A Synthesis of Important Areas in the U.S. Chukchi Sea

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Introduction

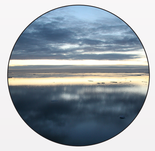

Image Credit: Tim Sullivan/USCG

A thorough understanding of Arctic marine ecology and habitat usage patterns is necessary for making well-informed management decisions in the Arctic Ocean. The objective of our study was to identify and map areas critical to the functioning of the marine ecosystem in the U.S. Arctic through a synthesis of best available scientific data. Our study areas were the federal Chukchi and Beaufort Sea Outer Continental Shelf (OCS) planning areas and state waters.

Methods

Image Credit: Suzanne Miller/USFWS

We used spatial analysis and mapping to examine patterns of use and overlap of high-value habitats, including information on wildlife migration routes and foraging areas, subsistence use areas, seafloor habitats, ice habitat areas, and places with high primary productivity.

Our maps drew from an extensive literature and data review of the current body of knowledge of the Arctic scientific community. Spatial data sources included telemetry, aerial and boat surveys, maps and area descriptions in published studies, publically available and scientifically documented local and traditional knowledge, and personal communication with experts.

In the Chukchi Sea, interpretation of important-area boundaries was based foremost on the most reliably and precisely mapped spatial datasets, and was further documented with supporting information that was less precisely mapped. We collected a library of over 800 related papers and reports, synthesized spatial data from more than 70 sources, and created 25 new maps of the Chukchi Sea.

Results & Discussion

Image Credit: Tim Sullivan/USCG

We identified and described four areas critical to ecosystem functioning and resilience: the Chukchi Corridor, Barrow Canyon Complex, Hanna Shoal Region, and Herald Shoal.

Omission from our maps did not necessarily indicate that an area was considered unimportant; additional field data collection from the area could reveal ecological patterns that were not apparent in our analysis. This synthesis brought together information on the current understanding of different aspects of the U.S. Chukchi Sea ecosystem to provide spatial information for management, conservation, and further research.

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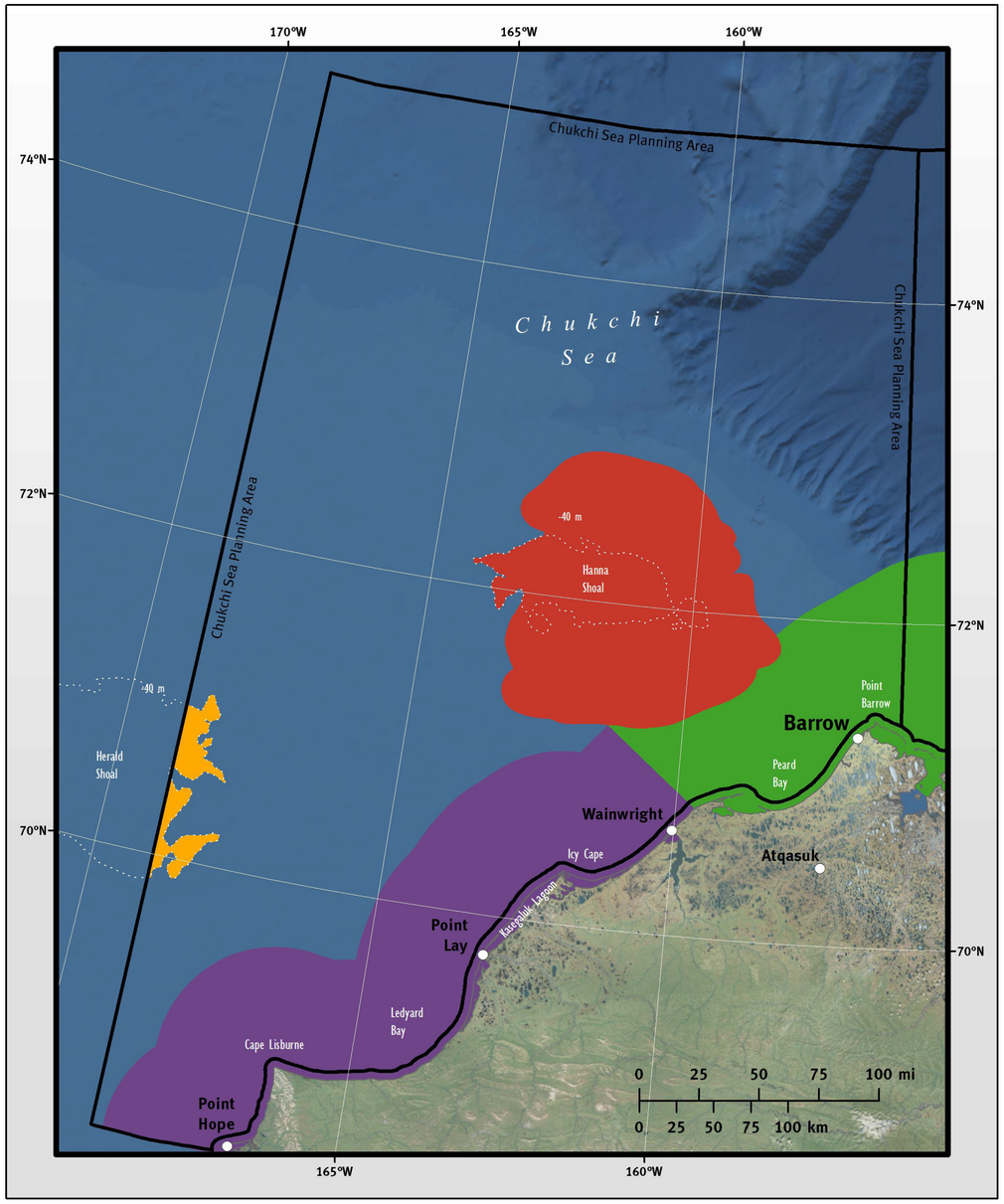

Barrow Canyon Complex

Image Credit: NOAA Fisheries

Water mass mixing, upwelling, and sea ice dynamics make the waters around Point Barrow and Barrow Canyon very productive compared to other nearby areas and the nutrient-poor Canada Basin (Mathis et al. 2007). The area has very high levels of primary productivity (Grebmeier et al. 2006) and zooplankton. See also the Daniel et al. (2015) Beaufort Sea poster.

Key Features:

- *Subsistence hunting areas for the communities of Barrow and Wainwright*
- *A major migration passageway for marine mammal species in the U.S. Arctic Ocean*
- *A major migration passageway for birds nesting on the North Slope in summer*
- *Globally significant Important Bird Areas (IBAs)*
- *A major concentration area for bowhead whales feeding in the spring and fall*
- *Gray whale feeding hotspots*
- *Feeding and denning concentration areas for polar bears*
- *Important habitat for walrus*
- *Ice seal concentration areas*
- *Seafloor (benthic) biomass and primary productivity hotspots*
- *Federally designated Essential Fish Habitat*
- *State-designated Most Environmentally Sensitive Area (MESA)*
- *Ecosystem-level hotspots, i.e. Important Ecological Areas (IEAs)*
- *Ecosystem resilience and climate change refugia.*

Chukchi Corridor

Image Credit: Milo Burcham

Within this corridor, there is significant wildlife activity, including one of the largest marine mammal migrations in the world. From winter through early summer, the area is covered in sea ice with recurring open leads and polynyas (Eicken et al. 2005) that allow wildlife to migrate north from the Bering Sea to areas of the Chukchi and Beaufort seas during spring and early summer.

Key Features:

- *Subsistence hunting areas for the communities of Point Hope, Point Lay, Wainwright, and Barrow*
- *A major migration passageway for marine mammal species in the U.S. Arctic Ocean*
- *A major migration passageway for birds nesting on the North Slope in summer*
- *Federally designated critical habitat for threatened spectacled eiders*
- *A network of globally significant IBAs*
- *Nesting colonies that support one quarter million breeding birds*
- *Important habitat for foraging, transiting, and hauled-out walrus*
- *A significant concentration of molting and calving beluga whales*
- *Feeding and low-density denning areas for polar bears*
- *Ice seal concentration areas*
- *Three state-designated MESAs*
- *Gray whale feeding hotspots*
- *Federally designated Essential Fish Habitat*
- *Ecosystem-level hotspots*
- *Ecosystem resilience and climate change refugia*

Hanna Shoal Region & Herald Shoal

Image Credit: Tim Sullivan/USCG

These shallow areas divert warm water masses flowing northward from the Bering Sea, entraining colder water long into the summer season (Weingartner et al. 2005). As a result, sea ice persists in these areas longer into the summer season as well (Martin and Drucker 1997; Spall 2007). With climate change effects, the persistent ice floes are increasingly important for ice-associated wildlife.

Key Features:

- *Mid to late-summer lingering sea ice*
- *Seafloor (benthic) biomass and primary productivity hotspots*
- *High-concentration walrus summer haulout and foraging area*
- *Feeding area for gray whales, bearded seals, and marine birds*
- *Ecosystem-level hotspots*
- *Ecosystem resilience and climate change refugia*

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