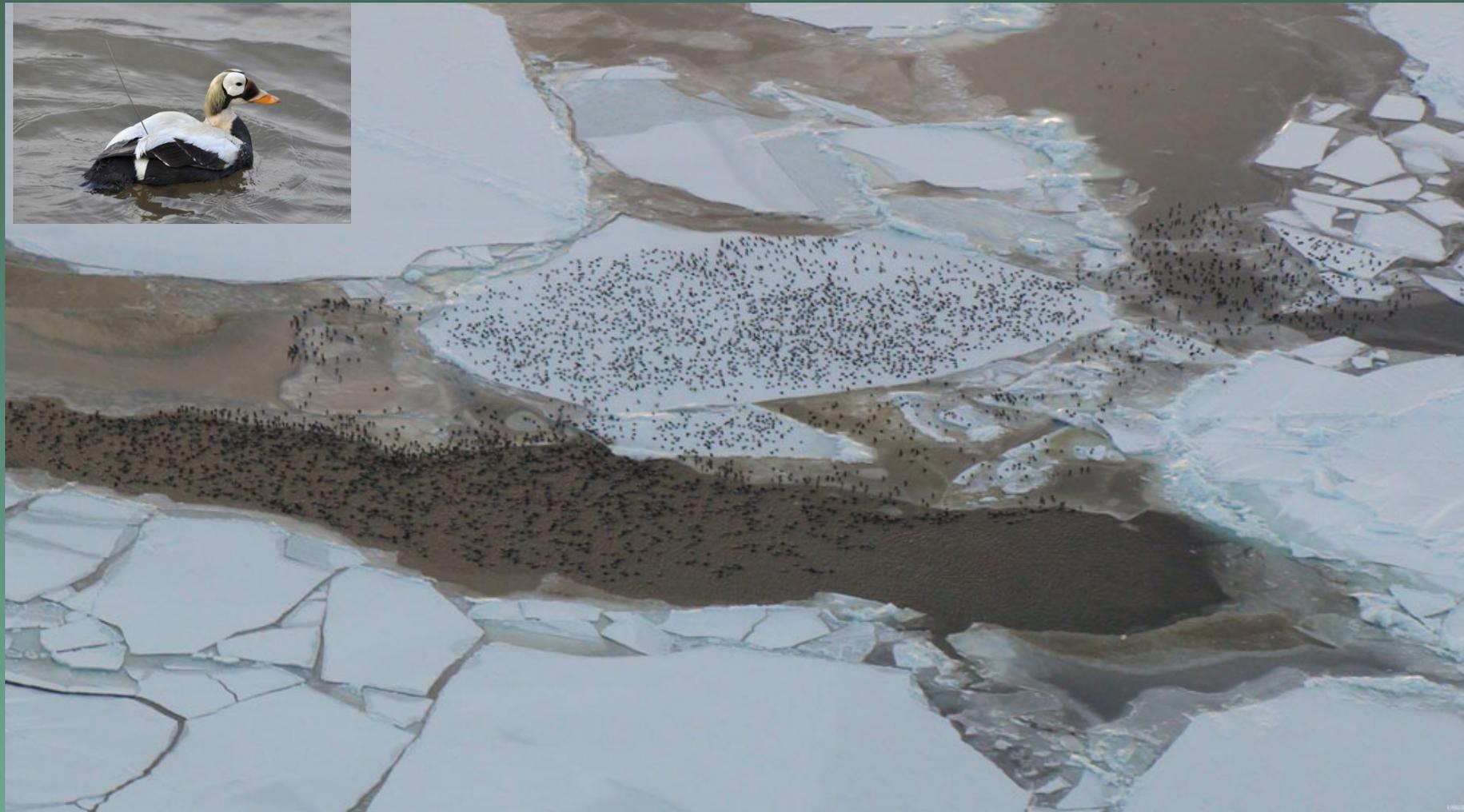
Sea Ice is for the Birds Too!

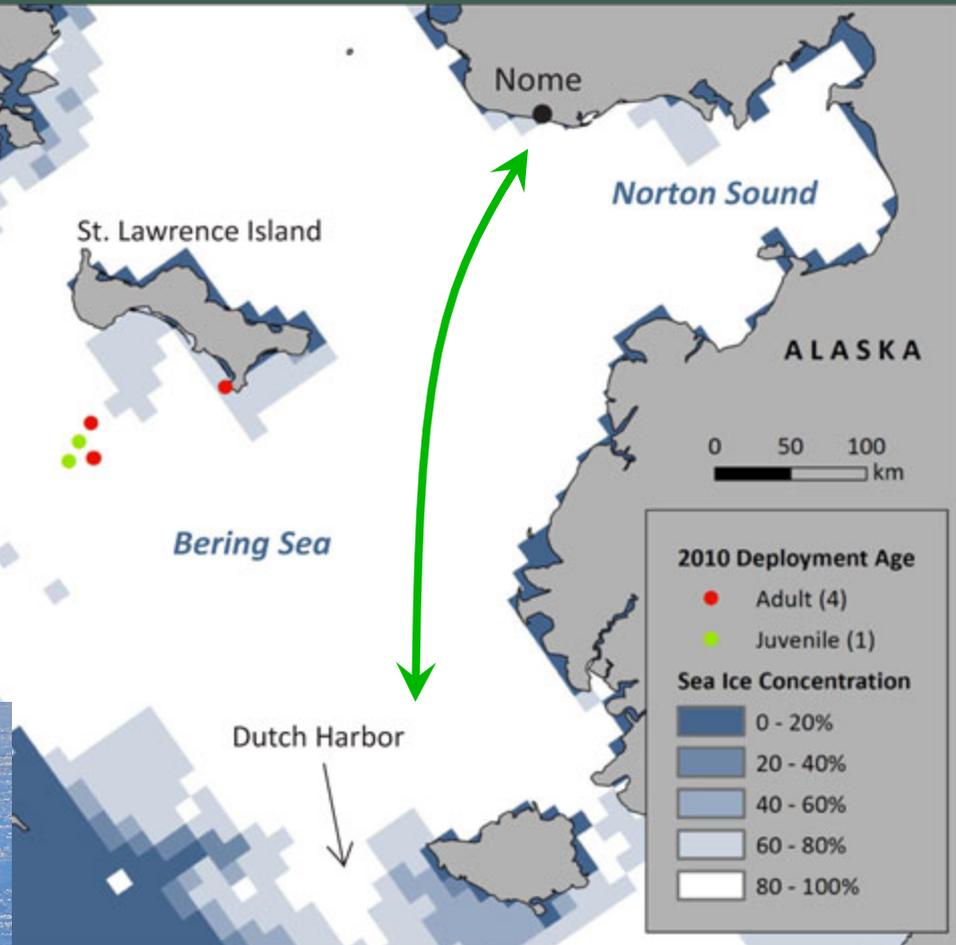




Spectacled Eider satellite telemetry locations from 24 June 2009 through 8 March 2012. Capture locations in northern Alaska are shown in black.







Approximate track of M/T Renda and R/V Healy, in January 2012 and satellite transmitter locations of Spectacled Eider recorded on 2-8 January 2012.