1. Biologically Important Areas for Cetaceans Within U.S. Waters – Aleutian Islands and Bering Sea Region

Supplementary Descriptions

BIAs are sorted by species common name, BIA type, Importance Score and descriptive name. Child BIAs, if present, follow the parent BIA in the order of Importance Score and descriptive name.

Supplementary Description 1. 1. Beluga feeding area

Species name: Beluga (*Delphinapterus leucas*)

Stock or population: Eastern Bering Sea

Descriptive name: Norton Sound - Parent

BIA type: Feeding Area

BIA label: F-BIA2-d-b2-ABS044-0a

Transboundary across: None

Hierarchy: Hierarchical BIA; Parent of children a

Importance score: 2 (Intensity: 2, Data support: 2)

- **Supporting notes for intensity score**: The majority of the Eastern Bering Sea population feeds in Norton Sound in spring through fall.
- **Supporting notes for data support score**: There is a fair amount of data for this area, and it is a mix of scientific data and Indigenous Knowledge, but most of it is getting older. The June 2017 aerial surveys documented that although the distribution was a little different from the surveys in the 1990s, it was still generally in the Yukon River plume.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Although the 2017 aerial surveys showed the distribution was generally the same as the 1990s, it did change a little. Beluga presence in the area depends on the fish runs, and those could vary due to oceanographic, river, or estuarine variables. Beluga arrival into Norton Sound is dependent on sea ice melt in the spring, and sea ice formation in the fall may play a part in their departure. Also, belugas used to go into Norton Bay in the summer, and do not anymore.

Boundary certainty: 2

- **Supporting notes for boundary certainty**: There have been few belugas documented outside of Norton Sound in the spring-fall, and it is likely they are all here feeding. Some of the data this is based on is getting to be older data (e.g., 20 years), but the 2017 surveys were recent.

Months of year designation is applicable: May, June, July, August, September, October, November

Tagging data supporting designation (Y/N): Y

- **# of tags**: 2
- **# of years in which supporting tagging data collected**: 2012-2013
- **Supporting information**: Tagged in Oct; tags documented both belugas' departure from Norton Sound in November and their return in June (Citta et al. 2016a, 2018a).

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: >1000 sightings of >2000 belugas, ~40 stomach contents
- **# of years in which supporting visual data collected**: 1992-2012, 2017
- **Supporting information**: Line transect aerial surveys in the 1990s and 2000, and 2017 resulted in population estimates of 6994 and 9242, respectively (Lowry et al. 2017, 2019) and documented belugas concentrated near the Yukon River Delta to feed on salmon. Stomach contents from belugas in Norton Sound & Hooper Bay included a variety of fish & invertebrates; the six belugas taken in Hooper Bay were part of a larger group of 80 belugas (Quakenbush et al. 2015). Bering Strait marine life and subsistence use data synthesis includes older data (1980s & earlier) and Indigenous Knowledge to document that belugas move around Norton Sound and the Yukon River Delta in the spring, summer, and fall based on fish concentrations and movements (Oceana-Kawerak 2014).

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?: The BIA polygon is based on the 1990s, 2000, and 2017 aerial surveys, the two 2012 satellite tagged belugas, and the Oceana and Kawerak (2014) synthesis, which states that belugas occur along the coastal areas in spring, summer, and fall. The southern end of the polygon is based on the October 2012 belugas sighted by Hooper Bay.

References: Citta, J.J., Richard, P., Lowry, L.F., O'Corry-Crowe, G., Marcoux, M., Suydam, R., et al. (2016a). Satellite telemetry reveals population specific winter ranges of beluga whales in the Bering Sea. Mar. Mamm. Sci. 33:1, 236-250.

doi:10.1111/mms.12357.

Citta, J.J., Lowry, L.F., Quakenbush, L.T., Kelly, B.P., Fischbach, A.S., London, J.M., et al. (2018a). A multi-species synthesis of satellite telemetry data in the Pacific Arctic (1987-2015): Overlap of marine mammal distributions and core use areas. Deep-Sea Res. Pt. II 152, 132-153.

Lowry, L.F., Zerbini, A., Frost, K.J., DeMaster, D.P., Hobbs, R.C. (2017). Development of an abundance estimate for the eastern Bering Sea stock of beluga whales (Delphinapterus leucas). J. Cet. Res. Manage. 16, 39-47.

Lowry, L.F., Citta, J.J., O'Corry-Crowe, G., Quakenbush, L.T., Frost, K.J., Suydam, R., et al. (2019). Distribution, abundance, harvest, and status of western Alaska beluga whale, Delphinapterus leucas, stocks. Mar. Fish. Rev. 81:3-4, 54-71. https://doi.org/10.7755/MFR.81.3–4.2.

Oceana and Kawerak, Inc. (2014). Bering Strait marine life and subsistence use data synthesis. Kawerak Incorporated, 1-499. https://oceana.org/publications/reports/the-bering-strait-marine-life-and-subsistence-data-synthesis

Quakenbush, L., Suydam, R.S., Bryan, A.L., Lowry, L.F., Frost, K.J., Mahoney, B.A. (2015). Diet of beluga whales (Delphinapterus leucas) in Alaska from stomach contents, March–November. Mar. Fish. Rev. 77:1, 70–84. doi:10.7755/MFR.77.1.7.

Approximate % of population that uses this area for the designated purpose (if known): 100

Approximate # of areas known specifically for this behavior (if feeding/cow-calf/mating/migratory) for this population: 2

Supplementary Description 1. 2. Beluga feeding area

Species name: Beluga (*Delphinapterus leucas*)

Stock or population: Eastern Bering Sea

Descriptive name: Norton Sound - Child

BIA type: Feeding Area

BIA label: F-BIA3-d-b2-ABS044-a

Transboundary across: None

Hierarchy: Hierarchical BIA; Child a

Importance score: 3 (Intensity: 3, Data support: 2)

- **Supporting notes for intensity score**: This region is where the highest densities of Eastern Bering Sea belugas are feeding in spring through fall.
- **Supporting notes for data support score**: There is a fair amount of data for this area, and it is a mix of scientific data and Indigenous Knowledge, but most of it is getting older. The June 2017 aerial surveys documented that although the distribution was a little different from the surveys in the 1990s, it was still generally in the Yukon River plume.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Although the 2017 aerial surveys showed the distribution was generally the same as the 1990s, it did change a little. Beluga presence in the area depends on the fish runs, and those could vary due to oceanographic, river, or estuarine variables. Beluga arrival into Norton Sound is dependent on sea ice melt in the spring, and sea ice formation in the fall may play a part in their departure. Also, belugas used to go into Norton Bay in the summer, and do not anymore.

Boundary certainty: 2

- **Supporting notes for boundary certainty**: There have been few belugas documented outside of Norton Sound in the spring-fall, and it is likely they are all here feeding. Some of the data this is based on is getting to be older data (e.g., 20 years), but the 2017 surveys were recent.

Months of year designation is applicable: May, June, July, August, September, October, November

Tagging data supporting designation (Y/N): Y

- **# of tags**: 2
- **# of years in which supporting tagging data collected**: 2012-2013
- **Supporting information**: Tagged in Oct; tags documented both belugas' departure from Norton Sound in November and their return in June (Citta et al. 2016a, 2018a).

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: >1000 sightings of >2000 belugas
- **# of years in which supporting visual data collected**: 1992-2012, 2017
- **Supporting information**: Line transect aerial surveys in the 1990s and 2000, and 2017 resulted in population estimates of 6994 and 9242, respectively (Lowry et al. 2017, 2019) and documented belugas concentrated near the Yukon River Delta to feed on salmon. Stomach contents from belugas in Norton Sound included a variety of fish & invertebrates (Quakenbush et al. 2015). Bering Strait Marine Life and Subsistence Use Data Synthesis includes older data (1980s & earlier) and Indigenous Knowledge to document that belugas move around Norton Sound and the Yukon River Delta in the spring, summer, and fall based on fish concentrations and movements (Oceana and Kawerak 2014).

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?: The BIA polygon is based on the area of highest density of belugas sighted during the aerial surveys in 1992-1995, 1999-2000, and 2017.

References: Citta, J.J., Richard, P., Lowry, L.F., O'Corry-Crowe, G., Marcoux, M., Suydam, R., et al. (2016a). Satellite telemetry reveals population specific winter ranges of beluga whales in the Bering Sea. Mar. Mamm. Sci. 33:1, 236-250. doi:10.1111/mms.12357.

Citta, J.J., Lowry, L.F., Quakenbush, L.T., Kelly, B.P., Fischbach, A.S., London, J.M., et al. (2018a). A multi-species synthesis of satellite telemetry data in the Pacific Arctic (1987-2015): Overlap of marine mammal distributions and core use areas. Deep-Sea Res. Pt. II 152, 132-153.

Lowry, L.F., Zerbini, A., Frost, K.J., DeMaster, D.P., Hobbs, R.C. (2017). Development of an abundance estimate for the eastern Bering Sea stock of beluga whales (Delphinapterus leucas). J. Cet. Res. Manage. 16, 39-47.

Lowry, L.F., Citta, J.J., O'Corry-Crowe, G., Quakenbush, L.T., Frost, K.J., Suydam, R., et al. (2019). Distribution, abundance, harvest, and status of western Alaska beluga whale, Delphinapterus leucas, stocks. Mar. Fish. Rev. 81:3-4, 54-71. https://doi.org/10.7755/MFR.81.3–4.2.

Oceana and Kawerak, Inc. (2014). Bering Strait marine life and subsistence use data synthesis. Kawerak Incorporated, 1-499. https://oceana.org/publications/reports/the-bering-strait-marine-life-and-subsistence-data-synthesis

Quakenbush, L., Suydam, R.S., Bryan, A.L., Lowry, L.F., Frost, K.J., Mahoney, B.A. (2015). Diet of beluga whales (Delphinapterus leucas) in Alaska from stomach contents, March–November. Mar. Fish. Rev. 77:1, 70–84. doi:10.7755/MFR.77.1.7.

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: 2

Supplementary Description 1. 3. Beluga feeding area

Species name: Beluga (*Delphinapterus leucas*)

Stock or population: Eastern Bering Sea

Descriptive name: Norton Bay

BIA type: Feeding Area

BIA label: F-BIA1-d-b1-ABS046-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 1 (Intensity: 1, Data support: 2)

- **Supporting notes for intensity score**: There is not much in the data sources to be able to rate Intensity, but Indigenous Knowledge from the 1990s mentions belugas come into the bay in small groups of 2-7 animals, or sometimes big groups spread out in a long line.
- **Supporting notes for data support score**: Although there is not a lot of recent data/knowledge, it is mostly Indigenous Knowledge and the community members who live in these places know the beluga presence and distribution.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Sea ice breakup in spring affects the timing, distribution, and length of stay of belugas in Norton Bay.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: The data sources do not go into detail how far out from Norton Bay that belugas are seen.

Months of year designation is applicable: April, May, August, September, October

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: 14 stomach samples, Indigenous Knowledge that does not report on numbers of animals
- **# of years in which supporting visual data collected**: 1995-2012
- **Supporting information**: Indigenous Knowledge documented belugas in Norton Bay in Apr-May for herring and tomcod; their arrival was based on ice presence. The belugas moved out for the summer (though they used to stay all summer), and returned for Aug-Oct for herring as well as other fish (Huntington et al. 1999). Stomach samples from belugas near Elim documented Arctic and saffron cod, salmon, other fishes, shrimp, and cephalopods (Quakenbush et al. 2015). Bering Strait Marine Life and Subsistence Use Data Synthesis includes older data (1980s & earlier) and Indigenous Knowledge to document that belugas arrive into Norton Bay in April and May as the ice breaks up, in summer they typically move out of Norton Bay, and in fall hunters from Elim, Koyuk, and Shaktoolik hunt them. (Oceana and Kawerak 2014).

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?: The BIA polygon is based on Indigenous Knowledge: community reports of beluga presence in Norton Bay.

References: Huntington, H.P., and the communities of Buckland, Elim, Koyuk, Point Lay, and Shaktoolik. (1999). Traditional knowledge on the ecology of beluga whales (Delphinapterus leucas) in the eastern Chukchi and northern Bering Seas, Alaska. Arctic. 52:1, 49-61.

Oceana and Kawerak, Inc. (2014). Bering Strait marine life and subsistence use data synthesis. Kawerak Incorporated, 1-499. https://oceana.org/publications/reports/the-bering-strait-marine-life-and-subsistence-data-synthesis

Quakenbush, L., Suydam, R.S., Bryan, A.L., Lowry, L.F., Frost, K.J., Mahoney, B.A. (2015). Diet of beluga whales (Delphinapterus leucas) in Alaska from stomach contents, March–November. Mar. Fish. Rev. 77:1, 70–84. doi:10.7755/MFR.77.1.7.

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: 2

Supplementary Description 1. 4. Beluga reproductive area

Species name: Beluga (*Delphinapterus leucas*)

Stock or population: Eastern Beaufort, Eastern Chukchi, and Eastern Bering seas wintering grounds

Descriptive name: EBS, ECS, & EB/NS Wintering grounds

BIA type: Reproductive Area

BIA label: R-BIA0-d-b1-ABS048-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: The spatial and temporal specifics of beluga reproduction are unknown, as is the density of belugas within those areas and times.
- **Supporting notes for data support score**: Data on the timing of beluga reproduction are quite limited. The satellite tag data is based on only a few individuals while on their wintering grounds. The acoustic moorings are at only a few locations (Bering Strait, Gambell, and Savoonga) for only 1-2 years and do not give stock or behavior data.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Sea ice is dynamic and likely affects beluga distribution on their wintering grounds.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: The boundaries are uncertain due to the limited data.

Months of year designation is applicable: March, April

Tagging data supporting designation (Y/N): Y

- **# of tags**: Eastern Beaufort: 4 tags, Eastern Chukchi: 2 tags, Eastern Bering: 2 tags
- **# of years in which supporting tagging data collected**: 2001-2013
- **Supporting information**: Satellite tags document belugas in Mar-Apr while on their wintering grounds and as they are beginning to migrate to their summering grounds (Citta et al. 2016a, 2018a; Luque and Ferguson 2010)

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: 149 mature females sampled at Point Lay; the majority were pregnant. 1444 belugas sampled for genetics throughout the entire North Pacific
- **# of years in which supporting visual data collected**: 1987-2005 (Point Lay belugas). 1978-2010 (North Pacific genetics).
- **Supporting information**: Suydam 2009 calculates Eastern Chukchi Sea beluga gestation period from the time of the Point Lay hunt, which is typically late June, when pregnant females may be carrying a term fetus or a small fetus from a recently initiated pregnancy, as 14.9 months, which puts a breeding season in about Mar-Apr. O'Corry-Crowe et al. 2018 found that genetic distance was more strongly related to distances between wintering rather than summering grounds and found extensive gene flow between Eastern Beaufort, Eastern Bering, and Bristol Bay belugas; because their summering areas are so far apart, the breeding likely takes place on the wintering grounds.

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: Individual beluga detection per mooring: Bering Strait: 510. Gambell: 1842. Savoonga: 254.
- **# of years in which supporting acoustic data collected**: 2012-2016
- **Supporting information**: Bering Strait mooring: Sep 2012-May 2013, duty cycle 10 min on/50 min off, 510 individual beluga detections in months Nov-Dec and Mar-mid-May. Gambell moorings: Oct 2014-Jul 2016, duty cycle either 5 or 10 min on/ 50 or 55 min off, 1842 individual beluga detections in Dec-Apr. Savoonga mooring: Oct 2014-Jun 2015, duty cycle 5 min on/55 min off, 254 individual beluga detections in Dec-Mar. (Chou et al. 2019)

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygons are based on Mar-Apr tagged beluga distribution in Citta et al. 2016a.

References: Chou, E., Antunes, R., Sardelis, S., Stafford, K., West, L., Spagnoli, C., et al. (2019). Seasonal variation in Arctic marine mammal acoustic detection in the northern Bering Sea. Mar. Mamm. Sci. 36:2, 522-547. doi: 10.1111/mms.12658.

Citta, J.J., Richard, P., Lowry, L.F., O'Corry-Crowe, G., Marcoux, M., Suydam, R., et al. (2016a). Satellite telemetry reveals population specific winter ranges of beluga whales in the Bering Sea. Mar. Mamm. Sci. 33:1, 236-250. doi:10.1111/mms.12357.

Citta, J.J., Lowry, L.F., Quakenbush, L.T., Kelly, B.P., Fischbach, A.S., London, J.M., et al. (2018a). A multi-species synthesis of satellite telemetry data in the Pacific Arctic (1987-2015): Overlap of marine mammal distributions and core use areas. Deep-Sea Res. Pt. II 152, 132-153.

Luque, S.P., and Ferguson, S.H. (2010). Age structure, growth, mortality, and density of belugas (Delphinapterus leucas) in the Canadian Arctic: responses to environment? Polar Biol. 33, 163-178. doi:10.1007/s00300-009-0694-2.

O'Corry-Crowe, G., Suydam, R., Quakenbush, L., Potgieter, B., Harwood, L., Litovka, D., et al. (2018). Migratory culture, population structure, and stock identity in North Pacific beluga whales (Delphinapterus leucas). PLOS One 13:B403, e0194201. doi:10.1371/journal.pone.0194201.

Suydam, R.S. (2009). Age, growth, reproduction, and movements of beluga whales (Delphinapterus leucas) from the eastern Chukchi Sea. Ph.D. dissertation, University of Washington, Seattle, WA. 152 pp.

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: 0 for Bering, 6 for Beaufort, 2 for Chukchi (these numbers do not include this Watchlist)

Supplementary Description 1. 5. Beluga small and resident pop.

Species name: Beluga (*Delphinapterus leucas*)

Stock or population: Bristol Bay

Descriptive name: Bristol Bay - summer - Nushagak and Kvichak bays

BIA type: Small and Resident Pop.

BIA label: S-BIA1-d-b3-ABS045-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 1 (Intensity: 1, Data support: 3)

Intensity matrix: Abundance: 1, Range: 2

Supporting notes for intensity score: We scored Intensity low (1) based on an abundance score of 1 and geographic range score of 2. S-BIA Intensity is scored quantitatively based on abundance and range size (Harrison et al. [this issue]). For abundance, this S-BIA scores low (1), in the abundance range of 501-2,000. The most recent Bristol Bay beluga abundance estimate from aerial surveys in 2016 is 2,040 individuals (Citta et al. 2019). Although that is slightly higher than the maximum of 2,000 for small and resident BIA classification, the lower bound of the 95% confidence interval on the abundance estimate is 1,541 individuals (the upper bound is 2,702 individuals). The previous abundance estimate from genetic mark-recapture methods in 2002-2011 was a minimum estimate of 1,928, with a confidence interval of 1,611–2,337 (Citta et al. 2018b). The estimated trend in abundance from aerial surveys in 1993-2005 was 4.8% increase per year over the 12-year period; however, the 2016 survey produced an estimate similar to that in 2005, suggesting the population has been stable in recent years and is not significantly increasing (Citta et al. 2019). Given the uncertainty around the most recent point estimate of 2040, and the lower 95% confidence bound of 1,541, we consider Bristol Bay belugas to be a small, resident population.

For geographic range size, this S-BIA scores moderate (2: 2,001-10,000 km2) because the S-BIA polygon is 6,932 km2.

Supporting notes for data support score: There are ample recent satellite tag, aerial survey, and genetic mark-recapture data for this population. The satellite tag data spanned 12 years with a relatively high number of belugas tagged (n=40). Aerial surveys were flown in 2016 and also previously in 1993, 1994, 1999, 2000, 2004, and 2005; during the 2016 surveys, high numbers of belugas were sighted on each survey (n=484-1,024 out of a resulting population estimate of 2,040). A high number of biopsies (n=516) were collected over 10 years.

The winter watch list small and resident population area (S-BIA0-d-b1-ABS047-0) cannot be combined with this S-BIA due to the geographic range scoring. In winter, when beluga distribution expands out into greater Bristol Bay, the range is >30,000 km2, resulting in a range score of 1. Furthermore, Data Support for the winter watch list small and resident population area (S-BIA0-d-b1-ABS047-0) consists of only satellite tag data, so it scored low (1), resulting in an Importance score of 0.

Spatiotemporal variability: d

Supporting notes for spatiotemporal variability: Bristol Bay beluga distribution and density are dependent on prey distribution and density, namely the salmon and smelt runs. In spring, the timing of these runs vary by ~2-3 weeks each year depending on ice melt in the rivers. From 2002 to 2009, belugas were reported in the Naknek River for the first time of the season between 10-29 April each year. The freeze-up timing of the rivers and bays, when belugas likely start moving out of the inner bays, is also highly variable per year.

Boundary certainty: 3

Supporting notes for boundary certainty: Boundary Certainty scored high based on the high Data Support, particularly the satellite tag data that track animals wherever they go, and the aerial survey data, which cover broad areas. Additionally, Bristol Bay beluga distribution has not changed perceptibly from the decades of data available prior to the data used in this BIA assessment.

Months of year designation is applicable: April (2nd half), May, June, July, August, September, October, November, December (1st half)

Tagging data supporting designation (Y/N): Y

# of tags: 40

# of years in which supporting tagging data collected: 2002-2013

Supporting information: Satellite tags document Bristol Bay belugas in Nushagak and Kvichak bays in spring, summer, and fall during smelt/smolt, sockeye, pink and coho, and post-salmon seasons (Citta et al. 2016a, 2016b, 2018a; Lowry et al. 2019).

Visual observations/records supporting designation (Y/N): Y

# of observations/records: thousands of sightings of thousands of belugas. 516 biopsies.

# of years in which supporting visual data collected: 2002-2011, 2016

Supporting information: Line transect aerial surveys in 2016 covering Nushagak and Kvichak bays for a population estimate of 2040 (Citta et al. 2019). Previous aerial surveys were also conducted in 1993, 1994, 1999, 2000, 2004, 2005. The mean and range of counts made in 2016 is similar to those calculated from 2004 and 2005 suggesting that the population growth observed during 1993–2005 has slowed or ceased. Genetic mark recapture from skin biopsies, 2002-2011; population estimate of 1928 (Citta et al. 2018b).

Information on beluga distribution, abundance, and movements in western Alaska through the 1980s (Seaman et al. 1985; Frost and Lowry 1990) was not included in this BIA assessment because it is too old (> 30 years) to be considered reliable. Nevertheless, the general beluga distribution and temporal movements inferred from the historical data are similar to recent data.

Seaman, G., Lowry, L.F., Frost, K.J. (1985). Investigation of belukha whales in coastal waters of western and northern Alaska. I. Distribution, abundance, and movements (OCSEAP Final Report, 56[1988], 153-220). Washington, DC: U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

Frost, K.J., and Lowry, L.F. (1990). "Distribution, abundance and movements of beluga whales, Delphinapterus leucas, in coastal waters of western Alaska" in Advances in research on the beluga whale, Delphinapterus leucas, eds. Smith, T.G., St. Aubin, D.J., Geraci, J.R. pp. 39-57. Can. B. Fish. Aquat. Sci. 224.

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?: The BIA polygon is based on the satellite tag data, particularly the tags per season as outlined in Citta et al. (2016b) and Lowry et al. (2019), using 100% of satellite tag locations, and aerial survey sightings.

References: Citta, J.J., Richard, P., Lowry, L.F., O'Corry-Crowe, G., Marcoux, M., Suydam, R., et al. (2016a). Satellite telemetry reveals population specific winter ranges of beluga whales in the Bering Sea. Mar. Mamm. Sci. 33:1, 236-250. doi:10.1111/mms.12357.

Citta, J.J., Quakenbush, L.T., Frost, K.J., Lowry, L. (2016b). Movements of beluga whales (Delphinapterus leucas) in Bristol Bay, Alaska. Mar. Mamm. Sci. 32:4, 1272-1298. doi:10.1111/mms.12337.

Citta, J.J., Lowry, L.F., Quakenbush, L.T., Kelly, B.P., Fischbach, A.S., London, J.M., et al. (2018a). A multi-species synthesis of satellite telemetry data in the Pacific Arctic (1987-2015): Overlap of marine mammal distributions and core use areas. Deep-Sea Res. Pt. II 152, 132-153.

Citta, J.J., O'Corry-Crowe, G., Quakenbush, L.T., Bryan, A.L., Ferrer, T., Hobbs, R.C., et al. (2018b). Assessing the abundance of Bristol Bay belugas with genetic mark-recapture methods. Mar. Mamm. Sci. 34:3, 666–686. https://doi.org/10.1111/mms.12472.

Citta, J.J., Frost, K.J., Quakenbush, L. (2019). Aerial surveys of Bristol Bay beluga whales, Delphinapterus leucas, in 2016. Mar. Fish. Rev. 81:3-4, 98-104. https://doi.org/10.7755/MFR.81.3–4.5.

Lowry, L.F., Citta, J.J., O'Corry-Crowe, G., Quakenbush, L.T., Frost, K.J., Suydam, R., et al. (2019). Distribution, abundance, harvest, and status of western Alaska beluga whale, Delphinapterus leucas, stocks. Mar. Fish. Rev. 81:3-4, 54-71. https://doi.org/10.7755/MFR.81.3–4.2.

Approximate % of population that uses this area for the designated purpose (if known): 100

Approximate # of areas known specifically for this behavior (if feeding/cow-calf/mating/migratory) for this population: 1

Supplementary Description 1. 6. Beluga small and resident pop.

Species name: Beluga (*Delphinapterus leucas*)

Stock or population: Bristol Bay

Descriptive name: Bristol Bay - winter

BIA type: Small and Resident Pop.

BIA label: S-BIA0-d-b1-ABS047-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

Intensity matrix: Abundance: 1, Range: 1

Supporting notes for intensity score: According to the BIA rules for scoring SBIAs, Abundance scores 1 for 2000 individuals, Range scores 1 for a range of 31,580 km2, resulting in an Intensity score of 1. This winter/early spring watch list area has a lower intensity than the late spring/summer/fall SBIA. In late spring, summer, and fall, Bristol Bay beluga range contracts close to the river mouths as belugas are feeding on fish runs, and expands in winter and early spring when Bristol Bay beluga range covers the whole bay.

Supporting notes for data support score: There are recent satellite tag data (7-24 tags) for this population during winter, but that is the only winter data. There are older data that state belugas move out of Nushagak and Kvichak bays during the winter and that they hang out in the southern edge of the seasonal sea ice, but specific locations where belugas went were not known and those data are too old (>30 years) to be reliable.

Spatiotemporal variability: d

Supporting notes for spatiotemporal variability: Belugas move out of the rivers and Nushagak and Kvichak bays (though they do still use the bays in the winter also) with the ice freeze-up, which is variable. Sea ice distribution in Bristol Bay is wind dependent and changes rapidly.

Boundary certainty: 1

Supporting notes for boundary certainty: Boundary certainty is low due to the only data the watch list area is based on are a small number of satellite tags (7-24) per month.

Months of year designation is applicable: January, February, March, April (1st half), December (2nd half)

Tagging data supporting designation (Y/N): Y

# of tags: 7-24 per month

# of years in which supporting tagging data collected: 2006-2012

Supporting information: Satellite tags document Bristol Bay belugas moving out of Nushagak and Kvichak bays during winter (Citta et al. 2016a, 2016b, 2018a; Lowry et al. 2019).

Visual observations/records supporting designation (Y/N): Y

Supporting information: Data not including because it is quite old (>30 years) to be reliable, and the general beluga distribution and temporal movements are similar to recent data, are Seaman et al. (1985) and Frost and Lowry (1990).

Seaman, G., Lowry, L.F., Frost, K.J. (1985). Investigation of belukha whales in coastal waters of western and northern Alaska. I. Distribution, abundance, and movements (OCSEAP Final Report, 56[1988], 153-220). Washington, DC: U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

Frost, K.J., and Lowry, L.F. (1990). "Distribution, abundance and movements of beluga whales, Delphinapterus leucas, in coastal waters of western Alaska" in Advances in research on the beluga whale, Delphinapterus leucas, eds. Smith, T.G., St. Aubin, D.J., Geraci, J.R. pp. 39-57. Can. B. Fish. Aquat. Sci. 224.

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?: The watch list area polygon is based on the satellite tag data (particularly the tags per season as outlined in Citta et al. 2016b and Lowry et al. 2019) using 100% of satellite tag locations.

References: Citta, J.J., Richard, P., Lowry, L.F., O'Corry-Crowe, G., Marcoux, M., Suydam, R., et al. (2016a). Satellite telemetry reveals population specific winter ranges of beluga whales in the Bering Sea. Mar. Mamm. Sci. 33:1, 236-250. doi:10.1111/mms.12357.

Citta, J.J., Quakenbush, L.T., Frost, K.J., Lowry, L. (2016b). Movements of beluga whales (Delphinapterus leucas) in Bristol Bay, Alaska. Mar. Mamm. Sci. 32:4, 1272-1298. doi:10.1111/mms.12337.

Citta, J.J., Lowry, L.F., Quakenbush, L.T., Kelly, B.P., Fischbach, A.S., London, J.M., et al. (2018a). A multi-species synthesis of satellite telemetry data in the Pacific Arctic (1987-2015): Overlap of marine mammal distributions and core use areas. Deep-Sea Res. Pt. II 152, 132-153.

Lowry, L.F., Citta, J.J., O'Corry-Crowe, G., Quakenbush, L.T., Frost, K.J., Suydam, R., et al. (2019). Distribution, abundance, harvest, and status of western Alaska beluga whale, Delphinapterus leucas, stocks. Mar. Fish. Rev. 81:3-4, 54-71. https://doi.org/10.7755/MFR.81.3–4.2.

Approximate % of population that uses this area for the designated purpose (if known): 100

Approximate # of areas known specifically for this behavior (if feeding/cow-calf/mating/migratory) for this population: 1 (does not include this Watchlist BIA)

Supplementary Description 1. 7. Bowhead feeding area

Species name: Bowhead (*Balaena mysticetus*)

Stock or population: Bering-Chukchi-Beaufort

Descriptive name: Chukotka/Bering Strait/Chirikov Basin/St. Lawrence Island

BIA type: Feeding Area

BIA label: F-BIA3-d-b2-ABS016-0

Transboundary across: ARC

Hierarchy: Non-hierarchical; single BIA

Importance score: 3 (Intensity: 3, Data support: 2)

- **Supporting notes for intensity score**: The satellite tag data indicates high densities of bowhead whales occur along the Chukotka coast in December. We can infer bowhead whales are feeding because the satellite tag dive data show bowhead whales diving near the seafloor (1/2 of their dives are square-shaped, where the majority of the dive duration is spent at the max depth of the dive) where overwintering copepods are expected to aggregate and which bowhead whales are likely feeding on. St. Lawrence Island Indigenous Knowledge and whaler data, including bowhead whale stomach contents, indicates bowhead whales have been feeding near there for generations or longer. Passive acoustics at the NM1, Bering Strait, Gambell, and Savoonga moorings show a strong bowhead whale presence. These data indicate that bowhead whale feeding in this time and area is substantial, which is why an Intensity score of 3 has been given. Bowhead whale feeding in the eastern Beaufort Sea of the Arctic region in summer also scored Intensity 3. These scores of 3 do not imply that bowhead whale feeding in these times and areas are perfectly equal, but rather that high densities of bowhead whales are feeding consistently in these areas during the designated BIA time frames.
- **Supporting notes for data support score**: The satellite tag data is recent, and we assume it is representative of the population, but 41 tags out of a 16,000 population is still a small sample size. Feeding behavior can be inferred from satellite tag dive behavior and zooplankton data. Other data sets are for small regions within the overall FBIA, e.g., St. Lawrence Island, but the St. Lawrence Island community knows their area well and has for generations or longer. Feeding behavior cannot be determined from the acoustics, but there is a strong bowhead whale presence at the NM1, Bering Strait, Gambell, and Savoonga moorings.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Some of the datasets are not parsed out by year (satellite tag, Indigenous Knowledge), so it is difficult to tell how much temporal variability there is. Bowhead whales tend to stay north of the ice edge, which can vary by year, and there are likely other oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect their prey base and that vary by year.

Boundary certainty: 2

- **Supporting notes for boundary certainty**: The satellite tag data indicates where the tagged bowhead whales are feeding. The St. Lawrence Island Indigenous Knowledge and whaler data goes back for generations or longer, but is for a small area within the BIA. The acoustic data give presence near only the moorings, not the entire BIA.

Months of year designation is applicable: December

Tagging data supporting designation (Y/N): Y

- **# of tags**: 41
- **# of years in which supporting tagging data collected**: 2006-2018
- **Supporting information**: 41 tags in Dec, 2006-2018, in Bering & Chukchi seas (Citta et al. 2021); 54 tags in all months pooled, 2006-2012, in Bering, Chukchi, & Beaufort seas (Citta et al. 2015); 46 tags in Dec-Apr, 2006-2015, in Bering & Chukchi seas (Citta et al. 2018)

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: 3 fecal samples (Sheffield & George 2013, 2021)
- **# of years in which supporting visual data collected**: Indigenous Knowledge, including firsthand knowledge, dating back to the 1940s and earlier (Noongwook et al. 2007). 2007-2012 (Sheffield & George 2013, 2021)
- **Supporting information**: St. Lawrence Island Indigenous Knowledge (Noongwook et al. 2007), synthesizing and mapping Indigenous Knowledge with satellite tag data (Oceana and Kawerak 2014), bowhead whale diet data (Sheffield and George 2013, 2021)

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: MML: 1 moored acoustic recorder; ~30% duty cycle, 16 kHz sampling rate. Chou et al. 2019: Bering Strait, Gambell, & Savoonga moored acoustic recorders; duty cycles either 5 or 10 min on/ 50 or 55 min off; Individual bowhead detections per mooring for entire mooring deployment: Bering Strait: 2046. Gambell: 4657. Savoonga: 1410.
- **# of years in which supporting acoustic data collected**: 2012-2018
- **Supporting information**: Bowheads were present at Marine Mammal Lab (MML) NM1 (Chirikov Basin) mooring in Dec each year, 2012-2018 (AFSC 2021). 3 more moorings reported in Chou et al. 2019: Bering Strait mooring deployed Sep 2012-May 2013, detections in months Nov-Jan and mid-Mar-Apr. Gambell moorings deployed Oct 2014-Jul 2016, detections in Dec-Apr. Savoonga mooring deployed Oct 2014-Jun 2015, detections in Dec-Apr.

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygon is based on satellite tag data (50% density contour from Citta et al. 2021 Fig. 4.4 Dec), St. Lawrence Island Indigenous Knowledge (Noongwook et al. 2007, Oceana and Kawerak 2014 "Subsistence Use" and "Concentration" areas), a 20 nm radius around Marine Mammal Lab acoustic mooring NM1 (based on an average detection range of 15-20 nm per MML moorings), and a 20 km buffer to the south of the Gambell mooring (Chou et al. 2019; the detection range for this mooring is several 10s of km; however, from the sat tag data, we expect higher densities of bowheads to be north of the Gambell mooring in December, not south).

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Chou, E., Antunes, R., Sardelis, S., Stafford, K., West, L., Spagnoli, C., et al. (2019). Seasonal variation in Arctic marine mammal acoustic detection in the northern Bering Sea. Mar. Mamm. Sci. 36:2, 522-547. doi: 10.1111/mms.12658.

Citta, J.J., Quakenbush, L.T., Okkonen, S.R., Druckenmiller, M.L., Maslowski, W., Clement-Kinney, J., et al. (2015). Ecological characteristics of core areas used by Bering-Chukchi-Beaufort (BCB) bowhead whales, 2006-2012. Progr. Oceanogr. 136, 201-222.

Citta, J.J., Lowry, L.F., Quakenbush, L.T., Kelly, B.P., Fischbach, A.S., London, J.M., et al. (2018a). A multi-species synthesis of satellite telemetry data in the Pacific Arctic (1987-2015): Overlap of marine mammal distributions and core use areas. Deep-Sea Res. Pt. II 152, 132-153.

Citta, J.J., Quakenbush, L., George, J.C. (2021). "Distribution and behavior of Bering-Chukchi-Beaufort bowhead whales as inferred by telemetry" in The Bowhead Whale Balaena mysticetus: Biology and Human Interactions, eds. J.C. George and J.G.M. Thewissen (Academic Press) 31-51.

Noongwook, G., the Native village of Savoonga, the Native village of Gambell, Huntington, H.P., George, J.C. (2007). Traditional knowledge of the bowhead whale (Balaena mysticetus) around St. Lawrence Island, Alaska. Arctic. 60:1, 47-54.

Oceana and Kawerak, Inc. (2014). Bering Strait marine life and subsistence use data synthesis. Kawerak Incorporated, 1-499. https://oceana.org/publications/reports/the-bering-strait-marine-life-and-subsistence-data-synthesis

Sheffield, G., George, J.C. (2013). "Diet studies," in Bowhead Whale Feeding Ecology Study (BOWFEST) in the Western Beaufort Sea, eds. Shelden, K.E.W., Mocklin, J.A. Final Report, OCS Study BOEM 2013. National Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, Seattle, WA, 245-269. http://www.afsc.noaa.gov/nmml/cetacean/bwasp/bowfest.php.

Sheffield, G., and George, J.C. (2021). "Diet and prey." in The Bowhead Whale Balaena mysticetus: Biology and Human Interactions, eds. J.C. George and J.G.M. Thewissen (Academic Press) 429-455.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021)

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: 17

Supplementary Description 1. 8. Bowhead feeding area

Species name: Bowhead (*Balaena mysticetus*)

Stock or population: Bering-Chukchi-Beaufort

Descriptive name: Chukotka/Bering Strait/Gulf of Anadyr/St. Lawrence Island/St. Matthew Island

BIA type: Feeding Area

BIA label: F-BIA3-d-b2-ABS019-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 3 (Intensity: 3, Data support: 2)

Supporting notes for intensity score: These data indicate that bowhead whale feeding in this time and area is substantial, which is why an Intensity score of 3 has been given. Satellite tag data indicate consistent bowhead whale use in these areas of the Bering Sea from January through April. From the satellite tag dive data, we can infer bowhead whales are feeding while on their winter grounds. St. Lawrence Island Indigenous knowledge and subsistence whaling data, including bowhead whale stomach and fecal contents, indicates bowhead whales have been feeding there for generations or longer and that their presence in winter has become more abundant. Passive acoustic moorings show a strong annual bowhead whale presence. In the Arctic region, bowhead whale F-BIAs in the eastern Beaufort Sea in summer also scored high (3) Intensity (Clarke et al. [this issue]). These common Intensity scores do not imply that bowhead whale feeding in these F-BIAs are perfectly equal; rather, high densities of bowhead whales are feeding consistently in these areas during the designated BIA time frames, and the coarseness of the numeric scale used to score BIAs resulted in these BIAs having the same Intensity score.

Supporting notes for data support score: The satellite tag data is recent. However, while we assume it is representative of the population, 27-32 tags per month out of a population numbering ~16,000-17,000 (Givens et al. 2016, 2021) is a small sample size. The satellite tag data are important because feeding behavior can be inferred from a combination of satellite tag dive behavior and zooplankton data. It is difficult to factor in acoustic data because they provide information on only presence, not behavior, density, or abundance; however, the acoustic presence is substantial. The other data sets are for smaller regions within the overall F-BIA (St. Lawrence Island & Chukotka shore station), but the Indigenous knowledge is important because the St. Lawrence Island residents have generations of experiential knowledge of their area.

Spatiotemporal variability: d

Supporting notes for spatiotemporal variability: Some of the information sources (satellite tag, Indigenous knowledge) did not provide information by year, so it is difficult to infer the level of temporal variability in these F-BIAs. Bowhead whales tend to stay north of the sea ice edge, which varies in space and time by year. Bowhead whales also tend to feed where there are dense aggregations of prey, and dynamic oceanographic factors such as currents, winds, fronts, and upwelling will affect if, when, where, and how dense those prey aggregations form.

Boundary certainty: 2

Supporting notes for boundary certainty: The satellite tag data indicate where the tagged bowhead whales are feeding during January to April. St. Lawrence Island Indigenous knowledge and subsistence whaling data go back for generations, but represent a small area within the F-BIA. The Chukotka data spanned only three years and are from 20 years ago. Acoustic data provide presence near only the moorings, not the entire F-BIA. During recent extreme winter sea ice loss in the Bering Sea, tagged bowhead whales shifted their range northward, never moving south of the marginal ice edge in winter 2018-19 (Citta et al. 2021), and were documented overwintering in the southern Chukchi Sea in winter 2017-18 by two tagged whales (Moore et al. 2021) and from passive acoustic detections (AFSC 2021).

Months of year designation is applicable: January, February, March, April

Tagging data supporting designation (Y/N): Y

# of tags: 27-32 tagged whales in Jan-Apr

# of years in which supporting tagging data collected: 2006-2018

Supporting information: 27-32 tags in Jan-Apr, 2006-2018, in Bering & Chukchi seas (Citta et al. 2021); 54 tags in all months pooled, 2006-2012, in Bering, Chukchi, & Beaufort seas (Citta et al. 2015); 46 tags in Dec-Apr, 2006-2015, in Bering & Chukchi seas (Citta et al. 2018)

Visual observations/records supporting designation (Y/N): Y

# of observations/records: ~20 stomach or fecal samples indicating feeding (Sheffield & George 2013, 2021). Shore-based counts at Sireniki in April: typically 1-5 bowhead whales sighted per day, but also sometimes large groups up to 27 whales sighted in a single day.

# of years in which supporting visual data collected: Indigenous Knowledge, including firsthand knowledge, dating back to the 1940s and earlier (Noongwook et al. 2007). 2007-2012 (Sheffield & George 2013, 2021). 1999-2001 (Melnikov et al. 2004).

Supporting information: Shore-based counts and experienced hunter observations (Melnikov et al. 2004), St Lawrence Island Indigenous Knowledge (Noongwook et al. 2007), synthesizing and mapping Indigenous Knowledge with satellite tag data (Oceana & Kawerak 2014), bowhead whale diet data (Sheffield & George 2013, 2021).

Data not included in this BIA are Aerial Surveys of Arctic Marine Mammals (https://www.fisheries.noaa.gov/alaska/marine-mammal-protection/aerial-surveys-arctic-marine-mammals) line transect data in the Chirikov Basin and near St Lawrence Island, Apr-May, 1980-84; this data is >40 years old and we know conditions in the northern Bering Sea have changed since

then.

Acoustic detections/records supporting designation (Y/N): Y

# of observations/records: MML: 3 moored acoustic recorders; ~30% duty cycle, 16 kHz sampling rate. Chou et al. 2019: Bering Strait, Gambell, & Savoonga moored acoustic recorders; duty cycles either 5 or 10 min on/ 50 or 55 min off; Individual bowhead detections per mooring for entire mooring deployment: Bering Strait: 2046. Gambell: 4657. Savoonga: 1410.

# of years in which supporting acoustic data collected: 2012-2018

Supporting information: Bowhead whales were present at 3 Marine Mammal Lab (MML) moorings: NM1 (Chirikov Basin), M8 (outside the Gulf of Anadyr), and BS1 (between St. Lawrence and St. Matthew islands) in Jan-Apr each year, 2012-2018 (AFSC 2021). 3 more moorings reported in Chou et al. 2019: Bering Strait mooring deployed Sep 2012-May 2013, detections in months Nov-Jan and mid-Mar-Apr. Gambell moorings deployed Oct 2014-Jul 2016, detections in Dec-Apr. Savoonga mooring deployed Oct 2014-Jun 2015, detections in Dec-Apr.

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygons are based on the 50% contour from Citta et al. 2021, Fig. 4.4 Jan, Feb, Mar, & Apr; St. Lawrence Island Indigenous Knowledge (Noongwook et al. 2007; Oceana and Kawerak 2014, the "Concentration" area); Sireniki Chukotka shore station (Melnikov et al. 2004); a 37 km radius around Marine Mammal Lab acoustic moorings BS1, M8, and NM1 (based on an average detection range of 28-38 km per MML moorings), and a 20 km buffer to the south of the Gambell mooring (Chou et al. 2019; the detection range for this mooring is several 10s of km; however, bowhead whale direction from the mooring cannot be determined, and from the sat tag data we expect higher densities of bowhead whales to be north of the Gambell mooring in December, not south).

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Chou, E., Antunes, R., Sardelis, S., Stafford, K., West, L., Spagnoli, C., et al. (2019). Seasonal variation in Arctic marine mammal acoustic detection in the northern Bering Sea. Mar. Mamm. Sci. 36:2, 522-547. doi: 10.1111/mms.12658.

Citta, J.J., Quakenbush, L.T., Okkonen, S.R., Druckenmiller, M.L., Maslowski, W., Clement-Kinney, J., et al. (2015). Ecological characteristics of core areas used by Bering-Chukchi-Beaufort (BCB) bowhead whales, 2006-2012. Progr. Oceanogr. 136, 201-222.

Citta, J.J., Lowry, L.F., Quakenbush, L.T., Kelly, B.P., Fischbach, A.S., London, J.M., et al. (2018a). A multi-species synthesis of satellite telemetry data in the Pacific Arctic (1987-2015): Overlap of marine mammal distributions and core use areas. Deep-Sea Res. Pt. II 152, 132-153.

Citta, J.J., Quakenbush, L., George, J.C. (2021). "Distribution and behavior of Bering-Chukchi-Beaufort bowhead whales as inferred by telemetry" in The Bowhead Whale Balaena mysticetus: Biology and Human Interactions, eds. J.C. George and J.G.M. Thewissen (Academic Press) 31-51.

Melnikov, V.V, Litovka, D.I., Zagrebin, L.A., Zelensky, G.M., Ainana, L.I. (2004). Shore-based counts of bowhead whales along the Chukotka Peninsula in May and June 1999-2001. Arctic 57:3, 290-298.

Noongwook, G., the Native village of Savoonga, the Native village of Gambell, Huntington, H.P., George, J.C. (2007). Traditional knowledge of the bowhead whale (Balaena mysticetus) around St. Lawrence Island, Alaska. Arctic. 60:1, 47-54.

Oceana and Kawerak, Inc. (2014). Bering Strait marine life and subsistence use data synthesis. Kawerak Incorporated, 1-499. https://oceana.org/publications/reports/the-bering-strait-marine-life-and-subsistence-data-synthesis

Sheffield, G., and George, J.C. (2021). "Diet and prey." in The Bowhead Whale Balaena mysticetus: Biology and Human Interactions, eds. J.C. George and J.G.M. Thewissen (Academic Press) 429-455.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021)

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: 17

Supplementary Description 1. 9. Bowhead feeding area

Species name: Bowhead (*Balaena mysticetus*)

Stock or population: Bering-Chukchi-Beaufort

Descriptive name: Bering Sea M8 & BS1 Moorings

BIA type: Feeding Area

BIA label: F-BIA2-d-b1-ABS018-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 2 (Intensity: 3, Data support: 1)

- **Supporting notes for intensity score**: In the acoustics data, the percentage of total time intervals that have bowhead whale calls per day in December are 100%, indicating the areas around these moorings are getting a lot of use.
- **Supporting notes for data support score**: There is only one set of data and feeding behavior is only implied by their presence and cannot be determined with certainty.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Bowhead whale presence at these moorings for the years of analysis in December are 100%, so bowhead whale presence is not ephemeral. Bowhead whales tend to stay north of the ice edge, which can vary by year, and there are likely other oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect their prey base and that vary by year.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: The moorings can typically record calls up to ~15-20 nm (depending on oceanographic conditions, how loud the animal is calling, etc.), and we do not know if the bowheads extend that far or farther from the moorings.

Months of year designation is applicable: December

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): N

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 2 moored acoustic recorders; ~30% duty cycle, 16 kHz sampling rate
- **# of years in which supporting acoustic data collected**: 2012-2018
- **Supporting information**: Bowhead whales were present at Marine Mammal Lab moorings M8 (outside the Gulf of Anadyr) and BS1 (between St. Lawrence and St. Matthew islands) in Dec each year, 2012-2018 (AFSC 2021).

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygons are based on MML acoustic moorings M8 & BS1, with a 20 nm buffer around the moorings. The moorings can typically record calls ~15-20 nm from the mooring depending on oceanographic conditions, how loud the animal is calling, etc.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021)

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: 17

Supplementary Description 1. 10. Bowhead feeding area

Species name: Bowhead (*Balaena mysticetus*)

Stock or population: Bering-Chukchi-Beaufort

Descriptive name: Gulf of Anadyr

BIA type: Feeding Area

BIA label: F-BIA1-d-b2-ABS017-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 1 (Intensity: 1, Data support: 2)

- **Supporting notes for intensity score**: Bowhead whales are arriving into this area in December, but not in as high of density as they are in January-April. The higher densities of bowhead whales are still farther north along the Chukotka Peninsula in December.
- **Supporting notes for data support score**: There is only one type of data for this area, and it is based on 41 satellite tags out of a population of 16,000 animals, but it is an important data source because feeding behavior can be inferred from the dive data.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Bowhead whales tend to stay north of the ice edge, which can vary by year, and there are likely other oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect their prey base and that vary by year.

Boundary certainty: 2

- **Supporting notes for boundary certainty**: The satellite tag data indicates where the tagged bowhead whales are feeding, but it is still only 41 whales out of 16,000.

Months of year designation is applicable: December

Tagging data supporting designation (Y/N): Y

- **# of tags**: 41 whales with tags in Dec (not all 41 whales were in this BIA)
- **# of years in which supporting tagging data collected**: 2006-2018
- **Supporting information**: 41 tags in Dec, 2006-2018, in Bering & Chukchi seas (Citta et al. 2021); 54 tags in all months pooled, 2006-2012, in Bering, Chukchi, & Beaufort seas (Citta et al. 2015); 46 tags in Dec-Apr, 2006-2015, in Bering & Chukchi seas (Citta et al. 2018)

Visual observations/records supporting designation (Y/N): N

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?: The BIA polygon is based on the satellite tag data 50% contour from Citta et al. 2021, Fig. 4.4 Dec.

References: Citta, J.J., Quakenbush, L.T., Okkonen, S.R., Druckenmiller, M.L., Maslowski, W., Clement-Kinney, J., et al. (2015). Ecological characteristics of core areas used by Bering-Chukchi-Beaufort (BCB) bowhead whales, 2006-2012. Progr. Oceanogr. 136, 201-222.

Citta, J.J., Lowry, L.F., Quakenbush, L.T., Kelly, B.P., Fischbach, A.S., London, J.M., et al. (2018a). A multi-species synthesis of satellite telemetry data in the Pacific Arctic (1987-2015): Overlap of marine mammal distributions and core use areas. Deep-Sea Res. Pt. II 152, 132-153.

Citta, J.J., Quakenbush, L., George, J.C. (2021). “Distribution and behavior of Bering-Chukchi-Beaufort bowhead whales as inferred by telemetry” in The Bowhead Whale Balaena mysticetus: Biology and Human Interactions, eds. J.C. George and J.G.M. Thewissen (Academic Press) 31-51.

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: 17

Supplementary Description 1. 11. Bowhead migratory route

Species name: Bowhead (*Balaena mysticetus*)

Stock or population: Bering-Chukchi-Beaufort

Descriptive name: Chukotka Coast

BIA type: Migratory Route

BIA label: M-BIA0-?-b1-ABS020-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: The bowhead whales migrating along the Chukotkan Coast in June are probably only ~500-1000 animals out of a population of 16,000. They all do need to pass through narrow Bering Strait, but this is a small portion (3-6%) of the population.
- **Supporting notes for data support score**: There were only two shore-based stations on Chukotka Peninsula so the data covers only those two small areas and nothing between, and from a shore-based station, you can see only so far offshore. Also, this data is ~20 years old.

Spatiotemporal variability: ?

- **Supporting notes for spatiotemporal variability**: Bowhead whales migrated through this area every year that we have data for (though only 3 years), so not ephemeral. Data to designate dynamic or static is lacking. From Melnikov et al. 2004, the ice can vary quite a bit depending on winds and currents (in 1999 and 2000, their ice-free viewing area varied from 2-7 km (any ice present was generally <30% though it got up to 80% a few times when disintegrating landfast ice was carried into Bering Strait); in 2001 there was no ice at all), but that would likely not affect a bowhead whale migration. Also, this data is 20 years old and with climate change, there may be less ice along Chukotka and in Bering Strait in June.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: There were only two shore-based stations on Chukotka Peninsula so the data covers only those two small areas and nothing between, and from a shore-based station, you can see only so far offshore.

Months of year designation is applicable: June

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: Shore-based counts at Sireniki in June: ~6-20 bowhead whales per season; at Cape Pe'ek in June: ~100 bowhead whales per season.
- **# of years in which supporting visual data collected**: 1999-2001
- **Supporting information**: Shore-based counts and experienced hunter observations at Sireniki and Cape Pe'ek (Melnikov et al. 2004, Melnikov & Zeh 2007)

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?: The watch list area polygon is based on the shore-based counts of migrating bowhead whales, but because we do not know how far offshore from Chukotka to extend the polygon, its boundaries should be considered a loose estimate. The data is for only Sireniki and Cape Pe'ek. Melnikov et al. (2004) reports 54% of whales were sighted >10 km offshore in 2001 (in 1999 and 2000 they could not sight whales that far offshore because there was a lot of ice present and it is hard to see blows when there is ice in the background). The distance between Cape Pe'ek and Ratmanov Island (Big Diomede) is 40 km. Melnikov et al. (2004) states bowhead whales migrating northward spread somewhat evenly over the 40 km distance and because so many were sightings >10 km from shore in 2001, the whales were not exhibiting preference towards shore or shorefast ice and that they migrate over a broad front.

References: Melnikov, V.V, Litovka, D.I., Zagrebin, L.A., Zelensky, G.M., Ainana, L.I. (2004). Shore-based counts of bowhead whales along the Chukotka Peninsula in May and June 1999-2001. Arctic 57:3, 290-298.

Melnikov, V.V, and Zeh, J.E. (2007). Chukotka Peninsula counts and estimates of the number of migrating bowhead whales (Balaena mysticetus). J. Cet. Res. Manage. 9:1, 29-35.

Approximate % of population that uses this area for the designated purpose (if known): 3-6%

Approximate # of areas known specifically for this behavior (if feeding/cow-calf/mating/migratory) for this population: 5 (does not include this watch list area)

Supplementary Description 1. 12. Bowhead migratory route

Species name: Bowhead (*Balaena mysticetus*)

Stock or population: Bering-Chukchi-Beaufort

Descriptive name: St. Matthew Island - Northbound

BIA type: Migratory Route

BIA label: M-BIA0-e-b1-ABS057-0

Transboundary across: ARC

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

Supporting notes for intensity score: Bowhead whale use of the area around St. Matthew is likely highly variable and dependent on annual sea ice extents. This is a watch list area.

Supporting notes for data support score: Data is limited to a few satellite tagged whales (Citta et al. 2021).

Spatiotemporal variability: e

Supporting notes for spatiotemporal variability: The area does not appear to be used every year (or likely even most years) and is likely dependent on annual winter sea ice extent.

Boundary certainty: 1

Supporting notes for boundary certainty: Based on 50% kernal density from relatively few satellite tagged whales (Citta et al. 2021).

Months of year designation is applicable: April

Tagging data supporting designation (Y/N): Y

# of tags: unk

# of years in which supporting tagging data collected: 2006-2018

Supporting information: Migration begins prior to ice-free conditions, with whales typically exiting the Bering Sea by the third week of April and passing Pt. Barrow 12 days later (Citta et al. 2021). The number of tagged whales represented by this BIA is unknown but believed to be small based on the lack of discussion about this area in the reference.

Visual observations/records supporting designation (Y/N): N

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?: Utilization distributions (or probability densities) were used to identify bowhead whale core-use areas; 50% kernal density represents the area where there is a 50% probability of use by bowhead whales, based on tag sampling (Citta et al. 2021).

References: Citta, J.J., L. Quakenbush, and J.C. George. 2021. Distribution and behavior of Bering-Chukchi-Beaufort bowhead whales as inferred by telemetry. Pages 31-56 In: J.C. George and J.G.H. Thewissan, editors, The Bowhead Whale Balaena mysticetus: Biology and Human Interactions. Academic Press: London.

Approximate % of population that uses this area for the designated purpose (if known): unk

Approximate # of areas known specifically for this behavior (if feeding/cow-calf/mating/migratory) for this population: 5 (does not include this watch list area)

Supplementary Description 1. 13. Bowhead reproductive area

Species name: Bowhead (*Balaena mysticetus*)

Stock or population: Bering-Chukchi-Beaufort

Descriptive name: Southeast Bering Sea

BIA type: Reproductive Area

BIA label: R-BIA0-e-b1-ABS021-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: Acoustic data detected song, which would imply reproductive behavior rather than feeding. The Marine Mammal Lab (MML) acoustic data is current (2012-2018), but in the most recent years of this data (2015-2018), bowhead whale presence is declining, and with sea ice declining in this area with climate change, we do not expect bowhead whales to begin occupying this area in greater numbers. MML has other, older data that show more and regular bowhead whale presence in this area in 2009-2012, but was done under an analysis method that is no longer being used, and the data have not been reanalyzed.
- **Supporting notes for data support score**: The Marine Mammal Lab (MML) acoustic data is recent, but it is the only data source we have for this watch list area. (MML has other, older data that show more and regular bowhead whale presence in this area in 2009-2012, but was done under an analysis method that is no longer being used, and the data have not been reanalyzed.) The satellite tags do not show bowhead whale density in this area in the years that the MML acoustic data shows.

Spatiotemporal variability: e

- **Supporting notes for spatiotemporal variability**: Bowhead whales do not appear to be using this area very much in the most recent years, which either implies it is ephemeral, or that they may no longer be using this area. Bowhead whales tend to stay north of the ice edge, which can vary by year, and there are likely other oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect their prey base and that vary by year.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: We know the bowhead whales were detected near (within ~15-20 nm) the acoustic recorders, but we don't know how much farther out from there that bowhead whales might be using.

Months of year designation is applicable: January, February, March

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): N

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 5 moored acoustic recorders; ~30% duty cycle, 16 kHz sampling rate
- **# of years in which supporting acoustic data collected**: 2012-2018
- **Supporting information**: Bowhead whales were present at Marine Mammal Lab moorings M2, BS3, M4, BS2, and M5 in the southeastern Bering Sea in Jan-Mar, 2012-2018, though not present at every mooring and in every year (AFSC 2021). Acoustic data detected song, which would imply reproductive behavior rather than feeding.

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is based on 20 nm radiuses around the moorings (recorders typically average ~15-20 nm detection range, depending on oceanographic conditions, how loud the animal is calling, etc.).

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021)

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: 9 (does not include this watch list area)

Supplementary Description 1. 14. Dall's porpoise feeding area

Species name: Dall's porpoise (*Phocoenoides dalli*)

Stock or population: Alaska

Descriptive name: Bering Sea

BIA type: Feeding Area

BIA label: F-BIA0-d-b1-ABS049-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

Supporting notes for intensity score: High densities of Dall's porpoises have been sighted in this area; however, we do not know how density in this watch list area compares to other areas in Dall's porpoise range because comparable surveys in other areas of the Dall's porpoise range have not been done.

Supporting notes for data support score: There have been cetacean surveys during the last 20 years in this watch list area; however there have been minimal surveys conducted in other areas of the Bering Sea in order compare whether this is a high density area for Dall's porpoises.

Spatiotemporal variability: d

Supporting notes for spatiotemporal variability: Dall's porpoise feed on squid and fish that tend to aggregate along the Bering Sea outer shelf and basin edge. Depending on whether it is a warm or cold year, the fish aggregations can change distribution, which would affect Dall's porpoise distribution and density. There are likely other factors that affect Dall's porpoise distribution and density as well.

Boundary certainty: 1

Supporting notes for boundary certainty: There have been surveys throughout the last 20 years that have found Dall's porpoises in relatively the same areas when effort was conducted in those areas; however, we do not know if Dall's porpoises occur in high densities in other areas that have not been surveyed. It could be that the level of information we have on Dall's porpoises in the Bering Sea and Aleutian Island region is sufficient only to delimit range and not BIAs; more data is needed in the entire region.

Months of year designation is applicable: June, July, August, September

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

# of observations/records: hundreds of sightings of thousands of Dall's porpoises

# of years in which supporting visual data collected: 2002-2019

Supporting information: Line transect vessel surveys: Dall's porpoises occupied both the outer (100-180 m isobath) and middle (50-100 m) domains, but higher abundancies and densities were recorded in the outer domain (Friday et al. 2012, 2013). Non-systematic vessel surveys (DBO 2019, LeDuc 2004, Vate Brattström et al. 2019).

Data not included are cetacean line transect surveys of the southeastern Bering Sea from 1997 and 1999 (Tynan et al. 2004) because the data are getting too old to be basing a feeding BIA off of; those surveys documented Dall's porpoises on the shelf, slope, and basin edge. Data also not included are IWC POWER cruise Dall's porpoise sightings because the report (Matsuoka et al. 2019) does not show a sightings map; although it does list sighting locations, when those sighting locations were plotted out for other species, the map did not match the species sighting maps in the report, so it is unknown if the sighting positions in the report are correct.

Tynan, C. (2004). Cetacean populations on the SE Bering Sea shelf during the late 1990s: Implications for decadal changes in ecosystem structure and carbon flow. Mar. Ecol. Prog. Ser. 272, 281-300. doi:10.3354/meps272281.

Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

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?: The watch list area polygon encompasses the high density sightings on the Bering Sea side of Unimak Pass, the southeastern Bering Sea shelf, and along the outer stratum/slope and basin-edge and in the middle stratum between the 50 & 100 m isobaths based on the Friday et al., and LeDuc papers and the DBO sightings.

References: Distributed Biological Observatory (DBO) vessel sightings, 2009-2019. (2019). NSF Grant Award #: OPP-1702211. arcticdata.io. doi:10.18739/A26T0GX06.

Friday, N.A., Waite, J.M., Zerbini, A.N., Moore, S.E. (2012). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf: 1999-2004. Deep-Sea Res. Pt. II. 65-70, 260-272.

Friday, N.A., Zerbini, A.N., Waite, J.M., Moore, S.E., Clapham, P.J. (2013). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf, June and July of 2002, 2008, and 2010. Deep-Sea Res. Pt. II, 94, 244-256. http://dx.doi.org/10.1016/j.dsr2.2013.03.011

LeDuc, R.G. (2004). Report of the results of the 2002 survey for North Pacific right whales (NOAA Tech. Memo. NMFS-SWFSC-357). Washington, DC: National Oceanic and Atmospheric Administration.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Data sources: Distributed Biological Observatory: https://arcticdata.io, doi:10.18739/A26T0GX06 (accessed Dec 2020).

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: 0

Supplementary Description 1. 15. Fin whale feeding area

Species name: Fin whale (*Balaenoptera physalus*)

Stock or population: Northeast Pacific

Descriptive name: M8 Mooring

BIA type: Feeding Area

BIA label: F-BIA2-d-b1-ABS038-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 2 (Intensity: 3, Data support: 1)

- **Supporting notes for intensity score**: The acoustic data show a strong presence of fin whales in this area every year. The ARCWEST cruise sighted a large aggregation of fin whales in this area and surveyed in this area in only two or three years. This mooring is located near the western-central Bering Sea high predicted fin whale abundance area modeled in Zerbini et al. 2016 and delineated in the fin whale western-central Bering Sea FBIA.
- **Supporting notes for data support score**: This BIA is based on only two sets of data, though mooring data is year round. Visual survey effort was small in this area.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: There are likely sea ice and other oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect fin whale prey base and that vary by year.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Boundaries are uncertain because of the limited data geographically (acoustic moorings) and temporally (visual sighting data).

Months of year designation is applicable: January, July, August, September, October, November, December

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: 48 sightings of 75 fin whales
- **# of years in which supporting visual data collected**: 2011
- **Supporting information**: Large aggregation of fin whales sighted on non-systematic cruise transiting through the area (Vate Brattström et al. 2019)

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 1 moored acoustic recorder; ~30% duty cycle, 16 kHz sampling rate. Several acoustic detections from sonobuoys.
- **# of years in which supporting acoustic data collected**: 2010-2018
- **Supporting information**: Fin whales were present at Marine Mammal Lab M8 mooring each year that data were collected (2010-2018) (AFSC 2021). Fin whales were detected on sonobuoys from a non-systematic cruise transiting through the area (Vate Brattström et al. 2019).

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygon is based on a 20 nm radius around the M8 mooring and the large aggregation of fin whales sighted by vessel. Recorders typically average ~15-20 nm detection range, which is variable depending on oceanographic conditions, how loud the animal is calling, etc.). In deep water locations, fin whale calls can be heard at distances much greater than 20 nm; however, on the shallow Bering Shelf where the Marine Mammal Lab moorings are located, fin whale call propagation will likely not be more than 20 nm.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021)

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: 9

Supplementary Description 1. 16. Fin whale feeding area

Species name: Fin whale (*Balaenoptera physalus*)

Stock or population: Northeast Pacific

Descriptive name: Southeast Bering Sea

BIA type: Feeding Area

BIA label: F-BIA2-d-b2-ABS032-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 2 (Intensity: 2, Data support: 3)

- **Supporting notes for intensity score**: The acoustic moorings show strong fin whale presence at these moorings (sometimes year-round), and there have been many fin whale sightings and sonobuoy detections in the past decade as well as the last few decades. However, their occurrence and feeding behavior appears to be more dense farther northwest near Russia.
- **Supporting notes for data support score**: Most of the data is fairly recent and includes several different datasets spanning a couple decades. There are four long-term moorings stationed in the BIA that collect data year round.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: There can be warm or cold years, which affect eddies and fronts, and nutrient upwelling and prey aggregation mechanisms, which affect fin whale prey distribution and abundance in the area.

Boundary certainty: 2

- **Supporting notes for boundary certainty**: There is a lot of data to support this BIA, though a lot of the surveys do not extend farther west, south, or northeast of the BIA.

Months of year designation is applicable: January, February, May, June, July, August, September, October, November, December

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: Hundreds of sightings of hundreds of fin whales.
- **# of years in which supporting visual data collected**: Non-systematic vessel surveys: 2002, 2007-2019. Line transect vessel surveys: 1999-2018. Line transect aerial surveys: 2008-09.
- **Supporting information**: Non-systematic vessel surveys (Clapham et al. 2012, DBO 2019, LeDuc 2004, Vate Brattström et al. 2019). Line-transect vessel surveys (Friday et al. 2012, 2013; Matsuoka et al. 2018, 2019). Modeling based off line-transect vessel surveys (Zerbini et al. 2016). Line transect aerial surveys (Clapham et al. 2012).
  A data source that was not used in this BIA was cetacean vessel line-transect surveys in 1997-99 (Tynan 2004) because that data is becoming old and there are more recent data available.
  Tynan, C. (2004). Cetacean populations on the SE Bering Sea shelf during the late 1990s: Implications for decadal changes in ecosystem structure and carbon flow. Mar. Ecol. Prog. Ser. 272, 281-300. doi:10.3354/meps272281.

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 4 moored acoustic recorders; ~30% duty cycle, 16 kHz sampling rate. Sonobuoys: tens to hundreds of sonobuoy detections.
- **# of years in which supporting acoustic data collected**: 2007-2018
- **Supporting information**: Fin whales were present at Marine Mammal Lab BS3 & M2 (in the NPRW Critical Habitat) and M4 and BS2 (Bering Sea) moorings in May-Feb, 2010-2018 (AFSC 2021). Extending the BIA months from May to Feb is based on mooring acoustic data. Sonobuoy data: Clapham et al. 2012, Matsuoka et al. 2018, 2019, Vate Brattström et al. 2019.

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygon is based on all of the sighting and acoustic mooring and sonobuoy data. The acoustic moorings BS3 & M2 have a 20 nm buffer. The moorings can typically record calls ~15-20 nm from the mooring depending on oceanographic conditions, how loud the animal is calling, etc. In deep water locations, fin whale calls can be heard at distances much greater than 20 nm; however, on the shallow Bering Shelf where the Marine Mammal Lab moorings are located, fin whale call propagation will likely not be more than 20 nm.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Clapham, P.J., Kennedy, A.S., Rone, B.K., Berchok, C.L., Crance, J.L., Zerbini, A.N. (2012). North Pacific right whales (Eubalaena japonica) in the southeastern Bering Sea (Final Report, OCS Study BOEM 2012-074). Seattle, WA: National Marine Mammal Laboratory, Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration.

Distributed Biological Observatory (DBO) vessel sightings, 2009-2019. (2019). NSF Grant Award #: OPP-1702211. arcticdata.io. doi:10.18739/A26T0GX06.

Friday, N.A., Waite, J.M., Zerbini, A.N., Moore, S.E. (2012). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf: 1999-2004. Deep-Sea Res. Pt. II. 65-70, 260-272.

Friday, N.A., Zerbini, A.N., Waite, J.M., Moore, S.E., Clapham, P.J. (2013). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf, June and July of 2002, 2008, and 2010. Deep-Sea Res. Pt. II, 94, 244-256. http://dx.doi.org/10.1016/j.dsr2.2013.03.011

LeDuc, R.G. (2004). Report of the results of the 2002 survey for North Pacific right whales (NOAA Tech. Memo. NMFS-SWFSC-357). Washington, DC: National Oceanic and Atmospheric Administration.

Matsuoka, K., Tayor, J., Yoshimura, I., Crance, J., Kasai., H. (2018). Cruise report of the 2017 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/67B/ASI/12.

Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Zerbini, A.N., Friday, N.A., Palacios, D.M., Waite, J.M., Ressler, P.H., Rone, B.K. et al. (2016). Baleen whale abundance & distribution in relation to environmental variables & prey density in the eastern Bering Sea. Deep Sea Res. Pt. II. 134, 312-320.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021). Distributed Biological Observatory: https://arcticdata.io, doi:10.18739/A26T0GX06 (accessed Dec 2020).

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: 9

Supplementary Description 1. 17. Fin whale feeding area

Species name: Fin whale (*Balaenoptera physalus*)

Stock or population: Northeast Pacific

Descriptive name: Western-central Bering Sea

BIA type: Feeding Area

BIA label: F-BIA2-d-b1-ABS036-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 2 (Intensity: 3, Data support: 1)

Supporting notes for intensity score: From the spatially-explicit fin whale modeled abundance in this area based on fin whale sightings, environmental variables, and the density of their prey, it is likely this is an important feeding area for fin whales. The modeled results show a higher abundance of fin whales in this F-BIA than farther to the southeast in the southeastern Bering Sea.

Supporting notes for data support score: The majority of the data supporting this BIA (Friday et al. 2013, Zerbini et al. 2016) includes only two months (in three different years) of surveys; the other surveys (LeDuc 2004, Matsuoka et al. 2019) covered only the southwestern edge of this F-BIA. All of these data sources are at least 10 years old.

Spatiotemporal variability: d

Supporting notes for spatiotemporal variability: Fin whale prey availability on the eastern Bering Sea shelf is affected by the prevailing temperature regime. The Bering Sea shelf underwent various temperature regime shifts with high interannual variability until 2000, a warm period from 2001-2005, and a cold period from 2007-2010. Whether sea ice covers the eastern Bering Sea shelf determines whether it will be a warm or cold year in that region. The minimum southerly extent of sea ice can vary by 100 km each year and is affected by prevailing winds and ocean currents, particularly in spring (Stabeno et al. 2012). Winds and ocean currents also affect the location of the fronts that separate the coastal, middle, and outer domains.

Boundary certainty: 1

Supporting notes for boundary certainty: These boundaries are uncertain because of the limited spatial and temporal extent of the data. Fin whales may be present during more than the three months during which surveys were conducted and in an area greater than what was surveyed. For example, at passive acoustic mooring M8 (see ABS region fin whale F-BIA M8 Mooring, "F-BIA2-d-b1-ABS038-0"), located just northeast of this F-BIA, there were high detections of fin whale calls from July to January in each year, 2010-2018 (AFSC 2021); that F-BIA could not be combined with this one because that F-BIA extends to January. Another source of uncertainty is that fin whale abundance was higher in the cold years of 2008 and 2010 than in the warm year of 2002. Fin whale surveys conducted on the Bering Sea middle shelf and outer stratum in 1999, a cold year, also indicated higher fin whale abundance compared to the warm year of 2002 (Friday et al. 2012, Stabeno et al. 2012). Adult and juvenile euphausiids and Calanus spp. increased in biomass, and recruitment of pollock increased, on the southeastern Bering Sea shelf during cold years, indicating that fin whale abundance may be linked to prey availability (Stabeno et al. 2012). With the extensive warming that the Bering Sea has been undergoing, particularly since the extreme loss of winter sea ice in 2017-18, it is possible that fin whales' and their prey's spatiotemporal distribution and density could be changing.

Months of year designation is applicable: June, July, August

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

# of observations/records: Tens of sightings of fin whales

# of years in which supporting visual data collected: 2002, 2008, 2010, 2018

Supporting information: Line transect vessel surveys in Jun-Sep (Friday et al. 2013, Matsuoka et al. 2019) and modeling predicting fin whale abundance based on the fin whale sightings, environmental variables, and prey data from Friday et al. (2013) surveys (Zerbini et al. 2016). Non-systematic vessel surveys along the shelfbreak in the southern portion of this BIA (LeDuc 2004).

Data not included are cetacean line transect data from the pollock trawl surveys of the 1990s (Friday et al. 2012) because those data were too old (> 20 years) to be considered representative of present conditions.

Friday, N. A., Waite, J. M., Zerbini, A. N., & Moore, S. E. (2012). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf: 1999-2004. Deep-Sea Research Part II, 65-70, 260-272.

Acoustic detections/records supporting designation (Y/N): Y

# of observations/records: several acoustic detections from sonobuoys

# of years in which supporting acoustic data collected: 2018

Supporting information: Line transect vessel survey (Matsuoka et al. 2019)

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The F-BIA polygon is based on fin whale sightings and acoustic detections from line transect and non-systematic vessel surveys. Along the north side, the polygon follows just shallow of the 100 m isobath, to

incorporate all of the outer domain. Along the south side, the polygon runs just deeper than the 1000 m isobath to incorporate the eastern edge of the continental shelf where the vessel line-transect study area ended (Friday et al. 2013).

References: Friday, N.A., Zerbini, A.N., Waite, J.M., Moore, S.E., Clapham, P.J. (2013). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf, June and July of 2002, 2008, and 2010. Deep-Sea Res. Pt. II, 94, 244-256. http://dx.doi.org/10.1016/j.dsr2.2013.03.011

LeDuc, R.G. (2004). Report of the results of the 2002 survey for North Pacific right whales (NOAA Tech. Memo. NMFS-SWFSC-357). Washington, DC: National Oceanic and Atmospheric Administration.

Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

Zerbini, A.N., Friday, N.A., Palacios, D.M., Waite, J.M., Ressler, P.H., Rone, B.K. et al. (2016). Baleen whale abundance & distribution in relation to environmental variables & prey density in the eastern Bering Sea. Deep Sea Res. Pt. II. 134, 312-320.

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: 9

Supplementary Description 1. 18. Fin whale feeding area

Species name: Fin whale (*Balaenoptera physalus*)

Stock or population: Northeast Pacific

Descriptive name: BS1 Mooring

BIA type: Feeding Area

BIA label: F-BIA0-d-b1-ABS037-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: The acoustic mooring shows strong fin whale presence here in each year that data was collected, but their feeding density appears to be higher farther to the northwest near Russia and south in the North Pacific Right Whale Critical Habitat.
- **Supporting notes for data support score**: This watch list area is based on only one dataset of one mooring.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: There can be warm or cold years, which affect eddies and fronts, and nutrient upwelling and prey aggregation mechanisms, which affect fin whale distribution and abundance in the area.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Fin whale presence likely extends farther than the 20 nm radius around this mooring.

Months of year designation is applicable: August, September, October, November, December

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: 2 fin whales
- **# of years in which supporting visual data collected**: 2010
- **Supporting information**: Two fin whales sighed on non-systematic cruise transiting through the area (Vate Brattström et al. 2019)

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 1 moored acoustic recorder; ~30% duty cycle, 16 kHz sampling rate. Several acoustic detections from sonobuoys.
- **# of years in which supporting acoustic data collected**: 2010-2018
- **Supporting information**: Fin whales were present at Marine Mammal Lab BS1 mooring each year that data were collected (2010-2018) (AFSC 2021). Fin whales were detected on sonobuoys from a non-systematic cruise transiting through the area ((Vate Brattström et al. 2019).

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is based on a 20 nm radius around the BS1 mooring. Recorders typically average ~15-20 nm detection range, which is variable depending on oceanographic conditions, how loud the animal is calling, etc.). In deep water locations, fin whale calls can be heard at distances much greater than 20 nm; however, on the shallow Bering Shelf where the Marine Mammal Lab moorings are located, fin whale call propagation will likely not be more than 20 nm.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021)

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: 9 (does not include this watch list area)

Supplementary Description 1. 19. Fin whale feeding area

Species name: Fin whale (*Balaenoptera physalus*)

Stock or population: Northeast Pacific

Descriptive name: Bristol Bay

BIA type: Feeding Area

BIA label: F-BIA0-d-b1-ABS033-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: Few surveys have been conducted in this area, but on one of those (the line transect cruise in 2017), what looks to be a dense aggregation of fin whales was sighted, as well as a few sightings in 2008.
- **Supporting notes for data support score**: This watch list area is based on only two surveys.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: There are likely oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect fin whale prey base in this area and that vary by year.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Data in this area are lacking as most survey effort has been farther west in the North Pacific Right Whale Critical Habitat or closer to shore for Bristol Bay belugas.

Months of year designation is applicable: July, August, September

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: Tens of sightings of fin whales
- **# of years in which supporting visual data collected**: 2008, 2017
- **Supporting information**: Line transect vessel surveys in Jul-Sep 2017 (Matsuoka et al. 2018), line transect aerial surveys in Jul-Aug 2008 (Clapham et al. 2012); the specific month during which surveys were conducted in Bristol Bay is not specified in the reports, so the months of this watchlist BIA may not be accurate.

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?: The watch list area polygon is based on the POWER 2017 line transect vessel survey and the PREIST 2008 aerial line transect survey.

References: Clapham, P.J., Kennedy, A.S., Rone, B.K., Berchok, C.L., Crance, J.L., Zerbini, A.N. (2012). North Pacific right whales (Eubalaena japonica) in the southeastern Bering Sea (Final Report, OCS Study BOEM 2012-074). Seattle, WA: National Marine Mammal Laboratory, Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration.

Matsuoka, K., Tayor, J., Yoshimura, I., Crance, J., Kasai., H. (2018). Cruise report of the 2017 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/67B/ASI/12.

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: 9 (does not include this watch list area)

Supplementary Description 1. 20. Fin whale feeding area

Species name: Fin whale (*Balaenoptera physalus*)

Stock or population: Northeast Pacific

Descriptive name: Southcentral Bering Sea

BIA type: Feeding Area

BIA label: F-BIA0-d-b1-ABS035-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: Fin whales may be feeding in this area, but there are higher densities of fin whales feeding elsewhere in the Bering Sea.
- **Supporting notes for data support score**: This watch list area is based on only one dataset from one year.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: There are likely oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect their prey base and that vary by year.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Boundaries are uncertain because of the limited data. It is likely the monthly timing of this watch list area may not be complete because the fin whale sightings and acoustic detections were documented in all three months that the survey was conducted. The polygon is close to the Western-central and Southeastern Bering Sea FBIAs and there is a cluster of sightings where the three BIAs meet. It is possible this could all be one BIA, but the months of data collection were different, so the BIAs and watch list area cannot be combined.

Months of year designation is applicable: July, August, September

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: Tens of sightings of fin whales
- **# of years in which supporting visual data collected**: 2018
- **Supporting information**: Line transect vessel survey (Matsuoka et al. 2019)

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: several acoustic detections from sonobuoys
- **# of years in which supporting acoustic data collected**: 2018
- **Supporting information**: Line transect vessel survey (Matsuoka et al. 2019)

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is drawn based around fin whale sightings and acoustic sonobuoy detections from the IWC POWER 2018 cruise.

References: Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

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: 9 (does not include this watch list area)

Supplementary Description 1. 21. Fin whale migratory route

Species name: Fin whale (*Balaenoptera physalus*)

Stock or population: Northeast Pacific

Descriptive name: BS4 & BS6 Moorings

BIA type: Migratory Route

BIA label: M-BIA0-d-b1-ABS034-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: The BS6 mooring seems to have a strong fin whale presence, but BS4 does not. We know killer whales hunt gray whales near Unimak Pass; could it be that fin whales are staying fairly quiet near BS4? Another possibility is that fin whales are not migrating through these passes, but are instead migrating west past them and use a more western pass to migrate into the Bering Sea. Or are these moorings detecting fin whales feeding north of the passes, and not fins migrating through the passes? In that case, perhaps this watch list area could be an FBIA combined with the southeast Bering FBIA.
- **Supporting notes for data support score**: This watch list area is based on only one dataset of two moorings. The moorings collect data year round, but BS6 collected data for only 2 years.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: There are likely oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect their prey base and that vary by year.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Boundaries are based only on the 20 nm radiuses around the moorings.

Months of year designation is applicable: January, February, August, September, October, November, December

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): N

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 2 moored acoustic recorders; ~30% duty cycle, 16 kHz sampling rate.
- **# of years in which supporting acoustic data collected**: 2012-2018
- **Supporting information**: Fin whales were present at Marine Mammal Lab BS6 mooring in Umnak Pass in 2016 & 2017 (years when data was collected), and BS4 mooring in Unimak Pass with a low detection rate from 2010-2017 (AFSC 2021). This data was analyzed using an autodetector, and one year at each BS4 and BS6 were analyzed manually. For BS4 analysis, the autodetector underperformed compared to the manual review, likely due to the extensive vessel noise presence and high currents that create a lot of flow noise in the lower frequencies in Unimak Pass; therefore, we suspect fin whales have a greater presence in Unimak Pass than these data are showing.

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is based on the long term mooring data at BS4 and BS6 with a 20 nm buffer around the moorings. The moorings can typically record calls ~15-20 nm from the mooring depending on oceanographic conditions, how loud the animal is calling, etc. In deep water locations, fin whale calls can be heard at distances much greater than 20 nm; however, on the shallow Bering Shelf where the Marine Mammal Lab moorings are located, fin whale call propagation will likely not be more than 20 nm.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021)

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: 0

Supplementary Description 1. 22. Fin whale migratory route

Species name: Fin whale (*Balaenoptera physalus*)

Stock or population: Northeast Pacific

Descriptive name: NM1 Mooring

BIA type: Migratory Route

BIA label: M-BIA0-d-b1-ABS039-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: There is consistent fin whale presence near this mooring each year. We know fin whales pass through Bering Strait to feed in the southern Chukchi Sea, and we suspect they are migrating through past this mooring.
- **Supporting notes for data support score**: This watch list area is based on only one set of data at one mooring, though the mooring does collect data year round. We cannot tell behavior from the mooring data.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Sea ice plays a role as to when this area is accessible to fin whales, and the sea ice varies by year. There are likely other oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect fin whale prey base and that vary by year, which likely affects fin whale migration.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Boundaries are uncertain because of the geographically limited data.

Months of year designation is applicable: August, September, October, November

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **Supporting information**: Limited and sparse data not included in this BIA because they did not fall within the 20 nm radius of the NM1 mooring or because they were not within the Aug-Nov timeframe included vessel sightings and sonobuoy acoustic detections from POWER (Matsuoka et al. 2018, 2019), ARCWEST & CHAOZ (Vate Brattström et al. 2019), and Distributed Biological Observatory (DBO 2019) cruises.
  Matsuoka, K., Tayor, J., Yoshimura, I., Crance, J., Kasai., H. (2018). Cruise report of the 2017 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/67B/ASI/12.
  Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.
  Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.
  Distributed Biological Observatory (DBO) vessel sightings, 2009-2019. (2019). NSF Grant Award #: OPP-1702211. arcticdata.io. doi:10.18739/A26T0GX06.

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 1 moored acoustic recorder; ~30% duty cycle, 16 kHz sampling rate.
- **# of years in which supporting acoustic data collected**: 2012-2018
- **Supporting information**: Fin whales were present at Marine Mammal Lab NM1 mooring each year that data were collected (2012-2018) (AFSC 2021).

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is based on a 20 nm radius around the NM1 mooring. Recorders typically average ~15-20 nm detection range, which is variable depending on oceanographic conditions, how loud the animal is calling, etc.). In deep water locations, fin whale calls can be heard at distances much greater than 20 nm; however, on the shallow Bering Shelf where the Marine Mammal Lab moorings are located, fin whale call propagation will likely not be more than 20 nm.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021)

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: 0

Supplementary Description 1. 23. Gray whale feeding area

Species name: Gray whale (*Eschrichtius robustus*)

Stock or population: Eastern North Pacific

Descriptive name: Chirikov Basin

BIA type: Feeding Area

BIA label: F-BIA2-d-b2-ABS022-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 2 (Intensity: 2, Data support: 2)

Supporting notes for intensity score: Gray whales have been feeding in the Chrikov Basin for decades or more. In a study conducted in 2002, gray whale feeding was estimated to have declined by as much as 3- to 17-fold. However, from satellite tag, acoustic, and visual data conducted in 2010-2019, particularly an aggregation of 50 gray whales observed in 2014 and a satellite tagged gray whale that stayed in the Chirikov Basin for over a month with behavior that was indicative of feeding behavior, we know there is still a fair amount of gray whale presence (and likely) feeding there. From benthic studies, we know that although the amphipod beds have shrunk in area, there are still amphipods there to be fed upon. Pacific Coast Feeding Group and "Sounders" gray whales were excluded from consideration when scoring this region's gray whale F-BIAs because they are small subsets (~1%) of the gray whale population that migrate only as far north as southeast Alaska.

Supporting notes for data support score: The sighting, satellite tag, and acoustic data are all within ~ 10 years. Although there is only 1 acoustic mooring in this area, it collects data year round.

Spatiotemporal variability: d

Supporting notes for spatiotemporal variability: The high benthic amphipod biomass area has shrunk since the 1970s and the area where gray whales have been documented has shrunk since the 1980s. Acoustics show that there is a greater presence there in some years than others. Ice can still be present in May, and it is coming back down in December.

Boundary certainty: 2

Supporting notes for boundary certainty: The polygon is based on the visual sightings, satellite tag, and acoustic data. Gray whales have been feeding in this area for decades, though the size of the amphipod area and where gray whales have been documented has reduced. DBO cruises likely covered a lot of the Chirikov gray whale feeding area, but the ARCWEST and CHAOZ cruises did not do extensive surveying in the Chirikov. The acoustics data are good for timing, but is just one point in space. The 2002 aerial survey was only one week long and was almost 20 years ago. There was only one satellite tagged gray whale, but it spent over a month in the Chirikov Basin and the tag data was indicative of feeding behavior.

Months of year designation is applicable: May (2nd half), June, July, August, September, October, November, December

Tagging data supporting designation (Y/N): Y

# of tags: 1

# of years in which supporting tagging data collected: 2017

Supporting information: One gray whale was satellite tagged in Baja, California Sur, and migrated to the Chirikov Basin in May (Urban et al. 2021). It stayed in the Chirikov Basin with the behavior classification of Area Restricted Search, which is indicative of feeding behavior, until July 11th when the tag stopped transmitting.

Satellite tag data not included in this BIA includes two tagged gray whales (out of 13) that were tagged off Chukotka, Russia. (Heide-Jorgensen et al. 2012). These two whales did venture out into the Chirikov Basin, but the Chirikov Basin did not reach the 50% density that we have required of satellite tag data of other Aleutian Island/Bering Sea region BIAs.

Heide-Jorgensen, M.P., Laidre, K.L., Litovka, D., Villum Jensen, M., Grebmeier, J.M., Sirenko, B.I. (2012). Identifying gray whale (Eschrichtius robustus) foraging grounds along the Chukotka Peninsula, Russia, using satellite telemetry. Polar Biol. 35, 1035-1045. doi:10.1007/s00300-011-1151-6.

Visual observations/records supporting designation (Y/N): Y

# of observations/records: Hundreds of sightings of hundreds of gray whales

# of years in which supporting visual data collected: 2002, 2010-2019

Supporting information: Non-systematic vessel sightings (DBO 2019, Vate Brattström et al. 2018), 1-week Chirikov Basin line transect aerial survey in 2002 (Moore et al. 2003), line-transect POWER cruises (Matsuoka et al. 2018, 2019).

Data not included in this BIA are Aerial Surveys of Arctic Marine Mammals (https://www.fisheries.noaa.gov/alaska/marine-mammal-protection/aerial-surveys-arctic-marine-mammals) line transect data in the Chirikov Basin, Apr-May, 1980-84; this data is >40 years old and we know conditions in the northern Bering Sea have changed since then. Also not included is the Bering Strait Marine Life & Subsistence Use Data Synthesis (Oceana and Kawerak 2014) because the data this is based on are already being used from their source and because the synthesis does not contain any Indigenous Knowledge of gray whales in the Bering Sea region.

Oceana and Kawerak, Inc. (2014). Bering Strait marine life and subsistence use data synthesis. Kawerak Incorporated, 1-499. https://oceana.org/publications/reports/the-bering-strait-marine-life-and-subsistence-data-synthesis

Acoustic detections/records supporting designation (Y/N): Y

# of observations/records: 1 moored acoustic recorder; ~30% duty cycle, 16 kHz sampling rate.

# of years in which supporting acoustic data collected: 2012-2018

Supporting information: Gray whales were present at Marine Mammal Lab NM1 mooring in the Chirikov Basin in late May-Dec in most years of data analysis 2012-2018 (AFSC 2021). Extending the BIA months from late May to Dec is based on mooring acoustic data.

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The polygon is based on non-systematic vessel sightings in 2010-2019, line transect vessel sightings in 2017 and 2018, line transect aerial sightings in 2002, satellite tag data from 2017, and moored acoustic detections in 2012-2018.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Distributed Biological Observatory (DBO) vessel sightings, 2009-2019. (2019). NSF Grant Award #: OPP-1702211. arcticdata.io. doi:10.18739/A26T0GX06.

Matsuoka, K., Tayor, J., Yoshimura, I., Crance, J., Kasai., H. (2018). Cruise report of the 2017 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/67B/ASI/12.

Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

Moore, S.E., Grebmeier, J.M., Davies, J.R. (2003). Gray whale distribution relative to forage habitat in the northern Bering Sea: Current conditions and retrospective summary. Can. J. of Zool. 81, 734-742. doi:10.1139/z03-043.

Urban, J.R., Jimenez-Lopez, E., Guzman, H.M., Viloria-Gomora, L. (2021). Migratory behavior of an eastern North Pacific gray whale from Baja California Sur to Chirikov Basin, Alaska. Front. Mar. Sci. 8:619290. doi: 10.3389/fmars.2021.619290.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021). Distributed Biological Observatory: https://arcticdata.io, doi:10.18739/A26T0GX06 (accessed Dec 2020).

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: 6

Supplementary Description 1. 24. Gray whale feeding area

Species name: Gray whale (*Eschrichtius robustus*)

Stock or population: Eastern North Pacific

Descriptive name: Alaska Peninsula

BIA type: Feeding Area

BIA label: F-BIA0-?-b1-ABS024-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

Supporting notes for intensity score: Although gray whales were sighted here by the hundreds in the 1970s and 1980s, the ecosystem may have undergone changes since then and there have been few gray whale sightings in recent years (though that could also be due to lack of survey effort). Gray whales do feed in many other places. Pacific Coast Feeding Group and "Sounders" gray whales were excluded from consideration when scoring this region's gray whale F-BIAs because they are small subsets (~1%) of the gray whale population that migrate only as far north as southeast Alaska.

Supporting notes for data support score: This watch list area consists of only 31 total gray whales sighted in two years during limited surveys that spanned only two months.

Spatiotemporal variability: ?

Supporting notes for spatiotemporal variability: Not enough data to classify this category.

Boundary certainty: 1

Supporting notes for boundary certainty: This watch list area is based a limited amount of data, which makes the boundary uncertain.

Months of year designation is applicable: June, July

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

# of observations/records: 13 sightings of 31 gray whales

# of years in which supporting visual data collected: 2002, 2008

Supporting information: Line transect vessel surveys (Friday et al. 2012, 2013; Moore et al. 2002).

Data not included are hundreds of gray whales, 50-80% of which were feeding, sighted from opportunistic land, vessel, and aerial surveys along the Alaska Peninsula, Apr-Nov, 1976-1982 (Gill and Hall 1983). This watch list area is being included because gray whales have been sighted during cetacean surveys of the Alaska Peninsula in recent years (though behavior was not reported) and may indicate that this is still a gray whale feeding area.

Gill, R.E., and Hall, J.D. (1983). Use of nearshore and estuarine areas of the southeastern Bering Sea by gray whales (Eschrichtius robustus). Arctic. 38:3, 275-281.

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?: The watch list area polygon is based on the 2002 and 2008 sightings from line transect vessel surveys.

References:

Friday, N.A., Waite, J.M., Zerbini, A.N., Moore, S.E. (2012). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf: 1999-2004. Deep-Sea Res. Pt. II. 65-70, 260-272.

Friday, N.A., Zerbini, A.N., Waite, J.M., Moore, S.E., Clapham, P.J. (2013). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf, June and July of 2002, 2008, and 2010. Deep-Sea Res. Pt. II, 94, 244-256. http://dx.doi.org/10.1016/j.dsr2.2013.03.011

Moore, S.E., Waite, J.M., Friday, N.A., Honkalehto, T. (2002). Cetacean distribution and relative abundance on the central-eastern and the southeastern Bering Sea shelf with reference to oceanographic domains. Prog. Oceanogr., 55, 249-261. doi:10.1016/S0079-6611(02)00082-4.

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: 6 (does not include this watch list area)

Supplementary Description 1. 25. Gray whale feeding area

Species name: Gray whale (*Eschrichtius robustus*)

Stock or population: Eastern North Pacific

Descriptive name: St. Lawrence Island

BIA type: Feeding Area

BIA label: F-BIA0-?-b1-ABS052-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: The area near St. Lawrence Island where gray whales have been sighted in recent years is a very small area compared to all the other places gray whales feed, and few large aggregations of gray whales have been sighted here in recent or past data. Pacific Coast Feeding Group and "Sounders" gray whales were excluded from consideration when scoring this region's gray whale F-BIAs because they are small subsets (~1%) of the gray whale population that migrate only as far north as southeast Alaska.
- **Supporting notes for data support score**: This watch list area is based on limited data. The aerial surveys were almost 20 years ago and were only one week long. The rest of the watch list area is based on one line transect cruise and one non-systematic cruise.

Spatiotemporal variability: ?

- **Supporting notes for spatiotemporal variability**: Not enough data to classify this category.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: This watch list area is based on a limited amount of data, which makes the boundary uncertain.

Months of year designation is applicable: July, August

Tagging data supporting designation (Y/N): Y

- **Supporting information**: Satellite tag data not included in this watch list area include two tagged gray whales whose percent density in the St. Lawrence Island area did not reach the 50% density that we have required of satellite tag data of other Aleutian Island/Bering Sea region BIAs. One gray whale was tagged at Gambell by ADFG (Citta et al. 2018) and stayed near St. Lawrence Island (presumably feeding), but not in a 50% density of the cells in their grid, presumably because the tag did not stay on very long. One gray whale was tagged by the ARCWEST cruise in the south-central Chukchi Sea and moved down to near St. Lawrence Island and partook in Area Restricted Search and dove to bottom depths, both indicators of feeding (Vate Brattström et al. 2019).

  Citta, J.J., Lowry, L.F., Quakenbush, L.T., Kelly, B.P., Fischbach, A.S., London, J.M., et al. (2018a). A multi-species synthesis of satellite telemetry data in the Pacific Arctic (1987-2015): Overlap of marine mammal distributions and core use areas. Deep-Sea Res. Pt. II 152, 132-153.

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: Tens of sightings of tens of gray whales
- **# of years in which supporting visual data collected**: 2002, 2012, 2018
- **Supporting information**: Line transect vessel survey (Matsuoka et al. 2019), non-systematic vessel cruise (Vate Brattström et al. 2019), line transect aerial survey (Moore et al. 2003).

  Data not included in this BIA are Aerial Surveys of Arctic Marine Mammals (https://www.fisheries.noaa.gov/alaska/marine-mammal-protection/aerial-surveys-arctic-marine-mammals) line transect data near St. Lawrence Island, Apr-May, 1980-84; this data is >40 years old and we know conditions in the northern Bering Sea have changed since then. Also not included are data from Noongwook et al. 2007, a paper on Indigenous Knowledge of bowhead whales near St. Lawrence Island, which mentions gray whales are seen in the same areas as bowhead whales in May and June, but does not give enough detail to include areas and times in this watch list area.

  Noongwook, G., the Native village of Savoonga, the Native village of Gambell, Huntington, H.P., George, J.C. (2007). Traditional knowledge of the bowhead whale (Balaena mysticetus) around St. Lawrence Island, Alaska. Arctic. 60:1, 47-54.

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: one sonobuoy acoustic detection
- **# of years in which supporting acoustic data collected**: 2018
- **Supporting information**: Line transect vessel cruise with sonobuoys deployed; one gray whale acoustic detection fell within this watch list area polygon; a few others were scattered farther out.

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is based on the 2002 aerial survey sightings and the 2012

and 2018 vessel survey sightings.

References: Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

Moore, S.E., Grebmeier, J.M., Davies, J.R. (2003). Gray whale distribution relative to forage habitat in the northern Bering Sea: Current conditions and retrospective summary. Can. J. of Zool. 81, 734-742. doi:10.1139/z03-043.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

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: 6 (does not include this watch list area)

Supplementary Description 1. 26. Gray whale migratory route

Species name: Gray whale (*Eschrichtius robustus*)

Stock or population: Eastern North Pacific

Descriptive name: Unimak Pass - Southbound

BIA type: Migratory Route

BIA label: M-BIA2-s-b1-ABS026-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 2 (Intensity: 3, Data support: 1)

Supporting notes for intensity score: All gray whales migrating south from their primary foraging grounds on the Bering and Chukchi seas have to pass through the Aleutian Islands, and it appears most of them use Unimak Pass.

Supporting notes for data support score: Although these data include thousands of gray whales sighted, the data are very old. Current data is needed.

Spatiotemporal variability: s

Supporting notes for spatiotemporal variability: The data indicate all whales pass very close to shore. Sea ice does not appear to be a factor in this area.

Boundary certainty: 1

Supporting notes for boundary certainty: Boundary is uncertain because the data are so old. If there has been a temporal shift that has happened since the 1980s, we would not have that documented.

Months of year designation is applicable: January, November, December

Tagging data supporting designation (Y/N): Y

Supporting information: Data not included are three western gray whales that were tagged off Sakhalin Island, Russia and migrated to areas considered to be eastern North Pacific gray whale territory; two of these whales went through Unimak Pass on their southbound migration (Mate et al. 2015).

Mate, B.R., Ilyashenko, V.Y., Bradford, A.L., Vertyankin, V.V., Tsidulko, G.A., Rozhnov, V.V., et al. (2015). Critically endangered western gray whales migrate to the eastern North Pacific. Biol. Lett. 11, 20150071. doi:10.1098/rsbl.2015.0071.

Visual observations/records supporting designation (Y/N): Y

# of observations/records: Thousands of sightings of thousands of gray whales

# of years in which supporting visual data collected: 1977-1979

Supporting information: Shore-based counts on Unimak Island and aerial surveys of Unimak Island and the Alaska Peninsula (Rugh et al. 1984), and peak migration date calculated from that data (Rugh et al. 2001).

Acoustic detections/records supporting designation (Y/N): Y

Supporting information: Data not included are AFSC moored acoustic data. There were few calls detected at mooring BS4 in Unimak Pass, and they were in the month of August. Acoustics also detected gray whales at BS6 in Umnak Pass in Sep-Jan, but only in one year (2016), which we did not think was enough data to expand the BIA to include Umnak Pass (AFSC 2021).

Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygon is based on the >3000 gray whales documented migrating within 3.7 km from shore during the late 1970s. Current data is needed. Also note the gray whale migration is one long continuous path; however, we had to make arbitrary cuts to the path so that we could separate the BIAs into monthly time segments.

References: Rugh, D.J. (1984). "Census of gray whales at Unimak Pass, Alaska: November-December 1977-1979" in The gray whale, Eschrichtius robustus, eds. Jones, M.L., Swartz, S.L., Leatherwood, S. (pp. 225-247). New York: Academic Press. doi:10.1016/B978-0-08-092372-7.50016-9.

Rugh, D., Shelden, K.E.W., Schulman-Janiger, A. (2001). Timing of the gray whale southbound migration (Eschrichtius robustus). J. of Cet. Res. and Manage. 3, 31-39.

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: 4

Supplementary Description 1. 27. Gray whale migratory route

Species name: Gray whale (*Eschrichtius robustus*)

Stock or population: Eastern North Pacific

Descriptive name: Unimak Pass to Nunivak Island - Northbound

BIA type: Migratory Route

BIA label: M-BIA2-s-b1-ABS025-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 2 (Intensity: 3, Data support: 1)

Supporting notes for intensity score: The majority of the eastern North Pacific gray whales travel to the Bering and Chukchi seas for summer/ fall foraging. From what we know, the majority of these whales pass through Unimak Pass (which is a very small area), and they've been using this path for decades or longer.

Supporting notes for data support score: The only current data is one satellite tagged whale and the non-systematic small boat surveys on one side of Unimak Island which were focused on killer whale predation rather than documenting all gray whales. More current data is needed.

Spatiotemporal variability: s

Supporting notes for spatiotemporal variability: In looking at sea ice satellite photos from 2010-2015, it does not look like this area is affected by sea ice.

Boundary certainty: 1

Supporting notes for boundary certainty: The majority of the data this BIA is based on comes from the 1970s-80s. Current data are limited; the satellite tag data is important, but is only one animal, and the killer whale predation study surveyed in only a small area around False Pass on the east and south sides of Unimak Island.

Months of year designation is applicable: April, May, June

Tagging data supporting designation (Y/N): Y

# of tags: 1

# of years in which supporting tagging data collected: 2017

Supporting information: One satellite tagged gray whale; in May it traversed from Kodiak Island to the Chirikov Basin and passed through Unimak Pass (Urban et al. 2021).

Data not included is one western gray whale that was tagged off Sakhalin Island, Russia, and migrated to areas considered to be eastern North Pacific gray whale territory; this whale migrated to Baja California and back; on the northbound migration, it passed through Unimak Pass and moved along the Alaska Peninsula to the east before turning and migrating back to Russia (Mate et al. 2015).

Mate, B.R., Ilyashenko, V.Y., Bradford, A.L., Vertyankin, V.V., Tsidulko, G.A., Rozhnov, V.V., et al. (2015). Critically endangered western gray whales migrate to the eastern North Pacific. Biol. Lett. 11, 20150071. doi:10.1098/rsbl.2015.0071.

Visual observations/records supporting designation (Y/N): Y

# of observations/records: Hundreds of sightings of hundreds of gray whales

# of years in which supporting visual data collected: 1958-1982, 2003-2006

Supporting information: Opportunistic land, vessel, & aerial surveys along the Alaska Peninsula (Braham 1984, Gill & Hall 1983, MML unpbl. data 1981), small boat surveys studying killer whale predatory attacks on gray whales near Unimak Pass (Barrett-Lennard et al. 2011)

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?: The BIA polygon is based on the air, land, and vessel sighting data from the 1950-1980s, the non-systematic small boat survey sightings at Unimak Island in 2011, and the 2017 tagged gray whale. The polygon is ~14 nm offshore of the Alaska Peninsula; the data from the 1950s-80s documented gray whales closer to shore, but the recent data we have, from the 2017 satellite tagged whale, is that it veered away from the peninsula for part of its path. More current data is needed. Also note the gray whale migration is one long continuous path; however, we had to make arbitrary cuts to the path so that we could separate the BIAs into monthly time segments.

References:

Barrett-Lennard, L.G., Matkin, C.O., Durban, J.W., Saulitis, E.L., Ellifrit, D. (2011). Predation on gray whales and prolonged feeding on submerged carcasses by transient killer whales at Unimak Island, Alaska. Mar. Ecol. Prog. Ser. 421:229-241.

Braham, H.W. (1984). "Distribution and migration of gray whales in Alaska" in The gray whale, Eschrichtius robustus, eds. Jones, M.L., Swartz, S.L., Leatherwood, S. (pp. 249-266). New York: Academic Press. http://dx.doi.org/10.1016/B978-0-08-092372-7.50017-0

Gill, R.E., and Hall, J.D. (1983). Use of nearshore and estuarine areas of the southeastern Bering Sea by gray whales (Eschrichtius robustus). Arctic. 38:3, 275-281.

Urban, J.R., Jimenez-Lopez, E., Guzman, H.M., Viloria-Gomora, L. (2021). Migratory behavior of an eastern North Pacific gray whale from Baja California Sur to Chirikov Basin, Alaska. Front. Mar. Sci. 8:619290. doi: 10.3389/fmars.2021.619290.

Data sources: MML unpbl data: Aerial Surveys of Arctic Marine Mammals: https://www.fisheries.noaa.gov/alaska/marine-mammal-protection/aerial-surveys-arctic-marine-mammals (accessed Jul 2020).

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: 4

Supplementary Description 1. 28. Harbor porpoise feeding area

Species name: Harbor porpoise (*Phocoena phocoena*)

Stock or population: Bering Sea

Descriptive name: Southeastern Bering Sea and Bristol Bay

BIA type: Feeding Area

BIA label: F-BIA0-d-b1-ABS050-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: Harbor porpoises were common along the coast in Bristol Bay during the Jun 1999 aerial survey, and were found in the area of the line-transect surveys in the late 1990s through 2010, but we do not feel there are clustered high density areas.
- **Supporting notes for data support score**: The majority of this watch list area is based on data that is ~20 years old (Friday et al. 2012, 2013), and the surveys were conducted mostly in only two months (June & July).

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Harbor porpoises were seen in different areas in some of the survey years, or few sightings were seen in some years when other years had numerous sightings, which could be due to the distribution of their prey (forage fishes such as herring and capelin) and whether it is a warm or cold year.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Because the data this watch list area is based on are getting older, there could be changes to porpoise distribution that are not reflected in this watch list area. It could be that the level of information we have on harbor porpoises in the Bering Sea and Aleutian Island region is sufficient only to delimit range and not BIAs; more data is needed in the entire region.

Months of year designation is applicable: June, July, August, September

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: hundreds of sightings of hundreds of harbor porpoises
- **# of years in which supporting visual data collected**: 2002-2019
- **Supporting information**: Line transect vessel surveys on the Bering Sea shelf & slope and line transect aerial surveys in Bristol Bay: harbor porpoises were common on the Bering Sea shelf and slope and along the Alaska Peninsula and in Bristol Bay (Friday et al. 2012, 2013). Non-systematic vessel surveys (DBO 2019, LeDuc 2004, Vate Brattström et al. 2019).

  Data not included are cetacean line transect surveys of the southeastern Bering Sea from 1997 and 1999 (Tynan et al. 2004) because the data are getting too old to be basing a feeding BIA off of; those surveys documented harbor porpoises on the shelf within the 100 m isobath and along the coast. Data also not included are IWC POWER cruise harbor porpoise sightings because the report (Matsuoka et al. 2019) does not show a sightings map; although it does list sighting locations, when those sighting locations were plotted out for other species, the map did not match the species sighting maps in the report, so it is unknown if the sighting positions in the report are correct.

  Tynan, C. (2004). Cetacean populations on the SE Bering Sea shelf during the late 1990s: Implications for decadal changes in ecosystem structure and carbon flow. Mar. Ecol. Prog. Ser. 272, 281-300. doi:10.3354/meps272281.

  Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

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?: The watch list area polygon encompasses the high density and abundances from Friday et al. (2012, 2013) with support from the DBO sightings and LeDuc (2004). Although Friday et al. (2013) documented high density in the outer domain in the middle of the Bering Sea in 2008, that area was not included in the BIA because the porpoises were documented there in only one year.

References: Distributed Biological Observatory (DBO) vessel sightings, 2009-2019. (2019). NSF Grant Award #: OPP-1702211. arcticdata.io. doi:10.18739/A26T0GX06.

Friday, N.A., Waite, J.M., Zerbini, A.N., Moore, S.E. (2012). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf: 1999-2004. Deep-Sea Res. Pt. II. 65-70, 260-272.

Friday, N.A., Zerbini, A.N., Waite, J.M., Moore, S.E., Clapham, P.J. (2013). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf, June and July of 2002, 2008, and 2010. Deep-Sea Res. Pt. II, 94, 244-256.

http://dx.doi.org/10.1016/j.dsr2.2013.03.011

LeDuc, R.G. (2004). Report of the results of the 2002 survey for North Pacific right whales (NOAA Tech. Memo. NMFS-SWFSC-357). Washington, DC: National Oceanic and Atmospheric Administration.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Data sources: Distributed Biological Observatory: https://arcticdata.io, doi:10.18739/A26T0GX06 (accessed Dec 2020).

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: 0

Supplementary Description 1. 29. Humpback whale feeding area

Species name: Humpback whale (*Megaptera novaeangliae*)

Stock or population: Western North Pacific or Central North Pacific

Descriptive name: Unmak Pass/Unimak Pass/North Pacific Right Whale Critical Habitat

BIA type: Feeding Area

BIA label: F-BIA2-d-b2-ABS027-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 2 (Intensity: 2, Data support: 3)

- **Supporting notes for intensity score**: Humpback whales feed in this area in high densities and have been for at least decades, but this is not their only feeding area.
- **Supporting notes for data support score**: All of the data is fairly recent and includes several different datasets spanning a couple decades. There are 4 long-term moorings stationed in the BIA that collect data year round.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: There can be warm or cold years, which affect eddies and fronts, and nutrient upwelling and prey aggregation mechanisms, which affect humpback whale distribution and abundance in the area.

Boundary certainty: 2

- **Supporting notes for boundary certainty**: There is a lot of data to support this BIA; however, a lot of the surveys do not extend farther south or west of the BIA or between the North Pacific Right Whale Critical Habitat and Bristol Bay, although on the contrary, few humpback whales have been sighted farther west in the Aleutian Islands on surveys in those regions.

Months of year designation is applicable: January, May, June, July, August, September, October, November, December

Tagging data supporting designation (Y/N): Y

- **# of tags**: 8 tagged whales
- **# of years in which supporting tagging data collected**: 2007-2011
- **Supporting information**: 8 tags deployed Aug-Sep from Unalaska Is, 2007-2011 (Kennedy et al. 2014). Tags lasted 8-67 days. Area-restricted search (i.e. foraging) in waters shallower than 1000 m; movement into deeper water was often associated with travel.

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: Non-systematic vessel surveys: hundreds of sightings of >1000 humpbacks. Line transect vessel surveys: hundreds of sightings of >1000 humpbacks. Line transect aerial surveys: tens of sightings of hundreds of humpbacks.
- **# of years in which supporting visual data collected**: Non-systematic vessel surveys: 2002, 2007-2019. Line transect vessel surveys: 1999-2018. Line transect aerial surveys: 2008-09.
- **Supporting information**: Non-systematic vessel surveys (Clapham et al. 2012, DBO 2019, LeDuc 2004, Vate Brattström et al. 2019). Line-transect vessel surveys (Friday et al. 2012, 2013; Matsuoka et al. 2018, 2019; Zerbini et al. 2006). Modeling based off line-transect vessel surveys (Zerbini et al. 2016). Line transect aerial surveys (Clapham et al. 2012).

  Data not used in this BIA were cetacean vessel line-transect surveys in 1997-99 (Tynan et al. 2004) because that data is becoming old and there are more recent data available.

  Tynan, C. (2004). Cetacean populations on the SE Bering Sea shelf during the late 1990s: Implications for decadal changes in ecosystem structure and carbon flow. Mar. Ecol. Prog. Ser. 272, 281-300. doi:10.3354/meps272281.

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 4 moored acoustic recorders; ~30% duty cycle, 16 kHz sampling rate. Sonobuoys: tens of sonobuoy detections.
- **# of years in which supporting acoustic data collected**: 2012-2018
- **Supporting information**: Humpback whales were present at Marine Mammal Lab BS3 & M2 (in the NPRW Critical Habitat), BS4 (Unimak Pass), and BS6 (Umnak Pass) moorings in May-Jan, 2012-2018 (AFSC 2021). Extending the BIA months from May to Jan is based on mooring acoustic data. Sonobuoy data: Clapham et al. 2012; Matsuoka et al. 2018, 2019; Vate Brattström et al. 2019.

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygon is based on all of the sighting, satellite tag, and acoustic mooring and sonobuoy data. Some of these data sources include sightings and acoustic sonobuoy detections between Unimak Pass and the Shumigan Islands; those sightings have not been included here because the area would score lower in Intensity and Data Support; they will likely be included as a watch list area in the Gulf of Alaska region.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

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Distributed Biological Observatory (DBO) vessel sightings, 2009-2019. (2019). NSF Grant Award #: OPP-1702211. arcticdata.io. doi:10.18739/A26T0GX06.

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Friday, N.A., Zerbini, A.N., Waite, J.M., Moore, S.E., Clapham, P.J. (2013). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf, June and July of 2002, 2008, and 2010. Deep-Sea Res. Pt. II, 94, 244-256. http://dx.doi.org/10.1016/j.dsr2.2013.03.011

Kennedy, A.S., Zerbini, A.N., Rone, B.K., Clapham, P.J. (2014). Individual variation in movements of humpback whales (Megaptera novaeangliae) satellite-tracked in the eastern Aleutian Islands and Bering Sea during summer. Endanger. Species Res. 23, 187-195. doi:10.3354/esr00570.

LeDuc, R.G. (2004). Report of the results of the 2002 survey for North Pacific right whales (NOAA Tech. Memo. NMFS-SWFSC-357). Washington, DC: National Oceanic and Atmospheric Administration.

Matsuoka, K., Tayor, J., Yoshimura, I., Crance, J., Kasai., H. (2018). Cruise report of the 2017 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/67B/ASI/12.

Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Zerbini, A.N., Waite, J.M., Laake, J.L., Wade, P.R. (2006). Abundance, trends and distribution of baleen whales off Western Alaska and the central Aleutian Islands. Deep-Sea Res. Pt. I. 53, 1772-1790. doi:10.1016/j.dsr.2006.08.009.

Zerbini, A.N., Friday, N.A., Palacios, D.M., Waite, J.M., Ressler, P.H., Rone, B.K. et al. (2016). Baleen whale abundance & distribution in relation to environmental variables & prey density in the eastern Bering Sea. Deep Sea Res. Pt. II. 134, 312-320.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021). Distributed Biological Observatory: https://arcticdata.io, doi:10.18739/A26T0GX06 (accessed Dec 2020).

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: 17

Supplementary Description 1. 30. Humpback whale feeding area

Species name: Humpback whale (*Megaptera novaeangliae*)

Stock or population: Western North Pacific or Central North Pacific

Descriptive name: Bristol Bay

BIA type: Feeding Area

BIA label: F-BIA1-d-b1-ABS028-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 1 (Intensity: 2, Data support: 1)

- **Supporting notes for intensity score**: Humpback whales appear to be densely aggregated and feeding in this area, but this is certainly not the only place they feed in the North Pacific.
- **Supporting notes for data support score**: Though the line transect data is quality data, there are only 3 small sets of data and the timeframe spans only the summer/fall – no year-round acoustics. None of these datasets specifically state humpbacks are feeding here, but we assume they are because the sightings are aggregated and humpback whales travel to these high latitudes for the purpose of feeding.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: There can be warm or cold years, which affect eddies and fronts, and nutrient upwelling and prey aggregation mechanisms, which affect humpback whale distribution and abundance in the area. In 1999, sightings were far to the north, which differed from the other years of 2008 and 2017.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: The boundaries are based on only a few datasets.

Months of year designation is applicable: June, July, August, September

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: Line-transect aerial surveys: tens of sightings tightly clusterd. Line-transect vessel survey: tens of sightings tightly clustered.
- **# of years in which supporting visual data collected**: Line-transect aerial surveys: 1999, 2008. Line-transect vessel survey: 2017.
- **Supporting information**: Line-transect aerial surveys: (Clapham et al. 2012, Friday et al. 2012). Line-transect vessel survey (Matsuoka et al. 2018).

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 5 acoustic detections in the area where this survey sighted tens of humpback whales.
- **# of years in which supporting acoustic data collected**: 2017
- **Supporting information**: Acoustic sonobuoys (Matsuoka et al. 2018)

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The polygon is based on line transect aerial surveys in 1999 and 2008 and line transect vessel surveys in 2017.

References: Clapham, P.J., Kennedy, A.S., Rone, B.K., Berchok, C.L., Crance, J.L., Zerbini, A.N. (2012). North Pacific right whales (Eubalaena japonica) in the southeastern Bering Sea (Final Report, OCS Study BOEM 2012-074). Seattle, WA: National Marine Mammal Laboratory, Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration.

Friday, N.A., Waite, J.M., Zerbini, A.N., Moore, S.E. (2012). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf: 1999-2004. Deep-Sea Res. Pt. II. 65-70, 260-272.

Matsuoka, K., Tayor, J., Yoshimura, I., Crance, J., Kasai., H. (2018). Cruise report of the 2017 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/67B/ASI/12.

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: 17

Supplementary Description 1. 31. Humpback whale feeding area

Species name: Humpback whale (*Megaptera novaeangliae*)

Stock or population: Western North Pacific or Central North Pacific

Descriptive name: M4, BS2, M5 Moorings

BIA type: Feeding Area

BIA label: F-BIA0-d-b1-ABS029-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: There is consistent humpback whale presence near these moorings each year, and we assume they are feeding because humpback whales travel to high latitudes in the North Pacific for the purpose of feeding, but this is certainly not the only place they feed in the North Pacific.
- **Supporting notes for data support score**: This watch list area is based solely on mooring data, and we are unable to determine animal density or behavior from mooring data.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Sea ice plays a role as to when this area is accessible to humpback whales, and the sea ice varies by year. There are likely other oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect their prey base and that vary by year.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Boundaries are based only on the radiuses around the moorings; we do not have data for areas farther from the moorings.

Months of year designation is applicable: January, June, July, August, September, October, November, December

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): N

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 3 moored acoustic recorders; ~30% duty cycle, 16 kHz sampling rate.
- **# of years in which supporting acoustic data collected**: 2012-2018
- **Supporting information**: Humpback whales were present at Marine Mammal Lab M4, BS2, and M5 moorings in the Bering Sea in Jun-Jan (AFSC 2021).

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygons are based on MML acoustic moorings M4, BS2, and M5, with a 20 nm buffer around the moorings. The moorings can typically record calls ~15-20 nm from the mooring depending on oceanographic conditions, how loud the animal is calling, etc. This is a watch list area because we cannot tell feeding behavior from the acoustics, and there are not many humpback sightings near these moorings in other datasets.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021)

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: 17 (does not include this watch list area)

Supplementary Description 1. 32. Humpback whale feeding area

Species name: Humpback whale (*Megaptera novaeangliae*)

Stock or population: Western North Pacific or Central North Pacific

Descriptive name: M8 & BS1 Moorings

BIA type: Feeding Area

BIA label: F-BIA0-d-b1-ABS030-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: There is consistent humpback presence near these moorings each year, and we assume they are feeding because humpback whales travel to high latitudes in the North Pacific for the purpose of feeding, but this is certainly not the only place they feed in the North Pacific. Also, some of the acoustic presence may be migratory (see Supporting Info for Acoustic detection field).
- **Supporting notes for data support score**: The main data for this watch list area are the mooring data, along with a sighting aggregation from one year, and a couple other sightings; behavior is not available for these datasets.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Sea ice plays a role as to when this area is accessible to humpback whales, and the sea ice varies by year. There are likely other oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect their prey base and that vary by year.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Boundaries are based only on the radiuses around the moorings and the area in between to incorporate the sighting aggregation; we do not have data for areas farther from the moorings.

Months of year designation is applicable: June, July, August, September, October, November, December

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: 27 sightings of 51 humpback whales
- **# of years in which supporting visual data collected**: 2010-2019
- **Supporting information**: Non-systematic vessel surveys (DBO 2019, Vate Brattström et al. 2019).

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 2 moored acoustic recorders; ~30% duty cycle, 16 kHz sampling rate.
- **# of years in which supporting acoustic data collected**: 2012-2018
- **Supporting information**: Humpback whales were consistently present at Marine Mammal Lab M8 and BS1 moorings in the Bering Sea in Jun-Dec in each year of data collection (AFSC 2021). Moorings M8, and BS1 show presence in Jun through Aug or Sep, and then another pulse in Oct/Nov through Dec. It is possible these could be migratory pulses instead of feeding behavior; future evaluations should consider whether to split this watch list area into summer and autumn watch list areas. There were also several sonobuoy acoustic detections (Vate Brattström et al. 2019).

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is based on a 20 nm radius around the MML moorings and a polygon that connects the two moorings to incorporate the large aggregation of humpbacks from the ARCWEST cruise. Recorders typically average ~15-20 nm detection range, which is variable depending on oceanographic conditions, how loud the animal is calling, etc.)

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Distributed Biological Observatory (DBO) vessel sightings, 2009-2019. (2019). NSF Grant Award #: OPP-1702211. arcticdata.io. doi:10.18739/A26T0GX06.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021). Distributed Biological Observatory: https://arcticdata.io, doi:10.18739/A26T0GX06 (accessed Dec 2020).

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: 17 (does

not include this watch list area)

Supplementary Description 1. 33. Humpback whale feeding area

Species name: Humpback whale (*Megaptera novaeangliae*)

Stock or population: Western North Pacific or Central North Pacific

Descriptive name: NM1 Mooring

BIA type: Feeding Area

BIA label: F-BIA0-d-b1-ABS031-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

Supporting notes for intensity score: There is humpback whale presence near this mooring each year, and we assume they are feeding because humpback whales travel to high latitudes in the North Pacific for the purpose of feeding, but this is certainly not the only place they feed in the North Pacific. Humpback whales also migrate through Bering Strait to feed in the southcentral Chukchi Sea, and they also feed along the Chukotkan coast. The detections at mooring NM1 may be connected with those other areas, but we do not have the data to determine whether they are or not.

Supporting notes for data support score: The main data for this watch list area are the mooring data, along with a few other sightings; behavior is not available for these datasets.

Spatiotemporal variability: d

Supporting notes for spatiotemporal variability: Sea ice plays a role as to when this area is accessible to humpback whales, and the sea ice varies by year. There are likely other oceanographic factors (winds, currents, upwelling, fronts, etc.) that affect their prey base and that vary by year.

Boundary certainty: 1

Supporting notes for boundary certainty: Boundaries are based only on the radius around the mooring; we do not have much data for areas farther from the moorings.

Months of year designation is applicable: June, July, August, September, October, November

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

# of observations/records: 5 sightings of 6 humpback whales

# of years in which supporting visual data collected: 2010-2019

Supporting information: Non-systematic vessel surveys (DBO 2019, Vate Brattström et al. 2019).

Data not including is one sighting near, but not within the 20 nm radius of, NM1 (Matsuoka et al. 2019).

Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

Acoustic detections/records supporting designation (Y/N): Y

# of observations/records: 1 moored acoustic recorder; ~30% duty cycle, 16 kHz sampling rate. 1 sonobuoy detection

# of years in which supporting acoustic data collected: 2012-2018

Supporting information: Humpback whales were present at Marine Mammal Lab NM1 mooring in the northern Bering Sea in Jun-Nov in every year that data was collected, though the intensity varies by year (AFSC 2021). One sonobuoy detection (Matsuoka et al. 2018).

Data not including is one sonobuoy acoustic detection near, but not within the 20 nm radius of, NM1 (Matsuoka et al. 2019).

Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is based on MML acoustic mooring NM1, with a 20 nm buffer around the mooring. The moorings can typically record calls ~15-20 nm from the mooring depending on oceanographic conditions, how loud the animal is calling, etc. Humpback whales are sighted in dense aggregations along the Chukotka coast and in the southcentral Chukchi Sea; it could be that this watch list area is related to those areas, however there is not sufficient data to determine whether it is or not.

References:

Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

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Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021). Distributed Biological Observatory: https://arcticdata.io, doi:10.18739/A26T0GX06 (accessed Dec 2020).

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: 17 (does not include this watch list area)

Supplementary Description 1. 34. Minke whale feeding area

Species name: Minke whale (*Balaenoptera acutorostrata*)

Stock or population: Alaska

Descriptive name: Aleutian Islands/Bering Sea/Chukchi Sea

BIA type: Feeding Area

BIA label: F-BIA0-d-b1-ABS051-0

Transboundary across: ARC

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: Although minke whales are found throughout the U.S. Bering and Chukchi seas and Aleutian Islands, they are not clustered in a high density area anywhere. This watch list area may be more of a documentation of range than a high density area, which is what the BIAs are supposed to document.
- **Supporting notes for data support score**: Although systematic aerial surveys and acoustic mooring data were collected in the last decade, survey effort in the Bering Sea and Aleutian Islands was scattered spatially and temporally.

Spatiotemporal variability: d

- **Supporting notes for spatiotemporal variability**: Minke whale distribution and density in the Bering Sea is dependent on their prey base; in the Bering Sea, minke whales were positively correlated with pollock, whose distribution likely changes due to oceanographic factors.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: The boundary is uncertain because although this watch list area documents range, areas of particularly high density have not been identified or delineated.

Months of year designation is applicable: July, August, September, October

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: hundreds of sightings of hundreds of minke whales
- **# of years in which supporting visual data collected**: 1999-2019
- **Supporting information**: Line transect vessel surveys in the Bering Sea (Friday et al. 2012, 2013; Matsuoka et al. 2018, 2019): distribution was throughout the Bering Sea shelf and slope, Bristol Bay, and along the Alaska Peninsula coast; habitat baseline modeling indicated minke whales were positively correlated with the biomass of age-1 pollock and were not associated with higher euphausiid biomasses (Zerbini et al. 2016). Line transect vessel surveys along the Aleutian Islands (Matsuoka et al. 2020, Zerbini et al. 2006): minke whales were found mostly west of Unimak Pass. Line transect aerial surveys in the Chukchi Sea (Clarke et al. 2020): distribution ranged from the southern Chukchi to the northeastern Chukchi Sea. Non-systematic vessel surveys in the Bering and Chukchi seas (Clapham et al. 2012, DBO 2019, LeDuc 2004, Vate Brattström et al. 2019): distribution ranged from the Aleutian Islands and Alaska Peninsula to the northeastern Chukchi Sea. Vessel and aerial surveys near oil leases in the northeastern Chukchi Sea documented several minke whales (Aerts et al. 2013, Bisson et al. 2013, Brueggeman 2010, Smultea et al. 2014). Dave Roseneau (USFWS) reported seeing one to three minke whales per year near Cape Lisburne from 1995 to 2009 (pers. comm. to J. Denton, BOEM, 15 October 2010).

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: Minke whale boing sounds detected on a few days on moorings in the northeastern Chukchi Sea, and a few sonobuoy detections in the Bering Sea.
- **# of years in which supporting acoustic data collected**: 2009-2014
- **Supporting information**: DeLarue et al. 2013, Vate Brattström et al. 2019

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon encompasses the systematic and non-systematic sighting and acoustic data in the Chukchi and Bering seas and along the Aleutian Islands. The polygon follows the 1000 m isobath along the Bering Sea slope and Aleutian Islands.

References: Aerts, L.A.M., McFarland, A.E., Watts, B.H., Lomac-MacNair, K.S., Seiser, P.E., Wisdom, S.S., et al. (2013). Marine mammal distribution and abundance in an offshore sub-region of the northeastern Chukchi Sea during the open-water season. Cont. Shelf Res. doi: 10.1016/j.csr.2013.04.020.

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Brueggeman, J. (2010). Marine mammal surveys at the Klondike and Burger survey areas in the Chukchi Sea during the 2009 open water season. Prepared for ConocoPhillips, Inc., Shell Exploration and Production Company, and Statoil USA E&P, Inc.

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Delarue, J., and Martin, B. (2013). Minke whale boing sound detection in the northeastern Chukchi Sea. Mar. Mamm. Sci. 29:3, E333-341. doi: 10.1111/j.1748-7692.2012.00611.x.

Distributed Biological Observatory (DBO) vessel sightings, 2009-2019. (2019). NSF Grant Award #: OPP-1702211. arcticdata.io. doi:10.18739/A26T0GX06.

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Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

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Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Zerbini, A.N., Waite, J.M., Laake, J.L., Wade, P.R. (2006). Abundance, trends and distribution of baleen whales off Western Alaska and the central Aleutian Islands. Deep-Sea Res. Pt. I. 53, 1772-1790. doi:10.1016/j.dsr.2006.08.009.

Zerbini, A.N., Friday, N.A., Palacios, D.M., Waite, J.M., Ressler, P.H., Rone, B.K. et al. (2016). Baleen whale abundance & distribution in relation to environmental variables & prey density in the eastern Bering Sea. Deep Sea Res. Pt. II. 134, 312-320.

Data sources: Aerial Surveys of Arctic Marine Mammals: https://www.fisheries.noaa.gov/alaska/marine-mammal-protection/aerial-surveys-arctic-marine-mammals (accessed Jul 2021). Distributed Biological Observatory: https://arcticdata.io, doi:10.18739/A26T0GX06 (accessed Dec 2020).

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: 0

Supplementary Description 1. 35. North Pacific right whale feeding area

Species name: North Pacific right whale (*Eubalaena japonica*)

Stock or population: Eastern North Pacific

Descriptive name: NPRW Critical Habitat/ M4 Mooring

BIA type: Feeding Area

BIA label: F-BIA3-s-b2-ABS040-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 3 (Intensity: 3, Data support: 2)

- **Supporting notes for intensity score**: The North Pacific right whale (NPRW) population numbers only ~30 individuals and almost all recent sighting and acoustic detections in the Bering Sea have been in this area. The whales are here feeding and there are few other places they have been documented feeding in recent years.
- **Supporting notes for data support score**: There is a fair amount of data for this area for such a small population, and good acoustic mooring data, but the last dedicated NPRW surveys in this area were a decade ago.

Spatiotemporal variability: s

- **Supporting notes for spatiotemporal variability**: Although there can be warm or cold years, which affect eddies and fronts, and nutrient upwelling and prey aggregation mechanisms, the area where NPRWs have been sighted and detected has not seemed to change much.

Boundary certainty: 2

- **Supporting notes for boundary certainty**: Almost all NPRW sightings from recent years have been in this area, though the last dedicated NPRW surveys in this area were a decade ago.

Months of year designation is applicable: January, June, July, August, September, October, November, December

Tagging data supporting designation (Y/N): Y

- **# of tags**: 5 tagged whales
- **# of years in which supporting tagging data collected**: 2004, 2007-2011
- **Supporting information**: 1 tag in 2004; tag lasted 40 days, whale moved throughout a large part of the southeastern Bering Sea shelf (Wade et al. 2006, Zerbini et al. 2015). 1 tag in 2008, 3 in 2009, average duration was 40 days; whales stayed in NPRW Critical Habitat (Clapham et al. 2012, Zerbini et al. 2015).

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: Dedicated right whale vessel & aerial surveys: 102 sightings of 170 right whales (with a high resighting rate during some cruises). Line transect vessel surveys: 9 sightings of 22 right whales. Non-systematic vessel surveys: 4 sightings of 5 right whales.
- **# of years in which supporting visual data collected**: Dedicated right whale vessel & aerial surveys: 1998-2011. Line transect vessel surveys: 1999, 2017-2018. Non-systematic vessel surveys: 2010-2011.
- **Supporting information**: Dedicated right whale vessel & aerial surveys: Clapham et al. 2012, LeDuc et al. 2001, LeDuc 2004, Wade et al. 2006. Line transect vessel surveys: Friday et al. 2012; Matsuoka et al. 2018, 2019. Non-systematic vessel surveys: Vate Brattström et al. 2019.

  Data not included because they are older and the ecosystem may have changed foraging opportunities since then include Shelden and Clapham 2006 and Shelden et al. 2005. Both manuscripts are compilations of historical and current (up to that time) right whale data in the Bering Sea. Also not included are a couple sightings of right whales in 1996 within what became the Critical Habitat (Goddard & Rugh 1998), and is what helped get NPRW research in the Bering Sea started again, and a couple sightings in 1997 and 1999, also in the Critical Habitat (Tynan et al. 2001, 2004).

  Shelden, K.E.W., and Clapham, P.J. (2006). Habitat requirements and extinction risks of eastern North Pacific right whales (AFSC Processed Report No. 2006–06). Seattle, WA: U.S. Department of Commerce.

  Shelden, K.E.W., Moore, S.E., Waite, J.M., Wade, P.R., Rugh, D.J. (2005). Historic and current habitat use by North Pacific right whales Eubalaena japonica in the Bering Sea and Gulf of Alaska. Mamm. Rev. 35, 129-155. doi:10.1111/j.1365-2907.2005.00065.x.

  Goddard, P.D., and Rugh, D.J. (1998). A group of right whales seen in the Bering Sea in July 1996. Mar. Mamm. Sci. 1:2, 344-349.

  Tynan, C.T., DeMaster, D.P., Peterson, W.T. (2001). Endangered right whales on the southeastern Bering Sea shelf. Science 294:5548, 1894. doi:10.1126/science.1065682.

  Tynan, C. (2004). Cetacean populations on the SE Bering Sea shelf during the late 1990s: Implications for decadal changes in ecosystem structure and carbon flow. Mar. Ecol. Prog. Ser. 272, 281-300. doi:10.3354/meps272281.

Acoustic detections/records supporting designation (Y/N): Y

# of observations/records: 3 moored acoustic recorders; ~30% duty cycle, 16 kHz sampling rate. Sonobuoys: hundreds of sonobuoy detections.

# of years in which supporting acoustic data collected: Moored recorder data: 2005-2006 and 2010-2018. Sonobuoy detections: 2002, 2004, 2007-2018

Supporting information: North Pacific right whales were present at Marine Mammal Lab BS3 & M2 (in the NPRW Critical Habitat), and M4 (just north of the Critical Habitat) moorings in Jun-Jan (AFSC 2021, Marques et al. 2011). In addition to the calling at M4 being temporally similar to the Critical Habitat, the bathymetry at M4 is similar to the main area in the Critical Habitat where right whales are feeding. Extending the BIA months from Jun to Jan is based on mooring acoustic data. Sonobuoy data: Clapham et al. 2012; LeDuc 2004; Matsuoka et al. 2018, 2019; Vate Brattström et al. 2019; Wade et al. 2006.

Photo-ID evidence supporting designation (Y/N): Y

# of individuals photographed: 198 right whales photographed, including repeats of the same individuals

# of years of photo records to compare: 1998-2011, 2017

Maximum # of years same individual photographed in area: 20

Supporting information: The number of right whales photographed includes many repeats of the same individuals since this population is only ~30 individuals. Clapham et al. 2012; LeDec et al. 2001; LeDuc 2004; Matsuoka et al. 2018; Wade et al. 2006, 2011

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygon is based on all of the sighting, acoustic mooring and sonobuoy, satellite tag, and photo ID data.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Clapham, P.J., Kennedy, A.S., Rone, B.K., Berchok, C.L., Crance, J.L., Zerbini, A.N. (2012). North Pacific right whales (Eubalaena japonica) in the southeastern Bering Sea (Final Report, OCS Study BOEM 2012-074). Seattle, WA: National Marine Mammal Laboratory, Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration.

Friday, N.A., Waite, J.M., Zerbini, A.N., Moore, S.E. (2012). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf: 1999-2004. Deep-Sea Res. Pt. II. 65-70, 260-272.

LeDuc, R.G., Perryman, W.L., Gilpatrick Jr., J.W., Hyde, J., Stinchcomb, C., Carretta, J.V., et al. (2001). A note on recent surveys for right whales in the southeastern Bering Sea. J. Cet. Res. Manag. Special Issue. 2, 287-289.

LeDuc, R.G. (2004). Report of the results of the 2002 survey for North Pacific right whales (NOAA Tech. Memo. NMFS-SWFSC-357). Washington, DC: National Oceanic and Atmospheric Administration.

Marques, T.A., Munger, L., Thomas, L., Wiggins, S., Hildebrand, .J.A. (2011). Estimating North Pacific right whale Eubalaena japonica density using passive acoustic cue counting. Endanger. Species Res. 13,v163-172. doi:10.3354/esr00325.

Matsuoka, K., Tayor, J., Yoshimura, I., Crance, J., Kasai., H. (2018). Cruise report of the 2017 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/67B/ASI/12.

Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Wade, P., Heide-Jorgensen, M.P., Shelden, K., Barlow, J., Carretta, J., Durban, J., et al. (2006). Acoustic detection and satellite-tracking leads to discovery of rare concentration of endangered North Pacific right whales. Biol. Lett. 2, 417-419.

Wade, P.R., Kennedy, A., LeDuc, R., Barlow, J., Carretta, J., Shelden, K., et al. (2011). The world's smallest whale population? Biol. Lett. 7, 83-85.

Zerbini, A.N., Baungartner, M.F., Kennedy, A.S., Rone, B.K., Wade, P.R., Clapham, P.J. (2015). Space use patterns of the endangered North Pacific right whale Eubalaena japonica in the Bering Sea. Mar. Ecol. Prog. Ser. 532, 269-281. doi: 10.3354/meps11366.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021).

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: 2

Supplementary Description 1. 36. North Pacific right whale feeding area

Species name: North Pacific right whale (*Eubalaena japonica*)

Stock or population: Eastern North Pacific

Descriptive name: BS2 Mooring

BIA type: Feeding Area

BIA label: F-BIA0-e-b1-ABS043-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: The acoustic mooring data indicate North Pacific right whale (NPRW) presence at this mooring in two years out of seven.
- **Supporting notes for data support score**: The data for this watch list area are limited with only one data source.

Spatiotemporal variability: e

- **Supporting notes for spatiotemporal variability**: The temporal presence at the BS2 mooring was high in only two years. This is likely due to oceanographic conditions that affect prey aggregation mechanisms.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Boundary is uncertain because there is only one data source, which is the mooring data and is only one point in space; we do not know how far out from there the right whales may be.

Months of year designation is applicable: July, August, September, October, November

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): N

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 1 moored acoustic recorder; ~30% duty cycle, 16 kHz sampling rate.
- **# of years in which supporting acoustic data collected**: 2012-2018
- **Supporting information**: North Pacific right whales were present at Marine Mammal Lab BS2 mooring in Jul-Nov 2015 and 2016 (AFSC 2021).

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is based on a 20 nm radius around the BS2 mooring. Recorders typically average ~15-20 nm detection range, which is variable depending on oceanographic conditions, how loud the animal is calling, etc.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021).

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: 2 (does not include this watch list area)

Supplementary Description 1. 37. North Pacific right whale feeding area

Species name: North Pacific right whale (*Eubalaena japonica*)

Stock or population: Eastern North Pacific

Descriptive name: Northern Bering BS1 Mooring

BIA type: Feeding Area

BIA label: F-BIA0-e-b1-ABS042-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: The acoustic detections showed a strong North Pacific right whale (NPRW) presence at this mooring (particularly for a population of only 30 animals), but in only one year. There have been no sightings in this area in recent years.
- **Supporting notes for data support score**: The data for this watch list area are limited with only one data source.

Spatiotemporal variability: e

- **Supporting notes for spatiotemporal variability**: Since 2016 was the only year a high density of calling at this mooring was detected, this watch list area is not active every year, likely due to prey availability and whether any individuals of this very small population of whales ventures north from their main habitat in the southeastern Bering Sea.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Boundary is uncertain because there is only one data source, which is the mooring data and is only one point in space; we do not know how far out from there the right whales may be.

Months of year designation is applicable: July, August, September, October, November

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): N

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 1 moored acoustic recorder; ~30% duty cycle, 16 kHz sampling rate.
- **# of years in which supporting acoustic data collected**: 2011-2018
- **Supporting information**: North Pacific right whales were present at Marine Mammal Lab BS1 mooring in Jul-Nov 2016 (AFSC 2021, Wright et al. 2019).

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is based on a 20 nm radius around the BS1 mooring. Recorders typically average ~15-20 nm detection range, which is variable depending on oceanographic conditions, how loud the animal is calling, etc.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Wright, D.L., Berchok, C.L., Crance, J.L., Clapham, P.J. (2019). Acoustic detection of the critically endangered North Pacific right whale in the northern Bering Sea. Mar. Mamm. Sci. 35:1, 311-326.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021).

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: 2 (does not include this watch list area)

Supplementary Description 1. 38. North Pacific right whale migratory route

Species name: North Pacific right whale (*Eubalaena japonica*)

Stock or population: Eastern North Pacific

Descriptive name: Unimak Pass BS4 Mooring

BIA type: Migratory Route

BIA label: M-BIA1-e-b1-ABS041-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 1 (Intensity: 2, Data support: 1)

- **Supporting notes for intensity score**: The acoustic data indicate North Pacific right whale (NPRW) presence at this mooring in some years, which is important for a population of only ~30 individuals. If NPRWs are migrating south during the winter, it is likely they would use this pass as they would likely be coming from/going to their feeding grounds in the Critical Habitat in the southeastern Bering Sea. Unimak Pass is a very narrow corridor (~16 km wide) with pervasive vessel noise, which could mask NPRW calls from detection, and it could also be that more NPRWs are using this pass but are staying quiet while in this area due to the high vessel noise.
- **Supporting notes for data support score**: The data for this BIA are limited with only one data source.

Spatiotemporal variability: e

- **Supporting notes for spatiotemporal variability**: The temporal presence at BS4 was not every year and was not consistent in months of the year.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Boundary is uncertain because there is only one data source, which is the mooring data and is only one point in space; we do not know how far out from there the right whales may be.

Months of year designation is applicable: Year-round

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): N

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: 1 moored acoustic recorder; ~30% duty cycle, 16 kHz sampling rate.
- **# of years in which supporting acoustic data collected**: 2009-2017
- **Supporting information**: North Pacific right whales were present at Marine Mammal Lab BS4 (Unimak Pass) mooring year round, including both during and outside of the assumed migratory period of Dec-Feb and Mar-May (AFSC 2021, Wright et al. 2018).

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygon is based on a 20 nm radius around the BS4 mooring. Recorders typically average ~15-20 nm detection range, which is variable depending on oceanographic conditions, how loud the animal is calling, etc.

References: Alaska Fisheries Science Center. (2021). AFSC/NMML: Acoustics long-term passive monitoring using moored autonomous recorders in the Bering, Chukchi, and Western Beaufort Seas, 2007-2012, https://www.fisheries.noaa.gov/inport/item/17343.

Wright, D.L., Castellote, M., Berchok, C.L., Panirakis, D., Crance, J.L., Clapham, P.J. (2018). Acoustic detection of North Pacific right whales in a high-traffic Alleutian Pass, 2009-2015. Endanger. Species Res. 37, 77-90.

Data sources: Alaska Fisheries Science Center acoustic data: https://www.fisheries.noaa.gov/inport/item/17343 (accessed 21 Jul 2021).

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: 1

Supplementary Description 1. 39. Sperm whale feeding area

Species name: Sperm whale (*Physeter macrocephalus*)

Stock or population: North Pacific

Descriptive name: Aleutian Islands - summer

BIA type: Feeding Area

BIA label: F-BIA3-d-b2-ABS053-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 3 (Intensity: 3, Data support: 2)

Supporting notes for intensity score: High densities of sperm whales have been sighted in the Aleutian Islands in recent years going back to the 2000s, and there are data of high densities of sperm whales using the area prior to 2000 as well. The acoustic data at the Buldir site also documents sperm whales in this area. Historically, cephalopods were an important food in the western Aleutians and Bering Sea, and fish became progressively more important towards the eastern Aleutians, and we assume sperm whales are coming to this area to feed.

Supporting notes for data support score: There were dedicated cetacean surveys for 16 years in the Aleutian Islands that were as recent as 2016, as well as reliable opportunistic sightings going back 20 years, and also acoustic data. But we do not have good data on sperm whale feeding in this area because they feed at great depths, which is very hard to document.

Spatiotemporal variability: d

Supporting notes for spatiotemporal variability: Sperm whale movements have been documented to be nomadic in response to temporal and geographic changes in prey distribution and abundance. Sperm whales have been documented concentrating in oceanographic frontal areas, which can move in space and time, because these frontal areas concentrate nutrients.

Boundary certainty: 2

Supporting notes for boundary certainty: It is clear that sperm whales are using the area around the Aleutian Island chain that they are documented in, but the visual surveys and opportunistic platforms likely did not venture far from the Aleutian chain, and the acoustics can record only what is near the mooring, so it could be that sperm whale density extends beyond the boundary of this BIA.

Months of year designation is applicable: April, May, June, July, August, September

Tagging data supporting designation (Y/N): Y

# of tags: 1

# of years in which supporting tagging data collected: 2015

Supporting information: One male satellite tagged in the western Aleutians; the whale consistently dove to 600-1200 m for 40-60 min, suggestive of feeding behavior (MML unpbl. data, P.Wade pers comm to A.Brower 24 May 2021)

Visual observations/records supporting designation (Y/N): Y

# of observations/records: hundreds of sightings of hundreds of sperm whales

# of years in which supporting visual data collected: 2000-2019

Supporting information: NMFS cetacean systematic vessel surveys with hundreds of sperm whale sightings, only single males in summer doing repetitive deep diving, suggestive of feeding behavior (MML unpbl. data, P.Wade pers comm to A.Brower 24 May 2021). NMFS Platform of Opportunity (POP) database (Boucher & Boaz 1989), only sightings with the highest reliability code of "Sure" were included; BIA months of Apr & May are based on this data. The POP database has data back to 1958, but we used data back to only the year 2000 so that we were using only recent data. Line transect surveys in 2017 & 2018 sighted ~32 sperm whales (Matsuoka et al. 2018, 2019).

Acoustic detections/records supporting designation (Y/N): Y

# of observations/records: moored data: up to 80% of hours per day with sperm whale detections in summer, though 20% was more typical. Tens of sonobuoy acoustic detections

# of years in which supporting acoustic data collected: 2010-2012, 2017-2019

Supporting information: Acoustic moorings in the western Aleutian Islands at Buldir and Kiska Islands, peak calling by males in summer. Line transect cruise with sonobuoy acoustic detections (Matsuoka et al. 2017, 2018, 2019). North Pacific right whale surveys detected a few sperm whales near Unalaska Island and Umnak Pass (Clapham et al. 2012). Non-systematic vessel surveys documented two sperm whale detections (Vate Brattström et al. 2019)

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygon is based on the cetacean vessel surveys in the Aleutian Islands, POP, line-transect vessel surveys, and acoustic data from the Buldir site.

References: Boucher, G.C., and Boaz, C.J. (1989). Documentation for the marine mammal sightings database of the National Marine Mammal Laboratory. Seattle, WA: NOAA Technical Memorandum NMFS F/NWC-159. Springfield, VA: US Department of Commerce, National Oceanic and Atmospheric Administration. 60 p.

Clapham, P.J., Kennedy, A.S., Rone, B.K., Berchok, C.L., Crance, J.L., Zerbini, A.N. (2012). North Pacific right whales (Eubalaena

japonica) in the southeastern Bering Sea (Final Report, OCS Study BOEM 2012-074). Seattle, WA: National Marine Mammal Laboratory, Alaska Fisheries Science Center, National Oceanic and Atmospheric Administration.

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Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

Matsuoka, K., Crance, J., Gilpatrick Jr., J.W., Yoshimura, I., Okoshi. C. (2020). Cruise report of the 2019 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report presented to the Int. Whaling Comm., paper SC/68B/ASI/XX.

Posdaljian, N., Soderstjerna, C., Solsona Berga, A., Hildebrand, J.A., Baumann-Pickering, S. (2021). Sperm whale habitat preference of males and social units in the Gulf of Alaska and Aleutian Islands. Poster presented at the virtual Alaska Marine Science Symposium, 26-28 Jan, 2021. Also presented to the Journal of the Acoustical Society of America 146, 2805 (2019). doi:10.1121/1.5136718.

Soderstjerna, C., Posdaljian, N., Solsona Berga, A., Hildebrand, J.A., Baumann-Pickering, S. (2021). Seasonal trends and demographic patterns of sperm whales at seven passive acoustic monitoring sites in the Gulf of Alaska and Aleutian Islands. Poster presented at the virtual Alaska Marine Science Symposium, 26-28 Jan, 2021.

Vate Brattström, L., Mocklin, J.A., Crance, J.L., Friday, N.A. (2019). Arctic Whale Ecology Study (ARCWEST): Use of the Chukchi Sea by Endangered Baleen and Other Whales (Westward Extension of the BOWFEST). Final Report of the Arctic Whale Ecology Study (ARCWEST), OCS Study BOEM 2018-022. Marine Mammal Laboratory, Alaska Fisheries Science Center, NMFS, NOAA, 7600 Sand Point Way NE, Seattle, WA 98115-6349.

Data sources: MML unpbl. data: cetacean vessel surveys in the Aleutians, Jun-Aug, 2001-2016, NMFS Platform of Opportunity database (accessed May 2021).

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: 3

Supplementary Description 1. 40. Sperm whale feeding area

Species name: Sperm whale (*Physeter macrocephalus*)

Stock or population: North Pacific

Descriptive name: Bering Sea Slope

BIA type: Feeding Area

BIA label: F-BIA1-e-b1-ABS055-0

Transboundary across: None

Hierarchy: Non-hierarchical; single BIA

Importance score: 1 (Intensity: 1, Data support: 2)

Supporting notes for intensity score: From the NMFS Platform of Opportunity (POP) sightings and consistent acoustic detections from the line transect vessel surveys, it appears sperm whales are utilizing the Bering Sea Slope, though there are not a lot of sightings and there are few sightings from dedicated cetacean surveys.

Supporting notes for data support score: The data for this BIA are fairly limited.

Spatiotemporal variability: e

Supporting notes for spatiotemporal variability: There are not sightings or acoustic detections in this BIA every year (though that could be due to limited survey effort in the area), but the sightings do span 2000-2018. Sperm whale movements in the North Pacific have been documented to be nomadic in response to temporal and geographic changes in prey distribution and abundance, which could suggest ephemeral or dynamic.

Boundary certainty: 1

Supporting notes for boundary certainty: Boundary certainty is low because of the limited data support.

Months of year designation is applicable: May, June, July, August, September

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

# of observations/records: ~40 sperm whales sighted

# of years in which supporting visual data collected: 2000-2019

Supporting information: Line transect vessel surveys (Friday et al. 2012; Matsuoka et al. 2018, 2019), dedicated right whale surveys (LeDuc 2004), and NMFS Platform of Opportunity (POP) database (Boucher and Boaz 1989)

Acoustic detections/records supporting designation (Y/N): Y

# of observations/records: ~23 sonobuoy acoustic detections

# of years in which supporting acoustic data collected: 2017-2018

Supporting information: Line transect vessel survey (Matsuoka et al. 2018, 2019)

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The BIA polygon is based on the POP, North Pacific right whale surveys, and line transect vessel survey sightings and acoustic detections. The polygon loosely follows the slope and includes the sightings/detections, which are mostly 100-3000 m deep (one of the sightings and a few of the acoustic detections near it are >3000 m).

References: Boucher, G.C., and Boaz, C.J. (1989). Documentation for the marine mammal sightings database of the National Marine Mammal Laboratory. Seattle, WA: NOAA Technical Memorandum NMFS F/NWC-159. Springfield, VA: US Department of Commerce, National Oceanic and Atmospheric Administration. 60 p.

Friday, N.A., Waite, J.M., Zerbini, A.N., Moore, S.E. (2012). Cetacean distribution and abundance in relation to oceanographic domains on the eastern Bering Sea shelf: 1999-2004. Deep-Sea Res. Pt. II. 65-70, 260-272.

LeDuc, R.G. (2004). Report of the results of the 2002 survey for North Pacific right whales (NOAA Tech. Memo. NMFS-SWFSC-357). Washington, DC: National Oceanic and Atmospheric Administration.

Matsuoka, K., Tayor, J., Yoshimura, I., Crance, J., Kasai., H. (2018). Cruise report of the 2017 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/67B/ASI/12.

Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

Data sources: NMFS Platform of Opportunity database (accessed May 2021).

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: 3

Supplementary Description 1. 41. Sperm whale feeding area

Species name: Sperm whale (*Physeter macrocephalus*)

Stock or population: North Pacific

Descriptive name: Aleutian Basin

BIA type: Feeding Area

BIA label: F-BIA0-?-b1-ABS056-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

Supporting notes for intensity score: The POWER 2018 cruise had sperm whale acoustic detections and a couple sightings in the Aleutian Basin and near Bower's Ridge during their cruise. Since there is such little survey effort or opportunistic platforms traversing this area, these sightings and detections may be important.

Supporting notes for data support score: The data for this watch list area are limited with only one data source.

Spatiotemporal variability: ?

Supporting notes for spatiotemporal variability: Sperm whale movements in the North Pacific have been documented to be nomadic in response to temporal and geographic changes in prey distribution and abundance, which could suggest ephemeral or dynamic. The data for this watch list area comes from only 1 year, so it is difficult to classify this.

Boundary certainty: 1

Supporting notes for boundary certainty: Boundary certainty is low because data came from only one year.

Months of year designation is applicable: August, September

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

# of observations/records: 1 sighting of 2 sperm whales

# of years in which supporting visual data collected: 2018

Supporting information: Line transect cruise (Matsuoka et al. 2019).

Data not included are the NMFS Platform of Opportunity (POP) database (Boucher and Boaz 1989) sightings; there were three that fell within this watch list area, but they were in Jun & Jul (and one was from 1999, which is getting old to be reliable data for a feeding BIA), and this watch list area is for Aug-Sep.

Boucher, G.C., and Boaz, C.J. (1989). Documentation for the marine mammal sightings database of the National Marine Mammal Laboratory. Seattle, WA: NOAA Technical Memorandum NMFS F/NWC-159. Springfield, VA: US Department of Commerce, National Oceanic and Atmospheric Administration. 60 p.

Acoustic detections/records supporting designation (Y/N): Y

# of observations/records: 32 sonobuoy detections

# of years in which supporting acoustic data collected: 2018

Supporting information: Line transect vessel survey (Matsuoka et al. 2019)

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon was drawn loosely incorporating the POWER sighting and acoustic detections in the Aleutian Basin.

References: Matsuoka, K., Tayor, J., Yoshimura, I., Crance, J., Kasai., H. (2018). Cruise report of the 2017 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/67B/ASI/12.

Matsuoka, K., Crance, J., James, A., Yoshimura, I., Kasai, H. (2019). Cruise report of the 2018 IWC-Pacific Ocean Whale and Ecosystem Research (IWC-POWER). Report to the Int. Whaling Comm., paper SC/68A/ASI/04.

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: 3 (does not include this watch list area)

Supplementary Description 1. 42. Sperm whale feeding area

Species name: Sperm whale (*Physeter macrocephalus*)

Stock or population: North Pacific

Descriptive name: Aleutian Islands - winter

BIA type: Feeding Area

BIA label: F-BIA0-?-b1-ABS054-0

Transboundary across: None

Hierarchy: Non-hierarchical; single watch list area

Importance score: 0 (Intensity: 1, Data support: 1)

- **Supporting notes for intensity score**: Because it was assumed that only single males currently occur in the Aleutian Islands, and only in the summer, this female and immature social group sighting and the acoustic detections in winter are noteworthy. Because there are so little data collected in this remote area in winter, these visual and acoustic data suggest this could be an important area for sperm whales in winter, or at least is an area to be watched.
- **Supporting notes for data support score**: The data support consists of only the one sighting and the two winters of acoustic data, but these data are noteworthy because there were likely very few surveys in this area in winter.

Spatiotemporal variability: ?

- **Supporting notes for spatiotemporal variability**: Likely ephemeral or dynamic. During the acoustic social group peak in winter, there was a weak Aleutian low pressure system with some of the coldest recorded water column temperatures. Sperm whale movements in the North Pacific have been documented to be nomadic in response to temporal and geographic changes in prey distribution and abundance.

Boundary certainty: 1

- **Supporting notes for boundary certainty**: Boundary certainty is low because the amount of data support is low, and the moorings indicate whether sperm whales are present in only those specific locations.

Months of year designation is applicable: January, February

Tagging data supporting designation (Y/N): N

Visual observations/records supporting designation (Y/N): Y

- **# of observations/records**: 50 female & immature sperm whales
- **# of years in which supporting visual data collected**: 2008
- **Supporting information**: This was a rare winter sighting of 50 female and immature sperm whales near Koniuji Island in a nutrient-rich productive area with steep associated topography, suggesting suitable habitat for sperm whales. Adult males are regularly sighted in this area in summer. In post-commercial whaling times, typically only adult males are sighted this far north.

Acoustic detections/records supporting designation (Y/N): Y

- **# of observations/records**: Moored data: up to 30% of hours per day with sperm whale detections in winter.
- **# of years in which supporting acoustic data collected**: 2010-2012
- **Supporting information**: Acoustic recordings in western Aleutians at Buldir Island (Aug 2010-Aug 2012) and Kiska Island (Jun-Jul 2010).
  Peak detections of social units in winters (Jan) of 2011 & 2012 (Posdaljian et al. 2021, Soderstjerna et al. 2021).

Photo-ID evidence supporting designation (Y/N): N

Genetic analyses conducted supporting designation (Y/N): N

What factors justify the boundary selection?: The watch list area polygon is based on the sighting at Koniuji Island and the mooring at Buldir Island.

References: Fearnbach, H., Durban, J.W., Mizroch, S.A., Barbeaux, S., Wade, P.R. (2012). Winter observations of a group of female and immature sperm whales in the high-latitude waters near the Aleutian Islands, Alaska. Mar. Biodivers. Records. 5:e13, 1-4. doi:10.1017/S1755267211001047.

Posdaljian, N., Soderstjerna, C., Solsona Berga, A., Hildebrand, J.A., Baumann-Pickering, S. (2021). Sperm whale habitat preference of males and social units in the Gulf of Alaska and Aleutian Islands. Poster presented at the virtual Alaska Marine Science Symposium, 26-28 Jan, 2021. Also presented to the Journal of the Acoustical Society of America 146, 2805 (2019). doi:10.1121/1.5136718.

Soderstjerna, C., Posdaljian, N., Solsona Berga, A., Hildebrand, J.A., Baumann-Pickering, S. (2021). Seasonal trends and demographic patterns of sperm whales at seven passive acoustic monitoring sites in the Gulf of Alaska and Aleutian Islands. Poster presented at the virtual Alaska Marine Science Symposium, 26-28 Jan, 2021.

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: 3 (does not include this watch list area)