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Prepared by:

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UNCLASSIFIED

2021-2022

**Office of Naval Research Arctic Research Activities
Incidental Harassment Authorization
After-Action Report**

February 14, 2023

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Office of Naval Research Arctic Research Activities – Incidental Harassment Authorization After Action Report for 2021-2022

1 INTRODUCTION

The U.S. Navy prepared this After Action Report in compliance with the National Marine Fisheries Service (NMFS) Incidental Harassment Authorization Renewal under the Marine Mammal Protection Act (MMPA) for Office of Naval Research (ONR) Active Research Activities in 2021-2022. The IHA was provided to ONR with a date of September 30, 2021 and covered scientific experiments in the Beaufort Sea from October 5, 2021 through October 4, 2022 (86 Federal Register 54931). That time period is discussed in this report. Two biological opinions were issued by NMFS that are covered by this monitoring report as well (AKRO-2021-01926 issued September 29, 2021; AKRO-2022-00 issued June 17, 2022).

As described in paragraph 6(a) of the 2021-2022 IHA, ONR is required to report the following information to NMFS:

- (1) Acoustic source use;
- (2) Number of shutdowns during monitoring;
- (3) Marine mammal sightings (including the marine mammal's location),
- (4) The number of individuals of each species observed during source deployment and operation; and,
- (5) Marine mammal behavior and distance from the project activities;

This information will be provided in Sections (2)-(4) below. An estimated number of marine mammals taken during the activity was then calculated in Section (5).

Cruises that occurred under this IHA include one by Research Vessel (R/V) Sikuliaq and one by Coast Guard Cutter (CGC) Healy. The R/V Sikuliaq cruise occurred between October 5 and November 3 of 2021, both departing and returning to Nome, Alaska. The CGC Healy cruise occurred between July 27 and August 30 of 2022.

2 Sound Sources Used

The modeled and permitted acoustic sources are listed in Table 1-1 of the 2021-2022 IHA application. The IHA covered October 2021 testing with acoustic sources by the R/V Sikuliaq and an unmanned undersea vehicle (UUV), deployment of seven active acoustic sources to be left in place for one year, the re-activation via satellite of Naval Research Laboratory (NRL) drifting sources previously deployed by aircraft, and the airborne deployment of new NRL drifting sources in the spring of 2022. While all planned *in-situ* testing took place, only three of the planned seven 900 Hertz (Hz) moored acoustic sources were deployed in October 2021 on the R/V Sikuliaq cruise; therefore, only three of the moored sources were active from October through August of the IHA period. The remaining four sources were then deployed in August 2022 on the CGC Healy cruise, and all seven sources were active for the remainder of the IHA period. Due to the need to add an additional cruise aboard the CGC Healy to deploy additional sources, sound associated with icebreaking was modeled prior to the CGC Healy cruise. Prior to the October 2021 cruise, it was determined that there was no scientific need to deploy

any additional NRL drifting sources and that existing batteries were not sufficient to support reactivation of previously deployed drifting sources; therefore, no NRL acoustic sources were active during the IHA period.

3 Individual marine mammal sighting information

No marine mammals were sighted during scientific operations on the Sikuliaq cruise. The R/V Sikuliaq bridge crew also maintained watch for marine mammals during transit to and from the Study Area, and their sightings are reported in Table 1.

Table 1. Marine Mammal Sightings Recorded During R/V Sikuliaq Research Cruise (Non-Ops)

<i>Date</i>	<i>Time (AKDT)</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Number</i>	<i>Species</i>	<i>Notes</i>
8 Oct 2021	16:40	67°12.3' N	168° 23.3' W	1	Unknown whale	In transit northward.
9 Oct 2021	No marine mammal sightings reported					
10 Oct 2021	No marine mammal sightings reported					
11 Oct 2021	No marine mammal sightings reported					
12 Oct 2021	No marine mammal sightings reported					
13 Oct 2021	No marine mammal sightings reported					
14 Oct 2021	No marine mammal sightings reported					
15 Oct 2021	10:06	73° 08.6' N	152° 43.5' W	1	Polar bear	0.25 nm closest approach
16 Oct 2021	No marine mammal sightings reported					
17 Oct 2021	No marine mammal sightings reported					
18 Oct 2021	No marine mammal sightings reported					
19 Oct 2021	No marine mammal sightings reported					
20 Oct 2021	No marine mammal sightings reported					
21 Oct 2021	No marine mammal sightings reported					
22 Oct 2021	No marine mammal sightings reported					
23 Oct 2021	No marine mammal sightings reported					
24 Oct 2021	No marine mammal sightings reported					
25 Oct 2021	No marine mammal sightings reported					
26 Oct 2021	No marine mammal sightings reported					
27 Oct 2021	No marine mammal sightings reported					
28 Oct 2021	No marine mammal sightings reported					
29 Oct 2021	No marine mammal sightings reported					
30 Oct 2021	No marine mammal sightings reported					
31 Oct 2021	No marine mammal sightings reported					
1 Nov 2021	No marine mammal sightings reported					
2 Nov 2021	12:35	66° 36.5' N	168° 00.8' W	2	Humpback whale	
2 Nov 2021	16:36	66° 15.2' N	168° 01.7' W	6	Unknown whale	
2 Nov 2021	17:01	66° 12.3' N	168° 05.7' W	6	Humpback whale	At least one of the six ID'd as a humpback
3 Nov 2021	No marine mammal sightings reported					

The AMOS mission on CGC Healy was a science of opportunity project in conjunction with CGC Healy patrol duties and icebreaking trials. ONR's mission was to recover elements of the moored array deployed in 2021 from R/V Sikuliaq, deploy the remaining four moored sources (to reach a total of seven), deploy an experimental very low frequency (VLF) source mooring, deploy an Ice Gateway Buoy Heavy (IGBH), deploy a REMUS R600 AUV, and deploy Seagliders to operate within the moored array and around the IGBH. Marine mammal monitoring logs have been separated by transit/underway (Table 2), transit through critical habitat areas (Table 3), and during scientific operations (Tables 4 and 5). Upon further inspection, some marine mammal sightings reported in Table 2 (underway, non-ops) occurred within designated critical habitat. These sightings have been denoted as such.

Table 2. Marine Mammal Sightings Recorded During CGC Healy Cruise (Underway, Non-Ops)

<i>Date</i>	<i>Time (AKDT)</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Type</i>	<i>Species</i>	<i>Number</i>	<i>Behavior/Action</i>
27 Jul 2022 ¹	1554	59°47.6' N	149°26.1' W	Whale	UNK	1	Swimming
27 Jul 2022 ¹	1724	59°33.4' N	149°23.1' W	Whale	Humpback	3	Swimming
27 Jul 2022	1942	59°11.1' N	149°27.4' W	Porpoise	UNK	7	Jumping
28 Jul 2022	0718	57°15.2' N	150°15.4' W	Porpoise	UNK	5	Swimming
28 Jul 2022	0726	57°13.3' N	150°20.3' W	Whale	Minke	1	Dead ²
28 Jul 2022	1459	56°15.8' N	150°46.5' W	Whale	Sperm	1	Swimming
28 Jul 2022	1536	56°10.8' N	152°59.2' W	Whale	UNK	1	Swimming
29 Jul 2022 ³	1646	54°05.6' N	161°23.8' W	Dolphin	UNK	4	Swimming
29 Jul 2022 ^{1,3}	1959	54°08.6' N	162°39.1' W	Whale	Humpback	5	Swimming
29 Jul 2022 ^{1,3}	2027	54°09.4' N	162°49.2' W	Porpoise	UNK	3	Swimming
29 Jul 2022 ³	2156	54°12.4' N	163°23.0' W	Whale	UNK	1	Swimming
29 Jul 2022 ³	2214	54°12.9' N	163°29.8' W	Whale	UNK	1	Swimming
29 Jul 2022 ³	2219	54°13.1' N	163°31.6' W	Whale	UNK	1	Swimming
29 Jul 2022 ³	2243	54°13.9' N	163°40.6' W	Whale	UNK	1	Swimming
29 Jul 2022 ³	2308	54°14.7' N	163°49.9' W	Whale	UNK	1	Swimming
30 Jul 2022 ³	1053	55°39.9' N	167°20.9' W	Dolphin	UNK	2	Swimming
30 Jul 2022	1259	55°59.0' N	167°59.2' W	Whale	UNK	1	Swimming
30 Jul 2022	1451	56°24.5' N	168°02.4' W	Other	Steller Sea Lion	3	Resting on Kelp
30 Jul 2022	1605	56°41.5' N	168°03.8' W	Seal	UNK	1	Swimming
30 Jul 2022	2213	58°07.7' N	168°11.1' W	Seal	UNK	1	Swimming
30 Jul 2022	2253	58°17.0' N	168°11.9' W	Whale	UNK	1	Swimming
30 Jul 2022	2328	58°26.1' N	168°12.7' W	Seal	UNK	1	Swimming
31 Jul 2022	No marine mammal sightings recorded						
1 Aug 2022	1625	67°25.9' N	168°21.5' W	Seal	UNK	1	Deceased ²
2 Aug 2022	1519 ⁴	71°35.8' N	161°39.3' W	Walrus	Pacific	1	Swimming
2 Aug 2022	1519 ⁴	71°37.0' N	161°40.3' W	Walrus	Pacific	25	Resting/Logging
2 Aug 2022	1600	71°40.9' N	161°16.0' W	Walrus	Pacific	1	Swimming
2 Aug 2022	1608	71°14.6' N	160°56.7' W	Walrus	Pacific	12	Swimming
2 Aug 2022	1628	71°43.5' N	160°56.7' W	Walrus	Pacific	15	Swimming
2 Aug 2022	1646	71°45.2' N	160°45.2' W	Walrus	Pacific	4	Swimming
2 Aug 2022	1657	71°46.3' N	160°37.8' W	Walrus	Pacific	7	Swimming
2 Aug 2022	1730	71°50.5' N	160°18.5' W	Walrus	Pacific	6	Swimming
2 Aug 2022	1743	71°52.3' N	160°10.1' W	Walrus	Pacific	11	Resting/Logging
2 Aug 2022	1756	71°54.1' N	160°03.0' W	Whale	Bowhead	3	Swimming
2 Aug 2022	1818	71°56.8' N	159°52.8' W	Walrus	Pacific	7	Resting/Logging

Date	Time (AKDT)	Latitude	Longitude	Type	Species	Number	Behavior/Action
2 Aug 2022	1831	71°58.4' N	159°58.4' W	Walrus	Pacific	12	Resting/Logging
2 Aug 2022	1832	71°58.6' N	159°46.2' W	Walrus	Pacific	1	Swimming
2 Aug 2022	1843	71°59.8' N	159°41.3' W	Walrus	Pacific	20	Resting/Logging
2 Aug 2022	1914	71°03.2' N	159°26.6' W	Walrus	Pacific	1	Swimming
3 Aug 2022	0410	72°38.3' N	156°06.3' W	Polar Bear	Polar Bear	3	Walking
3 Aug 2022	0954	72°53.1' N	154°16.6' W	Polar Bear	Polar Bear	1	Walking
3 Aug 2022	1240	73°00.6' N	153°09.7' W	Walrus	Pacific	2	Swimming
3 Aug 2022	1940	73°12.7' N	151°27.5' W	Seal	UNK	1	Swimming
3 Aug 2022	2255	73°20.0' N	150°23.1' W	Seal	UNK	1	Resting/Logging
4 Aug 2022	0732	73°30.0' N	148°52.5' W	Seal	Ringed	1	Hauled out
4 Aug 2022	0936	73°34.5' N	148°20.0' W	Seal	Spotted	1	Swimming
5 Aug 2022	1330	73°33.7' N	143°47.2' W	Seal	Harp	1	Hauled out
6 Aug 2022	0056	73°30.4' N	143°02.6' W	Seal	UNK	1	Resting/Logging
6 Aug 2022	1538	74°18.4' N	143°36.1' W	Seal	UNK	2	Hauled out
7 Aug 2022	No marine mammal sightings recorded						
8 Aug 2022	No marine mammal sightings recorded						
9 Aug 2022	1726	77°30.2' N	139°56.7' W	Seal	UNK	1	Swimming
10 Aug 2022	No marine mammal sightings recorded						
11 Aug 2022	0300	76°24.1' N	142°26.2' W	Seal	UNK	1	Swimming
11 Aug 2022	1930	75°56.8' N	143°17.3' W	Seal	Ringed	1	Resting/Logging
12 Aug 2022	No marine mammal sightings recorded						
13 Aug 2022	1914	75°36.0' N	141°17.2' W	Seal	Ringed	1	Hauled out
14 Aug 2022	2009	75°28.2' N	144°00.6' W	Seal	Ringed	1	Hauled out
15 Aug 2022	No marine mammal sightings recorded						
16 Aug 2022	1941	74°04.2' N	141°58.9' W	Seal	UNK	1	Swimming
17 Aug 2022	0936	75°52.6' N	143°06.8' W	Seal	Spotted	1	Swimming
18 Aug 2022	No marine mammal sightings recorded						
19 Aug 2022	No marine mammal sightings recorded						
20 Aug 2022	1052	74°37.3' N	134°52.2' W	Polar Bear	Polar Bear	1	Walking
20 Aug 2022	1225	74°37.2' N	134°43.3' W	Polar Bear	Polar Bear	1	Walking
21 Aug 2022	No marine mammal sightings recorded						
22 Aug 2022	No marine mammal sightings recorded						
23 Aug 2023	No marine mammal sightings recorded						
24 Aug 2022	1851	75°42.6' N	145°58.8' W	Polar Bear	Polar Bear	1	Walking
25 Aug 2022	No marine mammal sightings recorded						
26 Aug 2022	1138	72°27.0' N	157°39.3' W	Seal	Bearded	1	Swimming
26 Aug 2022	1150	72°24.3' N	157°43.8' W	Seal	Bearded	1	Swimming
26 Aug 2022	1445	71°57.2' N	159°07.7' W	Walrus	Pacific	2	Hauled out
26 Aug 2022	1455	71°55.5' N	159°12.7' W	Walrus	Pacific	10	Hauled out
26 Aug 2022	1516	71°51.6' N	159°24.4' W	Walrus	Pacific	15+	Swimming
26 Aug 2022	1534	71°48.2' N	159°34.9' W	Seal	Bearded	1	Swimming
26 Aug 2022	1546	71°46.0' N	159°41.6' W	Seal	Bearded	1	Swimming
26 Aug 2022	1607	71°41.9' N	159°53.9' W	Walrus	Pacific	5	Swimming

<i>Date</i>	<i>Time (AKDT)</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Type</i>	<i>Species</i>	<i>Number</i>	<i>Behavior/Action</i>
26 Aug 2022	1613	71°40.5' N	159°57.8' W	Walrus	Pacific	4	Swimming
26 Aug 2022	1716	71°28.2' N	160°34.5' W	Walrus	Pacific	1	Swimming
26 Aug 2022	1815	71°15.7' N	161°11.1' W	Seal	Spotted	1	Swimming
26 Aug 2022	1819	71°14.4' N	161°15.2' W	Whale	Bowhead	1	Fluking
26 Aug 2022	1820	71°14.4' N	161°15.2' W	Whale	Bowhead	2	Swimming
26 Aug 2022	1828	71°12.4' N	161°20.6' W	Whale	Bowhead	2	Swimming
26 Aug 2022	1927	71°00.4' N	161°55.6' W	Walrus	Pacific	3	Swimming
27 Aug 2022	No marine mammal sightings recorded						
28 Aug 2022	0742	65°01.2' N	170°00.7' W	Whale	UNK	1	Swimming
28 Aug 2022	0802	64°57.9' N	170°08.0' W	Whale	Minke	1	Swimming
28 Aug 2022	1620	63°40.6' N	172°56.4' W	Whale	Minke	20+	Swimming
28 Aug 2022	1803	63°24.1' N	173°31.4' W	Dolphin	Orca	10+	Swimming
28 Aug 2022	1818	63°24.1' N	173°31.4' W	Whale	Minke	2	Swimming
29 Aug 2022	No marine mammal sightings recorded						
30 Aug 2022 ^{1,3}	1744	54°00.8' N	166°29.0' W	Whale	UNK	6	Swimming
30 Aug 2022 ^{1,3}	1816	53°57.0' N	166°29.1' W	Whale	UNK	2	Swimming
30 Aug 2022 ³	1818	53°26.3' N	166°29.1' W	Whale	UNK	2	Swimming

Note: UNK=unknown

¹ This sighting occurred in critical habitat designated for Steller sea lions.

² Dead marine mammals were reported to NMFS per CGC Healy standard operating procedures.

³ This sighting occurred in critical habitat designated for humpback whales.

⁴ Potential that one of these times has been misrecorded since the latitude and longitudes do not align.

Table 3. Marine Mammal Sightings Recorded Inside Designated Critical Habitat During CGC Healy Cruise (Underway, Non-Ops)

<i>Date</i>	<i>Time (AKDT)</i>	<i>Designated Critical Habitat</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Beaufort Wind Force (0-12)</i>	<i>Visibility (nm)</i>	<i>Species</i>	<i>Number</i>	<i>Closest Range</i>	<i>Behavior/ Action</i>
27 Jul 2022	1720	Steller sea lion	59°34.26' N	149°23.06' W	4	12	Humpback whale	4	2 nm	Blowing
29 Jul 2022	1715	Humpback whale	54°05.95' N	161°34.54' W	4	5	Porpoise (UNK)	10	300 yd	Swimming
29 Jul 2022	2000	Steller sea lion, Humpback whale	54°08.57' N	162°38.96' W	4	5	Humpback whale	4	1 nm	Breaching, tail slapping
29 Jul 2022	2021	Steller sea lion, Humpback whale	54°09.27' N	162°46.99' W	4	5	Sea lion	1	200 yd	Startled(?), swam away
29 Jul 2022	2155	Humpback whale	54°12.35' N	163°22.25' W	4	5	Whale (UNK)	1	2 nm	
29 Jul 2022	2217	Humpback whale	54°13.07' N	163°30.57' W	4	5	Whale (UNK)	3	2 nm	
29 Jul 2022	2240	Humpback whale	54°13.82' N	163°39.21' W	4	5	Humpback whale	3	1 nm	Swimming
29 Jul 2022	2245	Humpback whale	54°13.99' N	163°41.08' W	4	5	Whale (UNK) ¹	1-3	4 nm	
29 Jul 2022	2320	Humpback whale	54°15.11' N	163°54.03' W	4	5	Whale (UNK) ¹	1	500 yd	
30 Jul 2022	1025	Humpback whale	55°35.62' N	167°12.14' W	4	10	Porpoise (UNK)	5	2 nm	Swimming
30 Jul 2022	1130	North Pacific right whale	55°45.37' N	167°31.61' W	4	10	Whale (UNK)	1	100 yd	Swimming away from ship
30 Aug 2022	1730	Steller sea lion, Humpback whale	54°05.53' N	166°35.21' W	5	5	Whale (UNK)	4-6	2 nm	Swimming

<i>Date</i>	<i>Time (AKDT)</i>	<i>Designated Critical Habitat</i>	<i>Latitude</i>	<i>Longitude</i>	<i>Beaufort Wind Force (0-12)</i>	<i>Visibility (nm)</i>	<i>Species</i>	<i>Number</i>	<i>Closest Range</i>	<i>Behavior/ Action</i>
30 Aug 2022	1820	Steller sea lion, Humpback whale	53°58.62' N	166°28.32' W	4	5	Humpback whale	3	500 yd	Swimming ²

Note: nm= nautical mile(s); UNK= unknown; yd= yard(s)

¹ Whales were identified as potentially being humpback whales, but monitor was unsure.

² CGC Healy stopped in order to allow whales to cross in front of the bow

Table 4. Activity Log for Science Operations on CGC Healy

Activity/ Description	Date	Time (AKDT)		Position		Ice Cover (%)	Beaufort Wind Force (0-12)	Visibility (nm)	Glare (%)	Marine Mammals Present?
		Start	Stop	Latitude	Longitude					
Icebreaking	03 Aug 2022	1809	1834	73°11.467' N	151°36.152' W	9	3	2	0	No
Icebreaking	04 Aug 2022	0103	0110	73°23.116' N	149°58.243' W	90	4	2	0	No
Icebreaking	04 Aug 2022	0845	0852	73°32.222' N	148°34.091' W	90	2	3	0	No
AMOS-SSW Mooring Recovery ¹	04 Aug 2022	1652	2359	73°47.7' N	146°08.6' W	80	4	10	0	No
AMOS-SSW Mooring Recovery ¹	05 Aug 2022	0000	0606	73°47.7' N	146°08.6' W	80	4	10	0	No
Icebreaking	05 Aug 2022	1352	1359	73°33.1' N	143°42.7' W	90	4	10	0	No
Icebreaking	05 Aug 2022	1510	1519	73°31.3' N	143°25.7' W	90	4	10	0	No
AMOS-SSE Mooring Recovery ¹	05 Aug 2022	1800	2359	73°27.3' N	142°46.0' W	90	3	10	0	No
AMOS-SSE Mooring Recovery ¹	06 Aug 2022	0000	0006	73°27.3' N	142°46.0' W	90	3	10	0	No
Icebreaking	06 Aug 2022	0408	0414	73°45.767' N	143°28.783' W	90	3	10	0	No
AMOS-A Mooring Recovery	06 Aug 2022	0730	1240	74°06.332' N	143°45.561' W	90	3	1	1	No
Icebreaking	06 Aug 2022	1436	1512	74°16.714' N	143°40.518' W	90	4	1	0	No
Icebreaking	07 Aug 2022	0954	1200	75°47.0' N	143°19.0' W	90	6	5	0	No
AMOS-C Mooring Recovery	08 Aug 2022	0654	1935	76°08.8' N	142°59.0' W	70	5	8	0	No
AMOS-VLF-1 Mooring Deployment	09 Aug 2022	1825	2157	77°29.608' N	140°10.771' W	90	3	1	0	No
Icebreaking	10 Aug 2022	0942	1109	76°51.546' N	141°36.844' W	80	3	5	0	No
AMOS-C Mooring Deployment	10 Aug 2022	1643	2116	76°24.787' N	142°28.169' W	90	4	6	3	No
CTD Cast	10 Aug 2022	2206	2224	76°24.653' N	142°19.010' W	80	4	2	0	No
CTD Cast ¹	10 Aug 2022	2250	2359	76°24.503' N	142°17.341' W	70	3	2	0	No
REMUS Deployment	10 Aug 2022	2310	2336	76°24.406' N	142°16.251' W	90	2	3	0	No
CTD Cast ¹	11 Aug 2022	0000	0023	76°24.503' N	142°17.341' W	70	3	2	0	No
AMOS-NW Mooring Recovery	11 Aug 2022	1043	1422	76°08.760' N	145°16.984' W	40	2	3	0	No

Activity/ Description	Date	Time (AKDT)		Position		Ice Cover (%)	Beaufort Wind Force (0-12)	Visibility (nm)	Glare (%)	Marine Mammals Present?
		Start	Stop	Latitude	Longitude					
AMOS-NE Mooring Recovery	12 Aug 2022	0826	1052	75°46.4' N	141°30.8' W	80	3	5	3	No
AMOS-B Mooring Recovery	14 Aug 2022	1507	1716	75°30.023' N	144°08.446' W	70	2	5	0	No
IGB-H Deployment	15 Aug 2022	1357	2024	75°04.688' N	141°37.531' W	50	2	5	0	No
Icebreaking	16 Aug 2022	0630	0948	75°04.7' N	141°45.3' W	80	1	8	0	No
REMUS Deployment	16 Aug 2022	0948	2003	75°04.7' N	141°45.3' W	80	1	8	0	Yes ² (Seal)
AMOS-SE Mooring Deployment	17 Aug 2022	0832	1045	74°52.5' N	143°05.2' W	70	3	10	10	Yes ² (Seal)
AMOS-SW Mooring Deployment	17 Aug 2022	2104	2310	75°13.0' N	146°40.6' W	70	3	8	10	No
AMOS-A Mooring Deployment	18 Aug 2022	0942	1305	74°35.347' N	145°32.692' W	40	4	5	0	No
Icebreaking	19 Aug 2022	0251	0303	75°00' N	142°27' W	70	2	10	0	No
CTD Cast	19 Aug 2022	0840	1052	74°59' N	142°24' W	50	2	5	0	No
CTD Cast	19 Aug 2022	1100	1348	75°00' N	142°25' W	0	2	5	0	No
Icebreaking	20 Aug 2022	1000	1015	74°37.972' N	135°09.957' W	90	2	10	0	No
Icebreaking	20 Aug 2022	1156	1225	74°37.2' N	143°43.3' W	100	2	6	0	Yes ²
Icebreaking	20 Aug 2022	1305	1310	74°37.455' N	134°51.947' W	100	2	5	0	No
Icebreaking	20 Aug 2022	1425	1437	73°36.8' N	134°44.397' W	100	1	5	0	No
Glider Deployment	21 Aug 2022	1304	1307	74°44.055' N	142°12.123' W	50	5	8	0	No
CTD Cast	22 Aug 2022	0805	1054	74°36.457' N	145°29.841' W	50	4	1	0	No
Glider Deployment	22 Aug 2022	1056	1101	74°36.457' N	145°29.841' W	50	4	1	0	No
CTD Cast	22 Aug 2022	1428	1646	74°49.426' N	145°09.195' W	40	2	0	0	No
CTD Cast	22 Aug 2022	1954	2201	75°0.3169' N	144°47.272' W	60	2	1	0	No
CTD Cast	23 Aug 2022	0235	0505	75°18.022' N	144°25.055' W	80	2	0	0	No
CTD Cast	23 Aug 2022	0735	1015	75°31.434' N	144°00.126' W	70	3	2	0	No
CTD Cast	23 Aug 2022	1312	1521	75°44.583' N	143°36.324' W	50	1	10	10	No
CTD Cast	23 Aug 2022	1816	2035	75°58.491' N	143°13.725' W	80	3	10	10	No
CTD Cast	24 Aug 2022	0516	0750	76°26.811' N	142°23.130' W	70	4	10	0	No
Glider Deployment	25 Aug 2022	0912	0922	74°46.9' N	149°51.2' W	40	1	1	0	No

¹ Activity spanned more than one day. Time spent on activity includes a line item per calendar day.

² Additional information on marine mammal observation can be found in Table 5.

Table 5. Marine Mammal Sightings During Science Operations on CGC Healy

Activity/ Description	Date	Time (AKDT)	Position		Sighting				Behavioral Reactions	Initial		Closest		Final	
			Latitude	Longitude	Species	Num.	Age	Sex		Range	Bearing	Range	Bearing	Range	Bearing
REMUS Deployment	16 Aug 2022	1941 ¹	74°04.2' N	141°58.9' W	Seal	1	UNK	UNK	Swimming, SW direction	150 yd	010R	125 yd	015R	N/A	N/A
AMOS-SE Mooring Deployment	17 Aug 2022	0936 ¹	75°52.6' N	143°06.8' W	Spotted seal	1	UNK	UNK	Swimming, SE direction	50 yd	030R	50 yd	030R	150 yd	030R
Icebreaking	20 Aug 2022	1215 ²	74°36.1' N	134°50.1' W	Polar bear	1	UNK	UNK	Walking, NE direction	2 NM	286	2 NM	286	5 NM	218

Note: NM= nautical mile(s); UNK= unknown; yd= yard(s)

¹ Mitigation measure taken was stopping experiment.

² Mitigation measure taken was for CGC Healy to alter course.

4 Mitigation Shutdown

Two mitigation shutdowns occurred during science operations. Both shutdowns were for seals; additional information about sightings can be found in Table 5. One shutdown was during REMUS deployment, and the other during AMOS-SE mooring deployment.

5 Take Estimate

No dead or injured animals were observed during the R/V Sikuliaq cruise, and two were observed during the CGC Healy cruise but were reported to NMFS per Healy standard operating procedures. No take of marine mammal was observed during the retrievals.

The authorized Level B take from the 2021-2022 IHA was:

- Beluga Whale (Beaufort Sea Stock): 375
- Beluga whale (Eastern Chukchi Sea stock): 125
- Ringed Seal: 6,050

The relevant estimate of take comes from:

- Seven ONR Fixed Navigation sources that continued to transmit from October 2021 to October 2022;
- REMUS glider deployments; and
- Three NRL drifting buoys from October 2021 through December 2021, and then five additional NRL drifting buoys active from March 2022 through August 2022.

Unlike previous IHA periods, no icebreaking was planned and therefore not modeled.

While all planned *in-situ* testing took place during the fall 2021 cruise, only three of the planned seven leave-behind sources were actually deployed due to unfavorable ice conditions. The remaining four were deployed during August 2022. Plans for reactivating and deploying new NRL sources were abandoned, as it had been determined that scientific objectives had already been met. Due to the addition of the CGC Healy cruise to deploy additional sources, icebreaking was modeled to determine if it could be accommodated into the previous take estimate. During this remodel, it was determined that Level B takes associated with acoustic transmissions would equal:

- Beluga whale (Beaufort Sea stock): 170 Level B takes
- Beluga whale (Eastern Chukchi Sea stock): 56 Level B takes
- Ringed seal: 2,599 Level B takes

Because acoustic sources were deployed and used as remodeled, these Level B take estimates are considered realistic.

Eight days of icebreaking were modeled, assuming a total of 4 hours of active icebreaking would occur per day. Icebreaking takes were modeled to equal:

- Beluga whale (Beaufort Sea stock): 16 Level B takes
- Beluga whale (Eastern Chukchi Sea stock): 5 Level B takes
- Ringed seal: 539 Level B takes

Based on activity logs presented in Table 5, icebreaking occurred over nine days instead of eight, but the total time of in situ icebreaking did not reach the total modeled time (i.e., 32 hours of active icebreaking). Just over 17 hours of active icebreaking occurred between 3 August 2022 and 20 August 2022, or 53 percent of the total modeled time. By that calculation, estimated take from icebreaking would be:

- Beluga whale (Beaufort Sea stock): $16 * 0.53 = 8$ Level B takes
- Beluga whale (Eastern Chukchi Sea stock): $5 * 0.53 = 3$ Level B takes
- Ringed seal: $539 * 0.53 = 286$ Level B takes

Based on the analysis above, the Navy estimates that the Level B take of marine mammals associated with Arctic Research Activities is significantly less than the requested take. **The total number of animals estimated to have been taken by the Proposed Action is:**

- Beluga whale (Beaufort Sea stock): 178 Level B takes
- Beluga whale (Eastern Chukchi Sea stock): 59 Level B takes
- Ringed seal: 2,885 Level B takes

6 Conclusion

As described above, the Arctic Research Activities in situ were not directly aligned with the action described in the request for IHA. No NRL sources were used during the IHA period, and not all modeled acoustic sources were deployed and active for the entire duration of the IHA period (as had been requested). All marine mammal sightings on the R/V Sikuliaq and CGC Healy were recorded, as were two mitigation shutdowns that occurred during science operations. Based on calculations in Section 5, the Navy estimates that the Level B take of marine mammals associated with the Arctic Research Activities during the IHA period is less than the requested number of takes.