

Mapping Connectivity for Cetaceans in the Alaskan Arctic - CetMap

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CetMap

Comprehensive and easily accessible regional cetacean density and distribution maps

Biologically Important Areas
(BIA)
Qualitative

- Identify areas where cetacean species are known to congregate for specific behaviors
- Provide additional context to examine potential interactions between cetaceans and *human activities*

Complementary

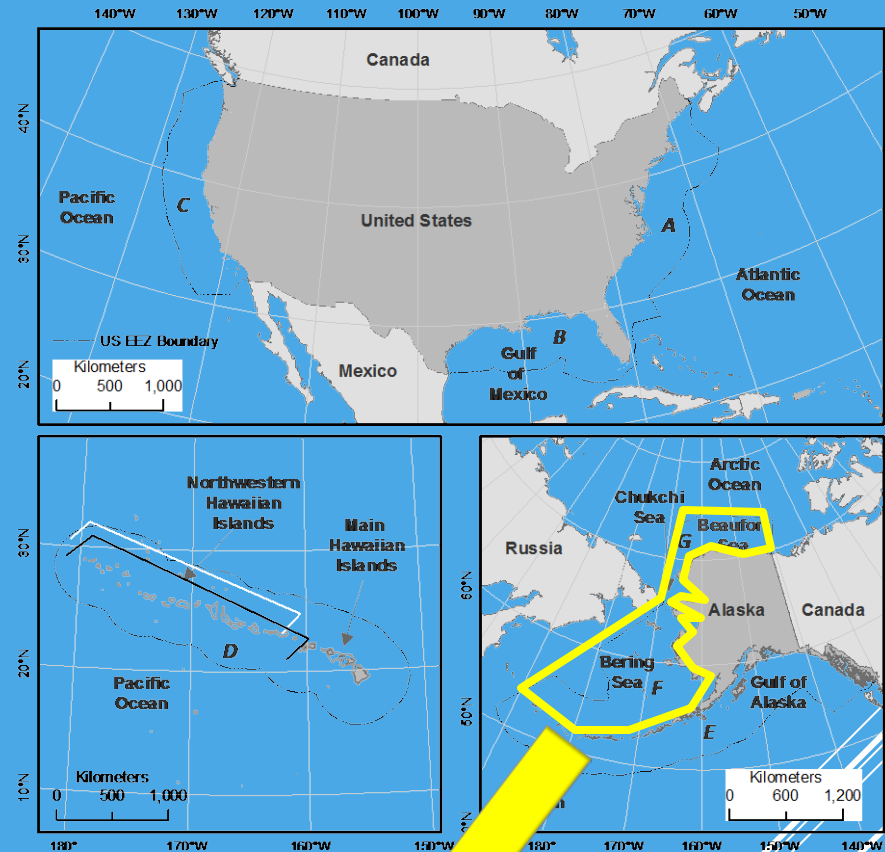
Habitat-based density
models
Quantitative

<http://cetsound.noaa.gov/important>

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What is a BIA?

- ▶ Region x Species x Time
- ▶ Seven Regions
- ▶ BIA Types
 - Reproductive
 - Feeding
 - Migratory Corridors
 - Small and Resident Population



Bering Sea and Aleutian Island BIAs
Arctic (Beaufort and Chukchi Sea) BIAs

Also...

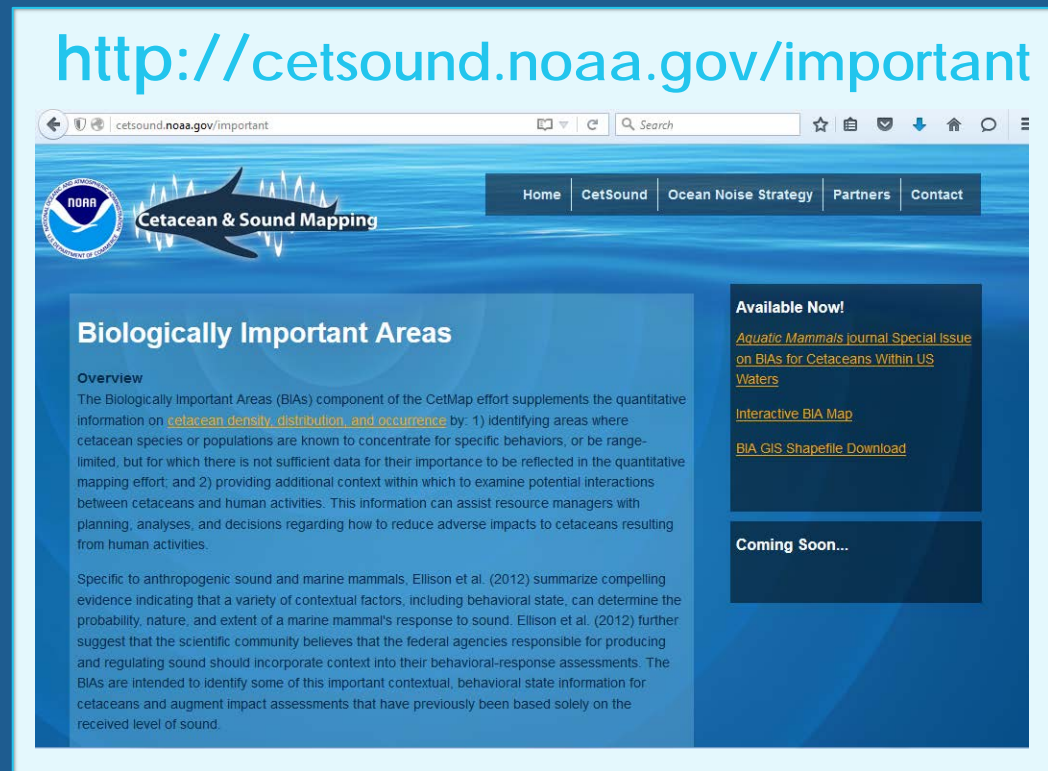
► Scientific

- No legal, political or socioeconomic input
- No direct or immediate regulatory consequences

► Best available science

► Goals

- Assess and minimize impacts of anthropogenic activities on cetaceans
- Identify information gaps
 - Help prioritize research



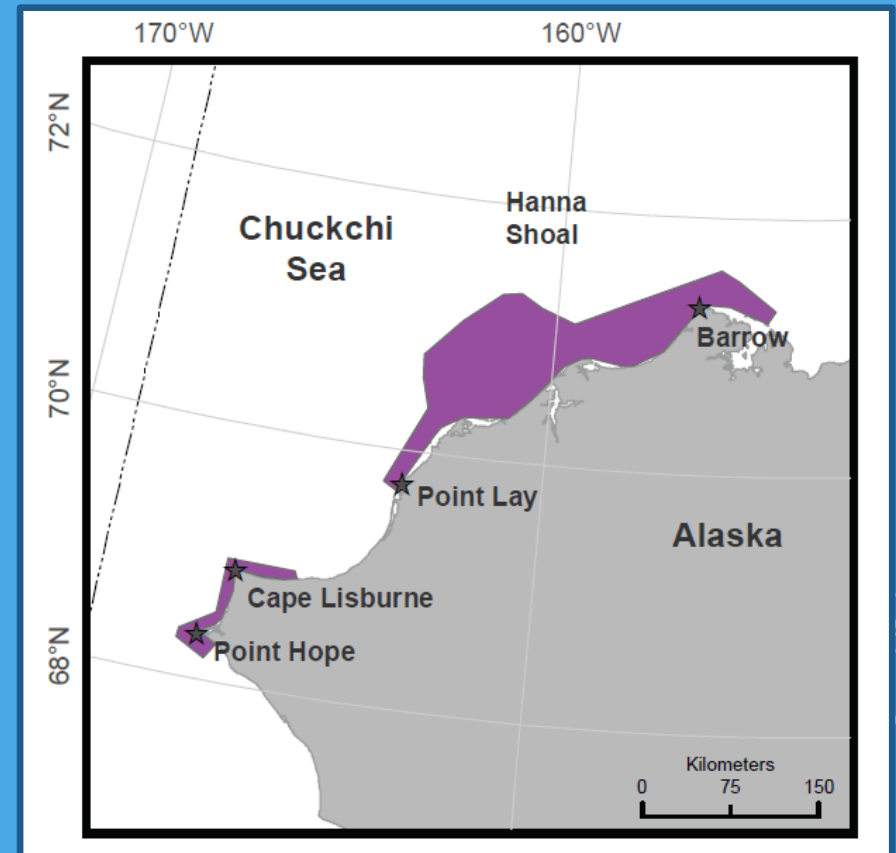
The screenshot shows the NOAA website for Cetacean & Sound Mapping. The URL is <http://cetsound.noaa.gov/important>. The page features a navigation menu with links for Home, CetSound, Ocean Noise Strategy, Partners, and Contact. The main content area is titled "Biologically Important Areas" and includes an "Overview" section. The overview text states: "The Biologically Important Areas (BIAs) component of the CetMap effort supplements the quantitative information on [cetacean density, distribution, and occurrence](#) by: 1) identifying areas where cetacean species or populations are known to concentrate for specific behaviors, or be range-limited, but for which there is not sufficient data for their importance to be reflected in the quantitative mapping effort; and 2) providing additional context within which to examine potential interactions between cetaceans and human activities. This information can assist resource managers with planning, analyses, and decisions regarding how to reduce adverse impacts to cetaceans resulting from human activities." Below this, a paragraph mentions a 2012 study by Ellison et al. regarding contextual factors. On the right side, there is a "Available Now!" section with links to an [Aquatic Mammals journal Special Issue on BIAs for Cetaceans Within US Waters](#), an [Interactive BIA Map](#), and a [BIA GIS Shapefile Download](#). A "Coming Soon..." section is also present.

Reproductive Areas

Areas and times within which a particular species selectively mates, gives birth, or is found with neonates or calves



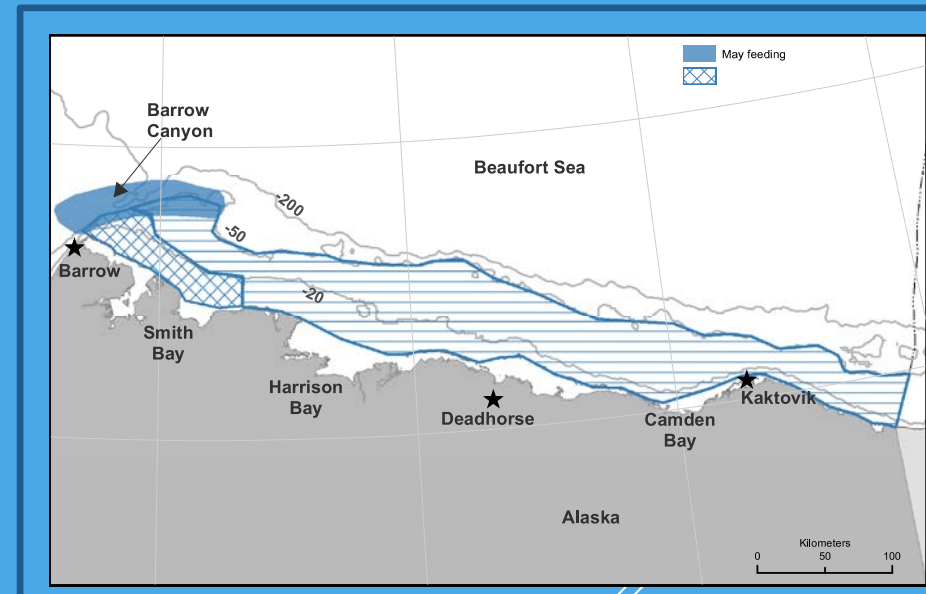
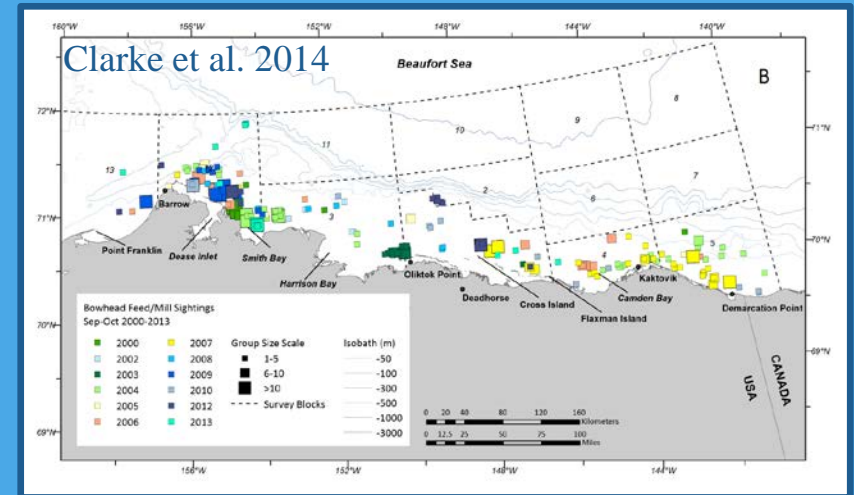
Gray Whale



Bowhead Whale

Feeding Areas

Areas and times within which **aggregations** of a particular species preferentially feed. These either may be **persistent in space and time** or associated with **ephemeral features** that are less predictable but are located within a larger area that can be delineated.

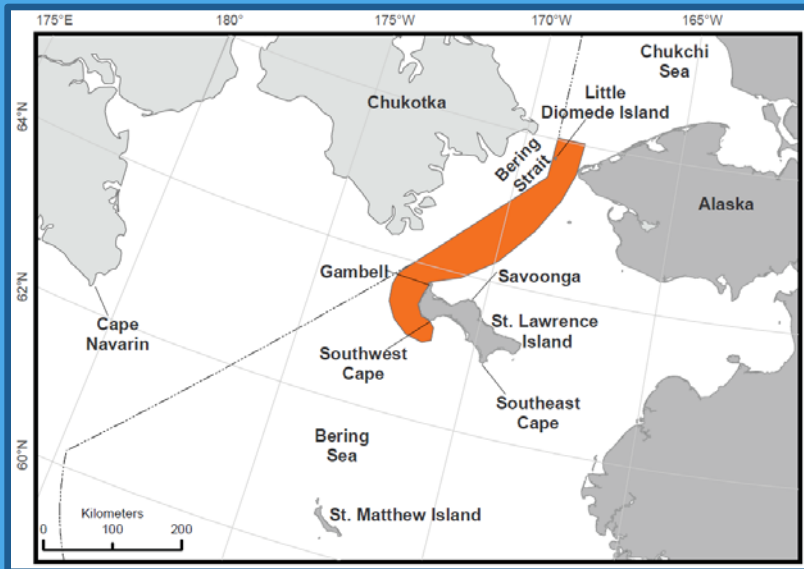


Clarke, J.T., A.A. Brower, C.L. Christman, and M.C. Ferguson. 2014. Distribution and Relative Abundance of Marine Mammals in the Northeastern Chukchi and Western Beaufort Seas, 2013. Annual Report, OCS Study BOEM 2014-018. National Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, F/AC3, Seattle, WA 98115-6349.

Migratory Corridors

Areas and times within which a **substantial portion** of a species is known to migrate; the corridor is **spatially restricted**

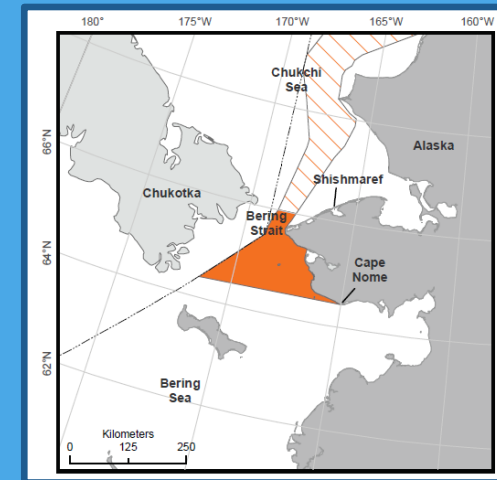
Bowhead Whale



Gray Whale



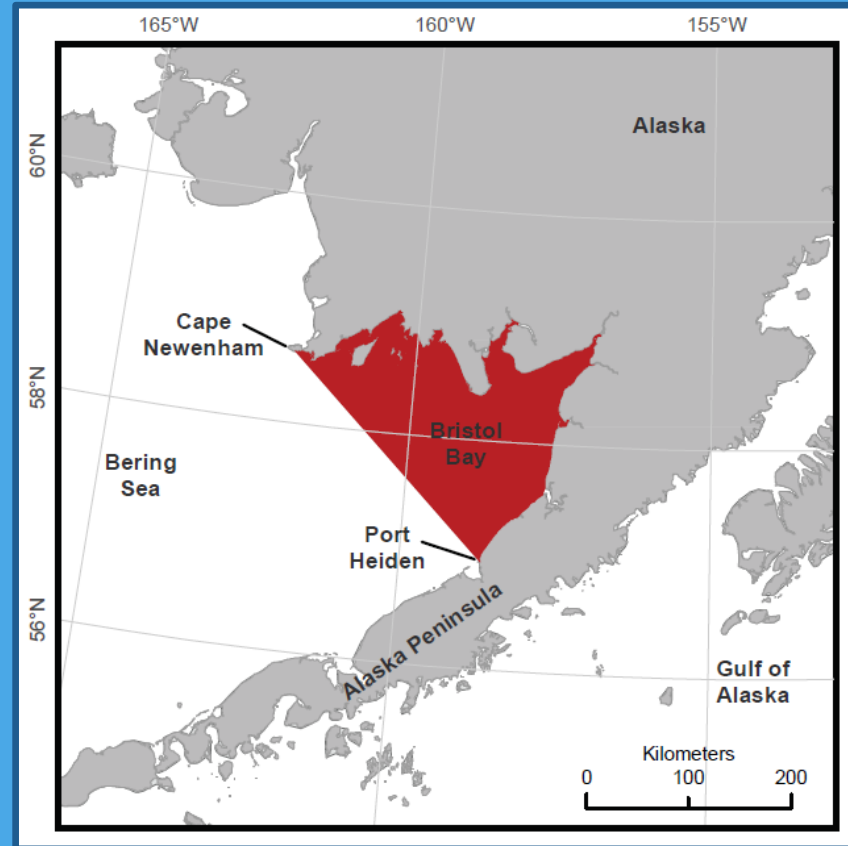
Beluga



Bristol Bay Belugas

Small and Resident Population

Areas and times within which **small and resident** populations occupy a **limited geographic extent**



- ▶ No quantitative thresholds
- ▶ No ranks
- ▶ 4 components to each BIA
 - Narrative
 - Map
 - Literature cited
 - Metadata table ➔

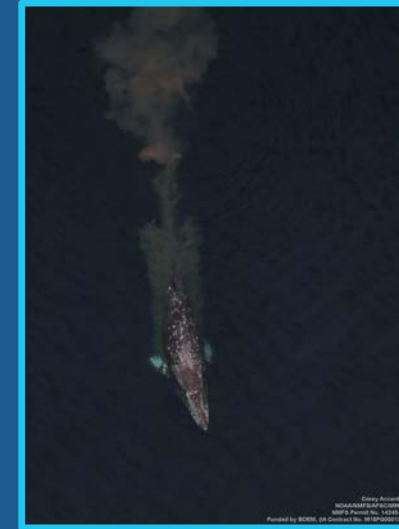
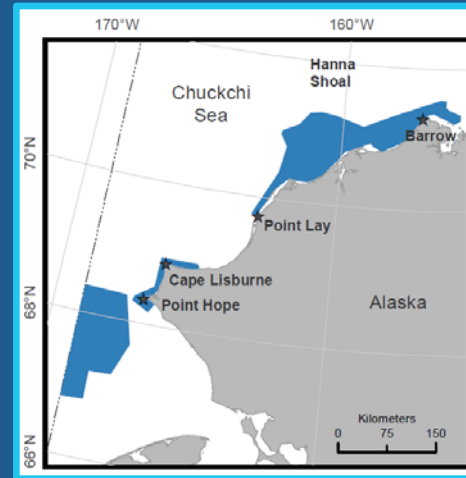


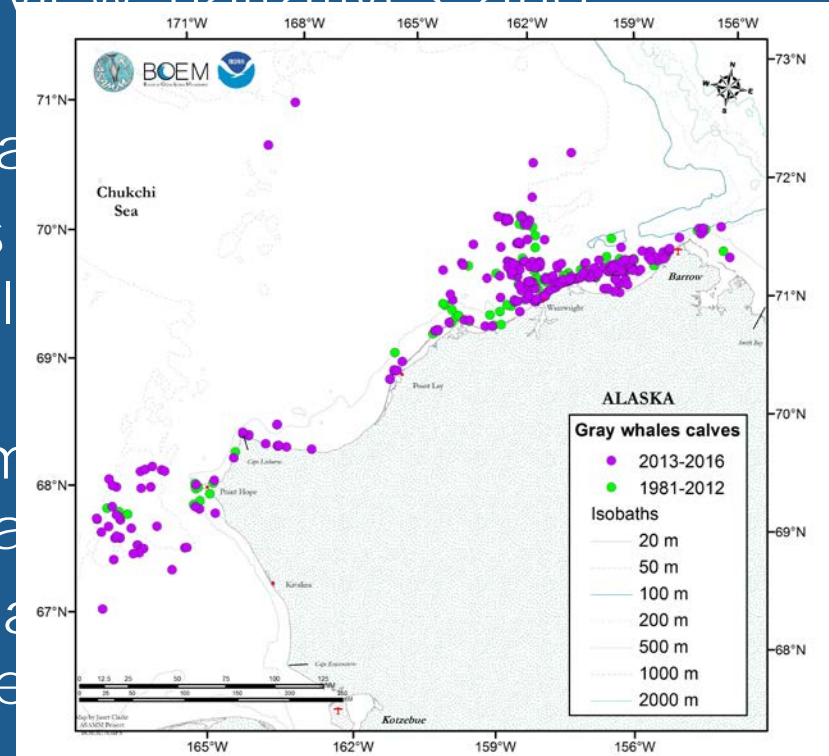
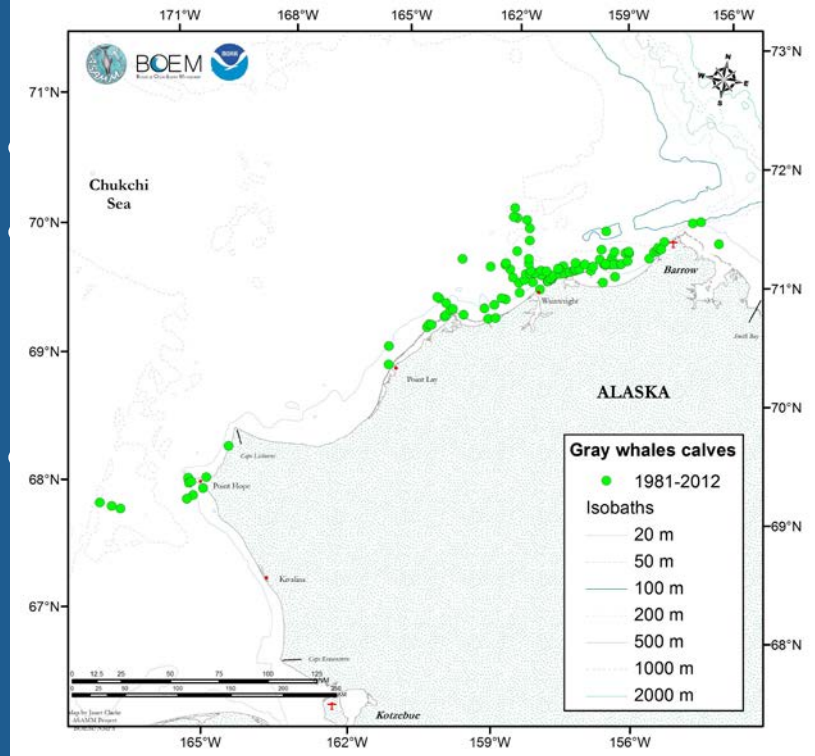
Table S8.9. Gray whale supporting information for feeding BIAs

Area type	Feeding
Migration direction (if applicable)	NA
Months of year designation is applicable	June-October
Satellite-tagging data supporting designation (Y/N)	N
Visual observations/records supporting designation (Y/N)	Y
# of observations/records	965 aerial survey records (ASAMM – northeast Chukchi), 2,584 vessel-sighted whales (southern Chukchi), and 40 vessel sighting records (RUSALCA)
# of years in which supporting visual data collected	17: 1980-1991, 2008-2012 (ASAMM); 2003 (vessel in southern Chukchi); and 2009 (RUSALCA cruise)
Nature of supporting information	Visual observations from aircraft and vessel of gray whales surfacing with mud streaming from the mouth
Acoustic detections/records supporting designation (Y/N)	N
Photo-ID evidence supporting designation (Y/N)	N
Genetic analyses conducted supporting designation (Y/N)	N
What factors justify the boundary selection?	Locations of sightings
Dataset sources	ASAMM (www.afsc.noaa.gov/NMML/software/bwasp-comida.php)
Approximate % of population that uses this area for the designated purpose (if known)	Unknown
Approximate # of areas known specifically for this behavior (if feeding/cow-calf/mating/migratory) for this population	Several known feeding areas for the ENP Stock: southern Chukchi Sea (principal), northern Chukchi Sea (both Chukotkan and Alaskan sides), Kodiak Island, Vancouver Island, and Washington State

Caveats and Limitations



• Important to read the overview narratives and



• BIA ≠ Habitat or Range

• Require updating and calibration

Recommendations

- Close data gaps specifically identified in BIAs
 - Beaufort and Chukchi seas
 - Bowhead whale use of western Beaufort Sea in summer and extent of fall migratory corridor in the Chukchi Sea;
 - Beluga use of outer continental shelf and slope in the Beaufort Sea;
 - Gray whale spring and fall migration corridors and movement between feeding hotspots
 - Bering Sea
 - Reproductive areas, migration routes and timing, and distribution, density and behavior in the offshelf areas
- Incorporate data from additional resources
 - Unmanned aerial and underwater vehicles
 - Traditional ecological knowledge
- Expand species x regions x times
 - Non-US EEZ, particularly Canada and Russia
 - Several additional cetacean species
 - Walruses, ice seals, polar bears, sea otters



Acknowledgments

- ▶ Funding
 - NOAA
 - Bureau of Ocean Energy Management
 - US Navy
- ▶ *Aquatic Mammals*
- ▶ 1.5 pages of detailed acknowledgments
 - *Aquatic Mammals* 2015 Vol. 41(1): 17-18