

**DRAFT**

**Environmental Assessment/Overseas Environmental Assessment  
for Ice Exercise 2026**



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# Draft ENVIRONMENTAL ASSESSMENT/OVERSEAS ENVIRONMENTAL ASSESSMENT

## ICE EXERCISE 2026

### Abstract

**Lead Agency:** United States Department of the Navy  
**Cooperating Agency:** National Marine Fisheries Service  
**Title of Proposed Action:** Ice Exercise Program  
**Designation:** Environmental Assessment

The United States (U.S.) Department of the Navy (Navy) prepared this Draft Environmental Assessment (EA)/Overseas Environmental Assessment (OEA) in compliance with the National Environmental Policy Act and Executive Order 12114.

This Draft EA/OEA evaluates the potential effects to the environment from an Ice Exercise (ICEX) in 2026. The need for the Proposed Action is to prepare forces capable of extended operations and warfighting in the Arctic, in accordance with section 8062 of title 10, U.S. Code, and to support the aims of the Arctic Research and Policy Act (15 U.S.C. Section 4101 *et seq.*). The purpose of the Navy's Proposed Action is to conduct realistic training and testing in an Arctic environment, and if resources are available, to gather data on environmental conditions and technology suitability in an Arctic environment. This Draft EA/OEA evaluates two alternatives: the No Action Alternative and the Proposed Action.

In this Draft EA/OEA, the Navy analyzed potential effects to the environment that could result from the No Action Alternative or the Proposed Action. The only resources evaluated were marine mammals because all other resources were fully analyzed in the February 2022 Environmental Assessment/Overseas Environmental Assessment for the Ice Exercise Program (2022 Programmatic EA/OEA), as supplemented by the January 2024 Supplemental Environmental Assessment/Overseas Environmental Assessment for Ice Exercise 2024 (2024 Supplemental EA/OEA). This Draft EA/OEA is tiered from the 2022 Programmatic EA/OEA and 2024 Supplemental EA/OEA. The Navy has evaluated the analysis and underlying assumptions in the 2022 Programmatic EA/OEA and determined that reliance on the analysis remains valid, and that the activities analyzed in the 2022 Programmatic EA/OEA are still relevant to the Proposed Action. The 2022 Programmatic EA/OEA and 2024 Supplemental EA/OEA are available at <https://www.nepa.navy.mil/icex/>.

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## Executive Summary

### ES.1 PROPOSED ACTION

The United States (U.S.) Department of the Navy (Navy) proposes to conduct an Ice Exercise in 2026 under the Navy's Ice Exercise (ICEX) Program. A 2022 Programmatic EA/OEA analyzed the Navy's Ice Exercise (ICEX) Program, and specifically the Navy's program to conduct biennial exercises in the Arctic involving submarine training and testing activities and, as time and resources permit, scientific research involving. Each ICEX includes the construction of a tracking range and temporary camp on an ice floe to support the submarine training and testing. The Study Area for the 2026 ICEX (hereinafter as ICEX26) remains the same as described in the 2022 Programmatic EA/OEA, including the deep Arctic Ocean basin near the North Pole (Figure 2-1).

The purpose of the Ice Exercise Program is to evaluate the employment and tactics of submarine operability in Arctic conditions. In addition to the primary purpose of the Ice Exercise Program, military and academic institutions collaterally benefit from the use of the ice camp to test new systems and conduct data collection and research in and about the Arctic environment.

The purpose of the Proposed Action remains as described in the 2022 Programmatic EA/OEA; specifically, to conduct realistic training and testing in an Arctic environment, and if resources are available, to gather data on environmental conditions and technology suitability in an Arctic environment. ICEX26 would be conducted in a manner similar to the activities analyzed in the 2022 Programmatic EA/OEA, including conducting torpedo training exercises. This Draft EA/OEA includes an updated literature review of the available science to support analysis of the environmental impacts of ICEX26.

### ES.2 ALTERNATIVES

For this Draft EA/OEA, two alternatives were analyzed: the No Action Alternative and the Proposed Action.

### ES.3 ENVIRONMENTAL CONSEQUENCES

The only environmental stressor analyzed in this EA/OEA is noise, and specifically the potential effects of acoustic transmissions on marine mammals. All other stressors remain as considered in the 2022 Programmatic EA/OEA, there are no significant updates in the scientific literature that would warrant reevaluating environmental impacts from these stressors, and the analysis and conclusions remain the same. Additionally, all other physical, biological, and socioeconomic resources were analyzed in the 2022 Programmatic EA/OEA and that analysis remains valid. The results of that analysis indicate that, with the implementation of standard operating procedures and mitigation measures, the Proposed Action would not significantly affect the natural and physical environment.

Under section 7 of the Endangered Species Act (ESA), the U.S. Navy requested informal consultation with the U.S. Fish and Wildlife Service (USFWS) for the polar bear (*Ursus maritimus*). The Navy requested formal consultation with the National Marine Fisheries Service (NMFS) under section 7 of the ESA for the ringed seal (*Phoca hispida*), based on the Navy's conclusion that acoustic transmissions associated with the Proposed Action are likely to adversely affect ringed seals. In accordance with the Marine Mammal Protection Act (MMPA), an application to NMFS for an Incidental Harassment Authorization (IHA) was prepared for the harassment of ringed seals incidental to active acoustic transmissions. The Navy has submitted an IHA application to USFWS under the MMPA for the harassment of polar bears incidental to

on-ice vehicle noise, aircraft, and human presence, and requested an intentional take permit (for the active deterrence of polar bears) under the MMPA. Additionally, the Navy has submitted an Incidental Take Regulation (ITR) application to USFWS under the MMPA for the incidental take of polar bears from on-ice vehicle noise, aircraft, and human presence for future ICEX events (years 2027 through 2034). The Navy previously completed consultation with NMFS under the Magnuson-Stevens Fishery Conservation and Management Act in conjunction with a prior ICEX in 2016. NMFS determined that the Proposed Action would not likely affect essential fish habitat and did not provide conservation recommendations. Since that time, the Navy has determined that reinitiation of consultation for future ICEX activities was not required. The Navy has again concluded that reinitiation of consultation under the Magnuson-Stevens Fishery Conservation and Management Act is not required for ICEX26 because the Proposed Action will not affect essential fish habitat. Finally, the Navy received a National Pollutant Discharge Elimination System permit from the Environmental Protection Agency for the discharge of graywater and reverse osmosis reject water from the ice camp into the Beaufort Sea for ICEX in 2022, which is in effect until December 31, 2026, well after ICEX26 is expected to conclude. The permit is available at <https://www.epa.gov/npdes-permits/npdes-permit-us-navy-arctic-ice-camp-alaska>.

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## Acronyms and Abbreviations

AINJ	Auditory Injury
CBS	Chukchi/Bering Seas
cm	centimeter(s)
dB	decibel(s)
EA	Environmental Assessment
EO	Executive Order
ESA	Endangered Species Act
FR	Federal Register
ft	foot/feet
gal	gallon(s)
Hz	Hertz
ICEX	Ice Exercise
ICEX22	Ice Exercise occurring in year 2022
ICEX26	Ice Exercise occurring in year 2026
IHA	Incidental Harassment Authorization
in	inch(es)
km	kilometer(s)
km <sup>2</sup>	square kilometer(s)
kHz	Kilohertz
L	liter(s)
m	meter(s)
mi	mile(s)
mi <sup>2</sup>	square mile(s)
MMPA	Marine Mammal Protection Act
Navy	United States Department of the Navy
NEPA	National Environmental Policy Act
NM	nautical miles
NMFS	National Marine Fisheries Service
OBIS	Ocean Biodiversity Information System
OEA	Overseas Environmental Assessment
PTS	Permanent Threshold Shift
re 1 $\mu$ Pa	referenced to 1 micropascal
re 1 $\mu$ Pa <sup>2</sup> s	referenced to 1 micropascal squared second
SEAMAP	Spatial Ecological Analysis of Megavertebrate Populations
SBS	Southern Beaufort Sea
SEL	Sound Exposure Level
TTS	Temporary Threshold Shift
U.S.	United States
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service

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# 1 Purpose and Need

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## 1.1 Introduction

The United States (U.S.) Department of the Navy (Navy) has maintained a presence in the Arctic region for decades. Navy experience in the Arctic includes Admiral Byrd’s historic overflight of the North Pole in 1926; various campaigns in World War II; consistent activity during the Cold War; and modern combined exercises with surface, subsurface, aviation, and expeditionary forces. While the Arctic is not unfamiliar for the Navy, expanded capabilities and capacity are needed for the Navy to increase its engagement in this region. Melting polar ice is increasing the importance of military readiness in the Arctic.

In 2020, Arctic sea ice reached its second smallest yearly extent in recorded history, breaking the previous record set in 2007 (Meier et al. 2024). This type of physical change in the Arctic is unprecedented in both the rate and scope of change. As a result, commercial shipping, resource development, research, tourism, environmental interests, and military focus in the region have reached new levels of activity. Because of these changes, the Navy’s strategic blueprint for the Arctic titled *A Blue Arctic* (a document that provides direction to the Navy to enhance the Navy’s ability to operate in the Arctic region) describes “how the Department will apply naval power as we continue to prepare for a more navigable Arctic Region over the next two decades” (Gilday et al. 2021).

Ice Exercises (ICEXs) are typically conducted every two years in the waters north of Alaska. ICEXs are conducted to allow for the continued training of submarine forces in the Arctic and to refine and validate procedures and required equipment (hereafter referred to as “training and testing”). Torpedo exercises are incorporated into ICEXs every four years. Additionally, military and academic institutions collaborate with the Navy during each ICEX to further their research objectives of better understanding the Arctic environment and the suitability and survivability of particular technologies in that environment.

The Navy prepared this Environmental Assessment (EA)/Overseas Environmental Assessment (OEA) to analyze the potential effects from a proposed 2026 ICEX (hereinafter ICEX26) on the environment in compliance with the National Environmental Policy Act (NEPA) and Executive Order (EO) 12114. This EA/OEA also supports the Navy’s applications to the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) for one-year Incidental Harassment Authorizations (IHA). This EA/OEA further supports the Navy’s request to USFWS for an Incidental Take Regulation (ITR) under the MMPA for future ICEXs (years 2027 through 2034). Once issued, an IHA and ITR will allow the unintentional take by harassment of marine mammals incidental to the training and testing activities within the Study Area.

## 1.2 Purpose and Need

The primary purpose of the Proposed Action is to conduct realistic training and testing in an Arctic environment in 2026 to evaluate the employment and tactics of submarine operability in Arctic conditions. The overall purpose has not changed since the Ice Exercise Program was fully analyzed in the 2022 Environmental Assessment/Overseas Environmental Assessment for the Ice Exercise Program (2022 Programmatic EA/OEA) (U.S. Department of the Navy 2021). Secondly, the Proposed Action would test emerging technologies and assess capabilities in the Arctic and gather data on Arctic environmental conditions. The need for the Proposed Action is to prepare forces capable of extended operations and warfighting in the Arctic in accordance with section 8062 of title 10, U.S. Code.

NMFS' purpose is to evaluate the Navy's Proposed Action pursuant to NMFS' authority under the MMPA, and to make a determination whether to issue an IHA, including any conditions or mitigation measures along with monitoring and reporting requirements needed to meet the statutory requirements of the MMPA. To authorize the incidental take of marine mammals, NMFS evaluates the best available scientific information to determine whether the anticipated incidental take would have a negligible effect on the affected marine mammal species or stocks and an unmitigable effect on their availability for taking for subsistence uses. NMFS must also prescribe permissible methods of taking, other "means of effecting the least practicable adverse impact" on the affected species or stocks and their habitat, and monitoring and reporting requirements. NMFS cannot issue an IHA unless it can make the required findings. The need for NMFS' proposed action is to consider the effects of the Navy's activities on marine mammals and meet NMFS' obligations under the MMPA. This EA/OEA analyzes the environmental effects associated with the issuance of the requested authorization for the take of marine mammals incidental to training and testing activities (i.e., active acoustic transmissions) within the Study Area. This EA/OEA also evaluates the practicability and efficacy of potential mitigation measures for active acoustic transmissions to reduce effects on marine mammal species or stocks and their habitat. This evaluation of mitigation measures will be used to support requirements pertaining to mitigation, monitoring, and reporting that will be specified in an IHA, if issued.

### **1.3 Applicable Laws and Directives**

Laws and directives applicable to ICEx26 are listed below but described in full detail in the 2022 Programmatic EA/OEA. Applicable laws and directives include:

- National Environmental Policy Act
- Executive Order 12114
- Arctic Research and Policy Act
- Clean Water Act
- Endangered Species Act
- Marine Mammal Protection Act
- Magnuson-Stevens Fishery Conservation and Management Act
- Migratory Bird Treaty Act

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## 2 Proposed Action and Alternatives

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The activities analyzed in this EA/OEA are largely a continuation of activities that were analyzed previously in the 2022 Programmatic EA/OEA. This EA/OEA includes any changes to activities that produce active acoustic transmissions previously analyzed, and it reflects the most up-to-date compilation of training and testing activities deemed necessary to accomplish military readiness requirements.

### 2.1 Proposed Action

The Navy's Proposed Action is to conduct submarine training and testing activities, which includes the establishment of a tracking range and temporary ice camp, and if resources are available scientific research in an Arctic environment as part of ICEX26. The objective of the Proposed Action is to evaluate the employment and tactics of submarine operability in Arctic conditions. The Navy's Proposed Action also would evaluate emerging technologies and assess capabilities in the Arctic environment and gather data on Arctic environmental conditions. NMFS' proposed action is to issue one-year IHAs pursuant to the MMPA to authorize the non-intentional harassment of marine mammal species and stocks incidental to the Navy's activities, if all required findings and determinations can be made. NMFS' proposed action will be a direct outcome of responding to the Navy's request for an incidental take authorization pursuant to the MMPA. The vast majority of submarine training and testing would occur near the ice camp; however, some submarine training and testing may occur throughout the deep Arctic Ocean basin near the North Pole, within the ICEX Study Area (Figure 2-1). Though the Study Area is large, the area where the proposed ice camp would be located is a much smaller area (see "Ice Camp Study Area" in Figure 2-1).

Though the configuration of equipment and/or the types of equipment used as part of the Proposed Action may deviate in minor ways from what was analyzed in the 2022 Programmatic EA/OEA, the general activities would remain the same, including the use of exercise torpedoes.

The Proposed Action, including the construction and demobilization of the ice camp, would occur over approximately a six-week period from February through April (considered winter through early spring). The submarine training and testing and the research activities would occur over approximately four weeks during the six-week period. The camp should be fully functional within five days after initial flights to drop off equipment.

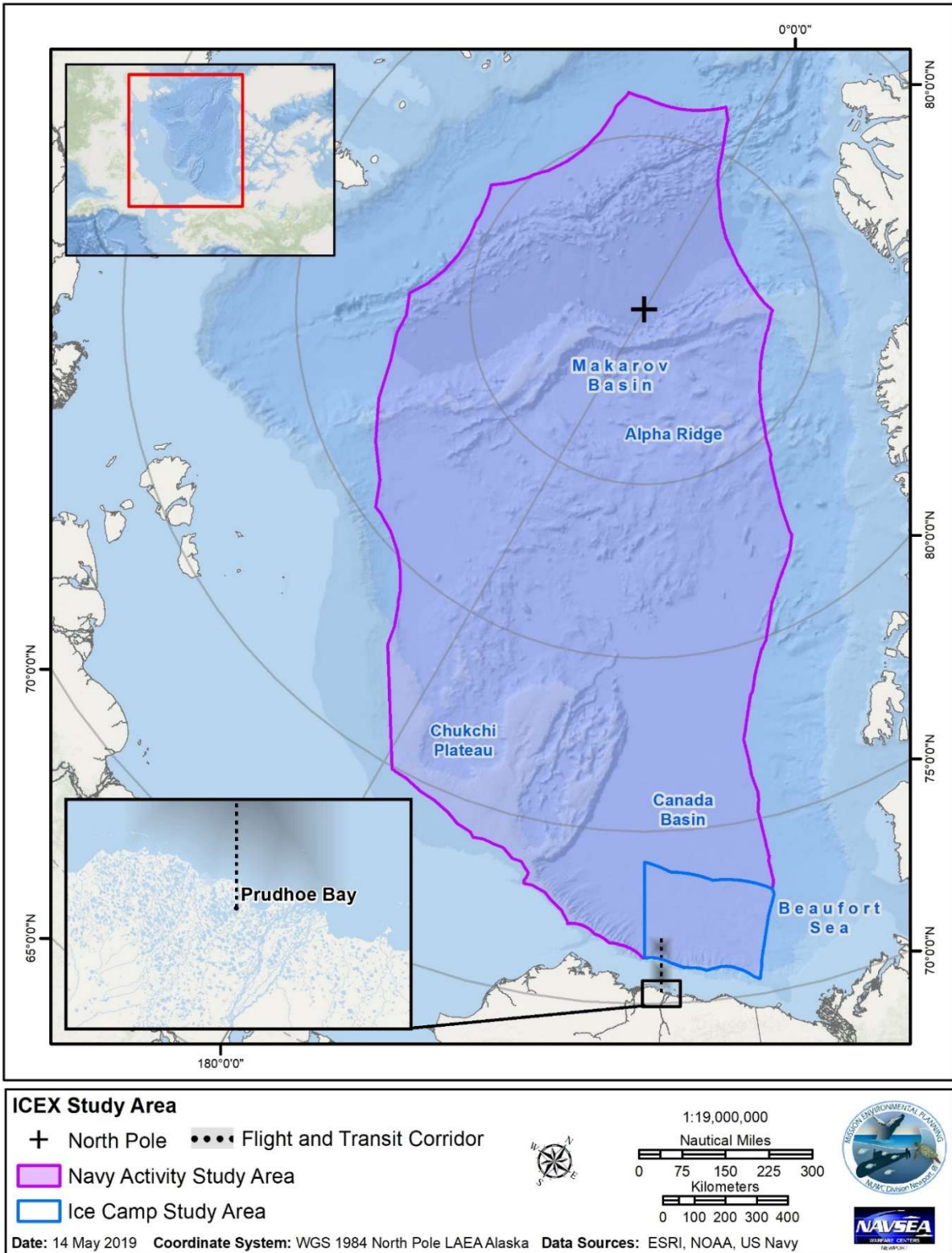


Figure 2-1. ICEX Study Area

### 2.1.1 Ice Camp

For the purposes of this EA/OEA, the ice camp would operate in the same manner as was described in the 2022 Programmatic EA/OEA. An ice camp would be constructed, used, and demobilized. The ice camp would consist of a command hut, dining tent, sleeping quarters, an outhouse, a powerhouse, two runways (a primary runway and a back-up runway for use in case of emergency), and a helipad (Figure 2-2). The number of structures/tents would range from 15 to 20, and structures typically would be 7 to 20 feet (ft; 2 to 6 meters [m]) by 20 to 33 ft (6 to 10 m) in size. Some tents may be octagon shaped and approximately 20 ft (6 m) in diameter. Berthing tents would contain collapsible bunk beds, a heating unit, and a circulation fan. The completed ice camp, including runway, would be approximately 1 mile (mi; 1.6 kilometers [km]) in diameter. Support equipment for the ice camp includes snowmobiles, snow blowers, gas powered augers and saws (for boring holes through the ice), two reverse osmosis water purification units, and diesel generators.



**Figure 2-2. Example Ice Camp**

Aircraft would be used to transport personnel and equipment from the ice camp to Prudhoe Bay; up to nine round trips would occur daily during ice camp build-up and demobilization. All ice camp materials, fuel, and food would be transported from Prudhoe Bay, Alaska, and delivered by either airdrop from military transport aircraft (e.g., C-17 and CH-47) or arrive via small twin-engine aircraft and military and commercial helicopters at the ice camp runway. At the completion of ICEX, the ice camp would be demobilized, and all personnel and materials would be removed from the ice floe. All materials, such as shelters, solid waste, hazardous waste, and sanitary waste, that were removed from the ice would be disposed of in accordance with applicable laws and regulations.

A portable tracking range for submarine training and testing would be installed in the vicinity of the ice camp during the Proposed Action; hydrophones would be deployed on the ice and extend to approximately 98 ft (30 m) below the ice. Hydrophones would be approximately 4.65 inches (in; 11.8 centimeters [cm]) in length and have 2,000 ft (610 m) of associated cables. The associated cable would be Kevlar reinforced with a long-life polyurethane jacket for durability. The hydrophones would

be deployed by drilling/melting holes in the ice and lowering the cable down into the water column. Hydrophones would be linked remotely to the command hut. Additionally, tracking pingers would be configured aboard each submarine to continuously monitor the location of the submarines. Acoustic communications with the submarines would be used to coordinate the training and research schedule with the submarines; an underwater telephone would be used as a backup to the acoustic communications. Recovery of the hydrophones is planned; however, if emergency demobilization is required or the hydrophones are frozen in place and are unrecoverable, they would be left in place. Additionally, hydrophones for research purposes could be deployed up to 1,641 ft (500 m) below the ice and would be recovered if possible.

Freshwater would only be made available in the camp's dining facility. This water would be available for limited food preparation, dishwashing, and human consumption. Additionally, a hygiene station would be available at the ice camp for hand washing. The hygiene station would be located in the dining facility and consist of a gravity fed container that would provide water for hand sanitizing and/or face washing if needed. The hygiene station would utilize the same drain as the kitchen sink for gray water discharge. Graywater would only be discharged during camp operation and not during construction of the ice camp. No shower facilities would be available at the camp.

Dishwashing and a hygiene station would use biodegradable, chlorine-, and phosphate-free detergent that meets the Environmental Protection Agency's Safer Choice standards (U.S. Environmental Protection Agency 2015). Prior to use, dishwashing water would be heated using an on-demand propane water heater. Wastewater generated during food preparation and dishwashing would be discharged to the Beaufort Sea via a single drain in the camp's dining facility. The drain would consist of a corrugated pipe, wrapped in electric heat tape to prevent the pipe from freezing, which would be placed through a hole drilled/melted into the ice. The drain would utilize a removable metal screen to capture solid debris (i.e., food particles) in the wastewater prior to discharge. The metal screen would have a mesh size of no greater than 0.06 in (0.16 cm). Solids captured in the screen would be disposed of via the camp's solid waste containers and brought back to Prudhoe Bay, Alaska, for disposal. Freeze-dried, camping style meals would be the primary form of meals, supplemented with fresh fruit, energy bars, etc. The camp would have an average discharge rate of 100 gallons (gal) per day (379 liters (L) per day), with a maximum discharge rate of 155 gal per day (587 L per day) during the two weeks of peak camp operations. The estimated total discharge from the ice camp's dining facility is 2,925 gal (11,072 L).

Most freshwater for drinking and meal preparation would be produced by reverse osmosis through desalination. However, the camp also may utilize mining and melting of multi-year ice. The operation of a reverse osmosis system results in "reject water," or water that is of higher salinity (approximately three times the salinity) than the initial seawater input. This reject water would be discharged at the camp via a single drain (corrugated pipe placed through a hole in the ice). Reject water discharge would only occur during camp operation and would not occur during construction of the ice camp. The average reject water production is expected to be 144 gal per day (545 L per day). This amount is based on the unit not being operated continuously due to downtime associated with system maintenance and adjustments for flow rate. The maximum reject water production would be approximately 600 gal per day (2,271 L per day). The extreme conditions of the ice camp would influence both the system's efficiency and ability to operate, which is why the output from the system would be variable. Assuming continuous operation (24 hours per day) for the four weeks of camp operations (excluding a week each for construction and demobilization), a maximum total discharge of reject water from the ice camp would be 8,064 gal (30,526 L).

Sanitary/human waste generated at the camp would be collected in zero-discharge sanitary facilities (e.g., individual waste collection plastic bags), which would then be containerized and flown back to Prudhoe Bay, Alaska, for disposal at appropriate facilities.

In addition to the main ice camp, two smaller, adjacent berthing areas are proposed for ICEX. These areas (used for expeditionary forces) would leverage the facilities provided by the main camp (e.g., sanitary facilities) while verifying these groups could function independently if necessary. All materials from these adjacent areas would be removed from the ice upon completion of the activities.

### **2.1.2 Prudhoe Bay**

During the Proposed Action, flights to and from Prudhoe Bay would utilize Deadhorse Airport, a public airport. Up to nine round trips could occur daily in addition to the usual flight traffic that occurs at the airport (average of 60 flights per day). All flights would leave from Deadhorse Airport and fly directly to the ice camp. The flight and transit corridor are shown in Figure 2-1. The flight corridor is approximately 25 mi (40 km) wide and is the most direct route to the camp. Additionally, exercise torpedoes (i.e., non-explosive) that are retrieved from the water column following submarine training and testing would then be transported to and processed at Prudhoe Bay. Exercise torpedoes would then be prepared for transport in accordance with existing Navy policies. -

An average of 6 to 12 personnel would stay at the local lodging facilities during the duration of the ICEX. Since the personnel would be staying in commercial lodging facilities, they would be supported by the existing communities' infrastructure and would not require any additional resources. The community is accustomed to supporting transient-type communities and handling influxes of groups, such as oil and gas employees. The additional transient personnel would have impacts consistent with what the city is accustomed to handle.

### **2.1.3 Submarine Training and Testing**

Submarine activities associated with the Proposed Action are classified, but they generally entail safety maneuvers, active sonar use, and exercise torpedo use. These maneuvers and sonar use are similar to submarine activities conducted in other undersea environments. These maneuvers and sonar use would be conducted in the Arctic to test their performance in a cold environment. Details on the activities conducted by the participating submarines can be provided to authorized personnel upon request. Submarine launched torpedo exercises are conducted every other ICEX (i.e., every four years) and are planned to occur during ICEX26. Torpedo exercises involve underwater active acoustic transmissions, and exercise torpedoes are non-explosive. Classified descriptions of submarine training and testing activities, including torpedoes and torpedo firings, planned for ICEX26 can be provided to authorized individuals upon request. Submarine training and testing involve active acoustic transmissions.

### **2.1.4 Research Activities**

Personnel and equipment proficiency testing and multiple research and development activities would be conducted (Table 2-1). Each type of activity scheduled for ICEX26 has been reviewed and placed into one of the general categories of actions (Table 2-1); these categories of actions are analyzed herein or were analyzed in the 2022 Programmatic EA/OEA and remain unchanged. Due to the uncertainty of extreme cold, some scheduled activities may not be able to be conducted. All researcher personnel traveling to the ice camp would be berthed at the established ice camp facilities.

**Table 2-1. Summary of ICEX26 Activities**

<b>Activity Type</b>	<b>Category of Activity</b>	<b>Project/Equipment</b>	<b>Description</b>
Submarine Training and Testing	Logistics	Ice Camp Operations	A camp is constructed, and an associated underwater tracking range is deployed to support submarine training and testing.
	Submarine Training and Testing	Submarine Training and Testing	Submarines conduct various training and testing events.
Research Activities	On-ice Data Collection/Equipment Testing	Sensors	Deployment or use of sensors to collect environmental data (e.g. wind speed, temperatures, sea ice properties).
		Lasers	Use of eye-safe lasers to collect data on above ground ice properties.
	In-ice Data Collection	Sensors	Deployment of sensors to capture ice properties (e.g., vibrations indicative of seismic events).
	In-water Data Collection/Equipment Testing	Sensors/Devices equipped with sensors	Deployment of various devices (e.g., buoys, Argos floats, sensor nodes) to collect measurements on water properties (e.g., salinity, temperature, pressure).
		Unmanned Underwater Vehicles	Deployment of unmanned underwater vehicles (e.g., measure ocean properties, sample under-ice, test communication).
		Acoustics/Communication	Various communication systems and/or acoustic sources deployed under the ice, or in the water column, to determine system signal recognition capabilities.
	Personnel/Equipment Proficiency	Training and Support	Personnel conduct various activities in extreme cold, including, but not limited to, combat casualty care protocols, equipment recovery, expeditionary ice diving operations, expeditionary camp construction operations support/maintenance, infiltration, special operations, and exfiltration.
	Unmanned Aerial System Testing and Data Collection	Fixed-wing	Fixed-wing UAS launched by hand or by pneumatic catapult. Fixed-wing systems may have up to 15 ft (4.6-m) wingspan and up to a 6.5 hour endurance.
		Rotary-wing	Rotary-wing UAS (“quadcopters”) used individually or simultaneously (e.g., test software, collect data on ice properties, use to retrieve sensors). Rotary-wing systems are approximately 20 in (51 cm) square and fly at speeds up to 30 knots.

cm = centimeter; ft = feet; in = inches; m = meters; UAS = unmanned aerial systems

## 2.2 Platform Descriptions

Typical platforms used for ice camp logistics and those necessary to support proposed research activities include on-ice vehicles (e.g., snowmobiles, unmanned on-ice vehicles), aircraft (e.g., fixed-wing, rotary-wing, unmanned aerial systems), and passive devices. Although details on some specific systems are provided as examples, the Navy analyzed general categories of platforms for their potential effects to the environment. Although specific systems may vary, the general categories of platforms – on-ice vehicles, aircraft, and passive scientific devices – are unchanged from those analyzed in the 2022 Programmatic EA/OEA. Therefore, platform descriptions are not repeated herein. However, new active acoustic devices have been proposed for ICEX26, and these devices are described below (Section 2.2).

### 2.2.1 Scientific Active Acoustic Devices

Details regarding most of the active acoustic devices associated with ICEX26 are classified. One unmanned underwater vehicle (i.e., Seaglider) would be deployed under the ice to test the communication and range of the vehicle and to conduct under-ice and in-water column sampling. Several other acoustic sources (i.e., echosounder, transducers) would be deployed under the ice, or in the water column, to determine systems’ signal recognition capabilities. Acoustic parameters for these active sources are in Table 2-2.

**Table 2-2. Parameters for Scientific Devices with Active Acoustics**

<i>Research Institution</i>	<i>Source Name</i>	<i>Frequency Range (kHz)</i>	<i>Source Level<sup>1</sup> (dB)</i>	<i>Pulse Length</i>	<i>Source Type</i>
University of Washington Applied Physics Laboratory	Seaglider	10	185	1 sec	Unmanned Underwater Vehicle
Naval Postgraduate School	Echosounder <sup>2</sup>	38 to 200	221	0.5 ms	Sonar
Massachusetts Institute of Technology Lincoln Lab	Echosounder <sup>2</sup>	0.05 to 9	180	TBD	Sonar
Massachusetts Institute of Technology Lincoln Lab	SimRad Combi	38/200	219/227	TBD	Transducer

dB = decibels; kHz = kilohertz; ms = millisecond(s); sec = second; TBD = to be determined

<sup>1</sup>Source level is defined as the power radiated by something that creates sound (i.e., sound source) for a specific direction. Source level does not depend on the distance from the source and does not depend on the attributes of the environment surrounding the source (DOSITS 2025).

<sup>2</sup>Echosounders are a type of sonar. Echosounders have transducers that send sound pulses (sonar signals) into the water. The signal is reflected, and the transducer receives the returning echo (DOSITS 2021).

## 2.3 Alternatives

For the purposes of this EA/OEA, only two alternatives are addressed: a No Action Alternative and the Proposed Action.

### 2.3.1 No Action Alternative

Under the No Action Alternative, the Navy would not conduct ICEX26, NMFS would not issue IHAs, and USFWS would not promulgate an ITR. The No Action Alternative does not meet the purpose of and need for the Proposed Action but is carried forward for comparative purposes.

### **2.3.2 Proposed Action**

Under the Proposed Action, the Navy would conduct ICEX 26 in accordance with the Ice Exercise Program and the exercise would include the submarine training and testing activities described in Section 2.1. The ice camp would be established approximately 100 to 200 nautical miles (NM) north of Prudhoe Bay, Alaska in the same study area defined in the 2022 Programmatic EA/OEA; the exact location cannot be identified in advance, as many of the required conditions (e.g., ice cover) cannot be forecasted until shortly before the exercises are expected to commence. The vast majority of submarine training and testing would occur near the ice camp; however, some submarine training and testing may occur throughout the deep Arctic Ocean basin near the North Pole, within the Study Area (Figure 2-1). Though the Study Area is large, the area where the proposed ice camp would be located is a much smaller area (Figure 2-1). Prior to the set-up of the ice camp, reconnaissance flights would be conducted to locate suitable ice conditions required for the location of the ice camp. The reconnaissance flights would occur over an area of approximately 27,172 square miles (mi<sup>2</sup>; 70,374 square kilometers [km<sup>2</sup>]); the actual ice camp would be no more than 1 mi (1.6 km) in diameter, approximately 0.8 mi<sup>2</sup> (2 km<sup>2</sup>) in area.

The Proposed Action would occur over an approximately six-week period from February to early April 2026, including construction and demobilization of the ice camp. The submarine training and testing would occur over approximately four weeks during the six-week period. The Proposed Action would include torpedo exercises in the vicinity of the ice camp with support at Prudhoe Bay.

### **2.3.3 NMFS Action Alternative**

Under the NMFS Action Alternative, NMFS would grant one-year IHAs to the Navy for the incidental, not intentional, harassment of marine mammal species or stocks caused by the Navy's ICEX26 activities, provided that all findings and required determinations could be made. NMFS received an application on May 19, 2025 for an IHA for the harassment of marine mammals (ringed seals [*Phoca hispida*]) incidental to training and testing activities (i.e., active acoustic transmissions) occurring over a six-week period in 2026.

### **2.3.4 Alternatives Eliminated from Further Consideration**

Other action alternatives were considered but eliminated from further consideration in the 2022 Programmatic EA/OEA. These alternatives are not reconsidered here.

## **2.4 Resource Analysis**

As part of the process to determine the potential effect from the Proposed Action, the Navy identified potential resources and issues to be analyzed. In this EA/OEA, only mammals are discussed (Table 2-3). Table 2-4 lists the resources eliminated from further analysis and provides an explanation for their dismissal. Resources were eliminated from further analysis if they are not applicable due to geographic location or seasonality of ICEX26 events, or if the resource was analyzed in the 2022 Programmatic EA/OEA and anticipated effects remain unchanged.

**Table 2-3. Relevant Resources and Potential Effects of the Proposed Action**

<i>Resource</i>	<i>Potential Stressors</i>
<b>Biological Environment</b>	
Marine Mammals	Acoustic transmissions, aircraft noise, on-ice vehicle noise, on-ice vehicle strike, in-water vessel and vehicle strike, human presence, entanglement, and ingestion have the potential to affect marine mammals. All stressors other than acoustic transmissions (ringed seal [ <i>Phoca hispida</i> ]) and effects of on-ice vehicles, aircraft, and human presence (polar bears [ <i>Ursus maritimus</i> ]) were analyzed in the 2022 Programmatic EA/OEA, and the potential for effects remains unchanged from that analysis.

EA = Environmental Assessment; OEA = Overseas Environmental Assessment

**Table 2-4. Resources Not Included In Analysis**

<i>Resource</i>	<i>Reason for Elimination</i>
<b>Physical Environment</b>	
Air Quality and Greenhouse Gases	Analyzed in the 2022 Programmatic EA/OEA. No new analysis required as the action has not significantly changed, the potential for effects remains unchanged, and there is no significant new science to consider.
Airspace	The majority of the Proposed Action would occur in the water or on the ice surface. Aircraft would depart from Deadhorse Airport in Prudhoe Bay, but with a maximum of nine flights per day at the height of the exercise, the Proposed Action would not have an effect to airspace use. All flights would be coordinated with the airport and would not create undue congestion of airspace. Low flying aircraft may be used for a portion of the training and testing, but they would not interfere with regular public airspace usage given that the offshore location is not a frequently used flight corridor. Therefore, the Proposed Action would not affect use of airspace.
Floodplains and Wetlands	The Proposed Action would occur in open water and would not affect the physical attributes of floodplains or wetlands. Therefore, the Proposed Action would not affect floodplains or wetlands.
Geology	No construction or dredging is planned as part of the Proposed Action. Therefore, the Proposed Action would not affect geological resources.
Land Use	The Proposed Action would occur offshore of Prudhoe Bay, Alaska on ice-covered water, not on land. Therefore, the Proposed Action would not affect land use.
Sea Ice	Analyzed in the 2022 Programmatic EA/OEA. No new analysis required as the action has not significantly changed, the potential for effects remains unchanged, and there is no significant new science to consider.
Terrestrial Environment	The Proposed Action would occur offshore, except for aircraft flights from Deadhorse Airport, in Prudhoe Bay. Because the Proposed Action would take place during the winter and early spring, no terrestrial biological resources would be present within the Deadhorse Airport, in Prudhoe Bay. Therefore, the Proposed Action would not affect the terrestrial environment, including parks, forests, and prime and unique farmland.
Water Quality	Analyzed in the 2022 Programmatic EA/OEA. No new analysis required as the action has not significantly changed, the potential for effects remains unchanged, and there is no significant new science to consider. The NPDES permit is valid until midnight, December 31, 2026, and therefore would cover ICEX26
Wild and Scenic Rivers	The Proposed Action would occur on or in ocean waters. Therefore, the Proposed Action would not affect wild and scenic rivers.

<b>Resource</b>	<b>Reason for Elimination</b>
<b>Biological Environment</b>	
Essential Fish Habitat	Analyzed in the 2022 Programmatic EA/OEA. No new analysis required as the action has not significantly changed, the potential for effects remains unchanged, and there is no significant new science to consider.
Fish	Analyzed in the 2022 Programmatic EA/OEA. No new analysis required as the action has not significantly changed, the potential for effects remains unchanged, and there is no significant new science to consider.
Invasive Species	No invasive species would be introduced into the area because research equipment is brought up to the ice camp dry and clean. Additionally, the harsh environmental conditions and freezing cold would likely kill exposed organisms during shipping.
Invertebrates	Analyzed in the 2022 Programmatic EA/OEA. No new analysis required as the action has not significantly changed, the potential for effects remains unchanged, and there is no significant new science to consider.
Marine Birds	Analyzed in the 2022 Programmatic EA/OEA. No new analysis required as the action has not significantly changed, the potential for effects remains unchanged, and there is no significant new science to consider.
Marine Vegetation	Marine vegetation is present within the Study Area; however, because of the limited amount of human presence and minimal chance for interaction with marine vegetation due to the ice camp being above the ice, there would be no effect on marine vegetation.
Deep Sea Corals and Coral Reefs	No deep-sea corals or coral reefs are present in the Study Area. Therefore, no effect would occur to these species.
Sea Turtles	No sea turtles would be present in the Study Area. Therefore, no effect would occur to these species.
Terrestrial Wildlife	With the exception of the Arctic fox ( <i>Vulpes lagopus</i> ), no other terrestrial wildlife is anticipated to occur at the ice camp. Therefore, no effect would occur to these species. Effects on the Arctic fox were analyzed in the 2022 Programmatic EA/OEA, and no new analysis is required as the action has not significantly changed, the potential for effects remains unchanged, and there is no significant new science to consider.
<b>Socioeconomic Environment</b>	
Aesthetics	Aircraft movements out of Deadhorse Airport, in Prudhoe Bay, would be consistent with the typical flights coming in and out of the airport. Vessel movements would be at least 100 to 150 nautical miles from shore and would be under the ice in the Study Area. Therefore, the Proposed Action would not affect aesthetics.
Archaeological and Historical Resources	No known archaeological or historical resources are located within the Study Area. Therefore, the Proposed Action would not affect archaeological and historical resources.
Commercial and Recreational Fisheries	There are no commercial or recreational fisheries in or near the Study Area. Therefore, the Proposed Action would not affect commercial and recreational fisheries.
Commercial Shipping and Transportation	Although there is a shipping lane in the Study Area (i.e., Northwest Passage), it is only used during late July through mid-October (depending on the route and year). Since this is outside of the timeframe of the Proposed Action, there would be no effect to commercial shipping and transportation.
Cultural Resources	The Study Area is offshore of known cultural resources.
Infrastructure	No modification of infrastructure would occur because of the Proposed Action. Therefore, the Proposed Action would not affect infrastructure.
Recreational Boating and Tourism	During the timeframe of the Proposed Action, there would be no recreational boating and tourism in the Study Area. Therefore, the Proposed Action would not affect recreational boating and tourism.

<b><i>Resource</i></b>	<b><i>Reason for Elimination</i></b>
Subsistence Hunting	Analyzed in the 2022 Programmatic EA/OEA. No new analysis required as the action has not significantly changed, the potential for effects remains unchanged, and there is no significant new science to consider.
Utilities	The Proposed Action would not occur near any utilities. Therefore, the Proposed Action would not affect utilities.

ICEX26 = Ice Exercise 2026; EA = Environmental Assessment; NPDES = National Pollutant Discharge Elimination System; OEA = Overseas Environmental Assessment;

### 3 Existing Environment

This chapter presents a description of the environmental resources that may be affected by the Proposed Action that requires new analysis from the 2022 Programmatic EA/OEA. As laid out in Table 2-4, the majority of resources considered in the 2022 Programmatic EA/OEA do not require additional analysis herein or there is no effect on the resource, due to the minimal changes in the Proposed Action. Therefore, the only resources considered in this EA/OEA are marine mammals.

#### 3.1 Biological Resources

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to, generally, as vegetation, and animal species are referred to, generally, as wildlife. Habitat can be defined as the resources and conditions present in an area that supports a plant or animal.

Based upon the analysis in the 2022 Programmatic EA/OEA, only marine mammals are anticipated to potentially be affected by the Proposed Action in a manner differing from the prior analysis; therefore, only marine mammals are included herein. Changes in the acoustic parameters have resulted in altered estimates of potential marine mammal exposures.

##### 3.1.1 Marine Mammals

Marine mammals may be present throughout the Study Area during the Proposed Action, including on the sea ice and within the water column. All marine mammals are protected under the MMPA, and some mammals, because they are threatened or endangered, are further protected by the ESA. Table 3-1 lists the mammals and stock designation, if applicable, that may occur within the Study Area during the Proposed Action. Other species, such as bowhead whales (*Balaena mysticetus*), beluga whales (*Delphinapterus leucas*), and narwhals (*Monodon monoceros*), may inhabit the Study Area during other times of the year (Burns et al. 1981; Garland et al. 2015; Heide-Jørgensen 2009; Jefferson et al. 2008; Muto et al. 2016), but they are not expected in the area during the Proposed Action. Bearded seals (*Erignathus barbatus nauticus*) were previously included in the 2022 Programmatic EA/OEA, and upon further review do not require additional analysis.

**Table 3-1. Marine Mammals Found in the Study Area during the Proposed Action**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Stock(s) within the Study Area</b>	<b>Critical Habitat within the Study Area</b>
Ringed seal <sup>1</sup>	<i>Phoca hispida hispida</i> <sup>2</sup>	Arctic <sup>3</sup>	Not within the Study Area
Polar bear <sup>1</sup>	<i>Ursus maritimus</i>	Southern Beaufort Sea, Chukchi/Bering Sea	Not within the Study Area

<sup>1</sup>Species currently listed as threatened under the Endangered Species Act.

<sup>2</sup>Scientific name of subspecies within the Study Area

<sup>3</sup>Stock is designated by the Marine Mammal Protection Act.

The only marine mammals expected to be susceptible to affects from acoustic stressors and/or physical stressors (Table 2-2), and present in the Study Area during the Proposed Action, are ringed seals and polar bears (*Ursus maritimus*). Based on consultation with NMFS and a review of the current literature (Refer to: Bengtson et al. 2005; Boveng and Cameron 2013; Cameron and Boveng 2009; Cleator et al. 1989; Crance et al. 2022; Gryba et al. 2021; Hamilton et al. 2022; Kovacs 2017; Olnes et al. 2020; Simpkins et al. 2003), it was determined that bearded seal (*Erignathus barbatus*) are unlikely to be present in the Study Area during the Proposed Action, as they are more likely to be found in the Chukchi

Sea and Bering Sea during this time period. MacIntyre et al. (2013) recorded bearded seal calls throughout the year in the Beaufort Sea, with the majority of calls detected from January to July (MacIntyre et al. 2013). However, this study used passive acoustic monitoring in shallow waters of the western Beaufort Sea. Cleator et al. (1989) indicated that bearded seal trills can be heard for up to 15.5 mi (25 km) underwater. If we assume that bearded seals were observed 15.5 mi (25 km) from the passive acoustic monitoring equipment, then seals would be well inshore from the ice camp location.

Details about the geographic range, habitat, distribution, and hearing of ringed seals and polar bears are discussed below.

### 3.1.1.1 Ringed Seal

The ringed seal, specifically the Arctic subspecies (*Phoca hispida hispida*), occurs within the U.S. Exclusive Economic Zone of the Beaufort, Chukchi, and Bering Seas and would be expected to occur within the Study Area (Hamilton et al. 2022; Kelly et al. 2009; Palo 2003; Palo et al. 2001; Young et al. 2024). The ringed seal is listed as threatened under the ESA (77 Federal Register [FR] 76706; December 28, 2012). The Arctic subspecies is listed as depleted and strategic under the Marine Mammal Protection Act. In 2022, NMFS designated critical habitat for the Arctic subspecies of ringed seal (87 FR 19232; April 1, 2022). However, ringed seal critical habitat was vacated in 2024 (*Alaska v. Nat'l Marine Fisheries Serv.*, No. 3:23-cv-00032-SLG (D. Alaska Sept. 26, 2024)). The physical and biological features that are necessary to conserve the Arctic subspecies include; snow-covered sea ice habitat that allows for the creation of subnivean lairs used for sheltering of pups in the whelping and nursing period, sea ice habitat that allows for molting and basking, and primary prey organisms needed to maintain ringed seals energy budgets. The ringed seal vacated critical habitat includes regions of the northern Bering, Chukchi, and Beaufort Seas, but the Study Area is excluded for national security reasons (

Figure 3-1). Only the transit between Deadhorse Airport and the ice camp would overlap with the vacated critical habitat.

Ringed seals have a wide distribution in seasonally and permanently ice-covered waters of the Northern Hemisphere (NAMMCO, 2004), and they are the most common pinniped in the Study Area. Ringed seals have an affinity for ice-covered waters and are well adapted to occupying both shore-fast and pack ice (Gryba et al. 2021; Kelly 1988b; Quakenbush et al. 2022). Ringed seals can be found farther offshore than other pinnipeds, since they can maintain breathing holes in ice thickness greater than 7 ft (2 m) (Kelly 2022; Smith and Stirling 1975). Breathing holes are maintained by ringed seals' claws on their fore flippers (Kelly 2022). They remain in contact with ice most of the year and use it as a platform for molting in late spring to early summer, for pupping and nursing in late winter to early spring, and for resting at all times of the year (Kelly 2022; Young et al. 2024). Recent surveys by Boveng et al. (2025) estimate a ringed seal abundance of 592,577 animals in the Chukchi Sea.

Ringed seals have at least two distinct types of subnivean lairs: haul out lairs and birthing lairs (Quakenbush et al. 2022; Smith and Stirling 1975). Haul out lairs are typically single-chambered (Hauser et al. 2021) and offer protection from predators and cold weather. Birthing lairs are larger, multi-chambered areas that are used for pupping in addition to protection from predators. Ringed seals pup on both land-fast ice as well as stable pack ice. Lentfer (1972) found that ringed seals north of Barrow, Alaska (west of the Ice Camp Study Area depicted in Figure 2-1), build their subnivean lairs on the pack ice near pressure ridges. Since subnivean lairs were found north of Barrow, Alaska, in pack ice, they are assumed to be found within sea ice in the Ice Camp Study Area. Ringed seals excavate subnivean lairs in drifts over their breathing holes in the ice, in which they rest, give birth, and nurse their pups for five to nine weeks during late winter and spring (Chapskii 1940; McLaren 1958; Smith and Stirling 1975). Snow depths of at least 20 to 26 in (50 to 65 cm) are required for functional birth lairs (Kelly 1988a; Lydersen

1998; Lydersen and Gjertz 1986; Smith and Stirling 1975), and such depths typically are found only where 8 to 12 in (20 to 30 cm) or more of snow has accumulated on flat ice and then drifted along pressure ridges or ice hummocks (Hammill 2008; Lydersen et al. 1990; Lydersen and Ryg 1991; Smith and Lydersen 1991). Pupping begins in March, but the majority of births occur in early April. About a month after parturition, mating resumes in late April and early May.

In general, ringed seals prey upon fish and crustaceans. Ringed seals are known to consume up to 72 different species in their diet. Their preferred prey species is the Arctic cod (Ghazal 2021; Quakenbush et al. 2020; Ross et al. 2022). Ringed seals also prey upon saffron cod, which is particularly important during the summer months in Alaskan waters (Crawford et al. 2015; Lowry et al. 1980). Invertebrate prey seems to become prevalent in the ringed seals' diet during the open-water season and often dominates the diet of young animals (Holst et al. 2001; Lowry et al. 1980). Large amphipods (e.g., *Gammarus spp.*), krill (e.g., *Thysanoessa spp.*), mysids (e.g., *Neomysis rayii*), shrimps (e.g., *Pandalus spp.*, *Eualus spp.*), and cephalopods (e.g., *Gonatus spp.*) are consumed by ringed seals (Crawford et al. 2015; Ghazal 2021; Ross et al. 2022).

### **3.1.1.2 Pinniped Vocalization and Hearing**

Ringed seals fall into the hearing group for phocid pinnipeds (true seals). Ringed seals have been recorded vocalizing between 20 hertz (Hz) and 30 kilohertz (kHz) (Barbosa et al. 2024; Southall et al. 2019). The generalized underwater and in-air hearing for phocids was updated in 2024, and range from 40 Hz to 90 kHz and 42 Hz to 52 kHz, respectively (NMFS 2024). Terhune and Ronald (1975a, 1975b) suggest that the best underwater hearing sensitivities for ringed seals occur between 16 and 45 kHz. Underwater audiograms for two ringed seals found the best hearing frequencies to be 12.8 and 25.6 kHz at thresholds of 49 and 50 decibels (dB) referenced to 1 micropascal (re 1  $\mu$ Pa), respectively (Sills et al. 2015a). The best in-air hearing frequencies for two ringed seals were 3.2 and 4.5 kHz at -6 and -12 dB re 20  $\mu$ Pa at 1 m, respectively (Sills et al. 2015b). The best sensitivity for hearing found by Sills et al. (2015b), falls within the generalized underwater and in-air hearing ranges for phocids (NMFS 2024).

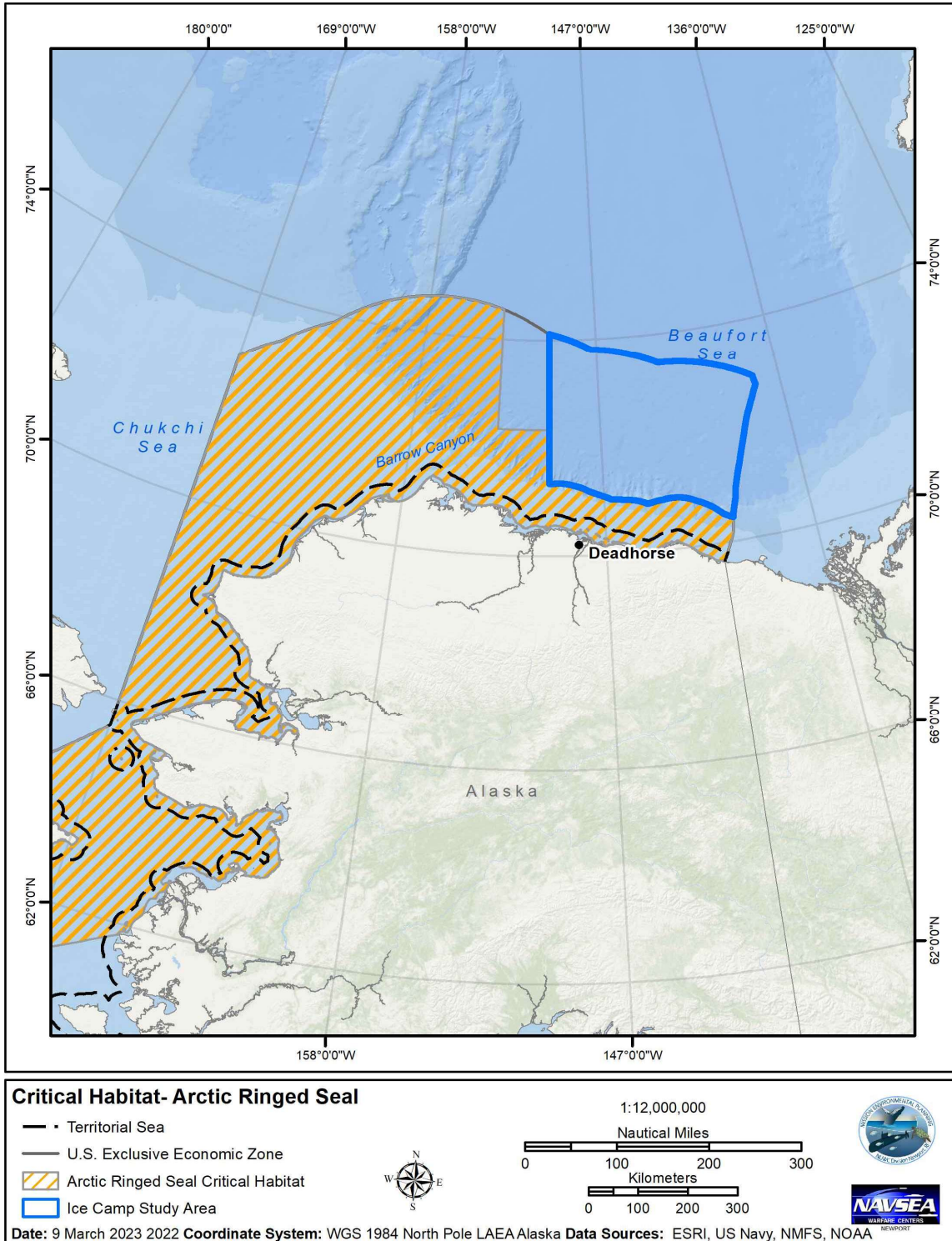
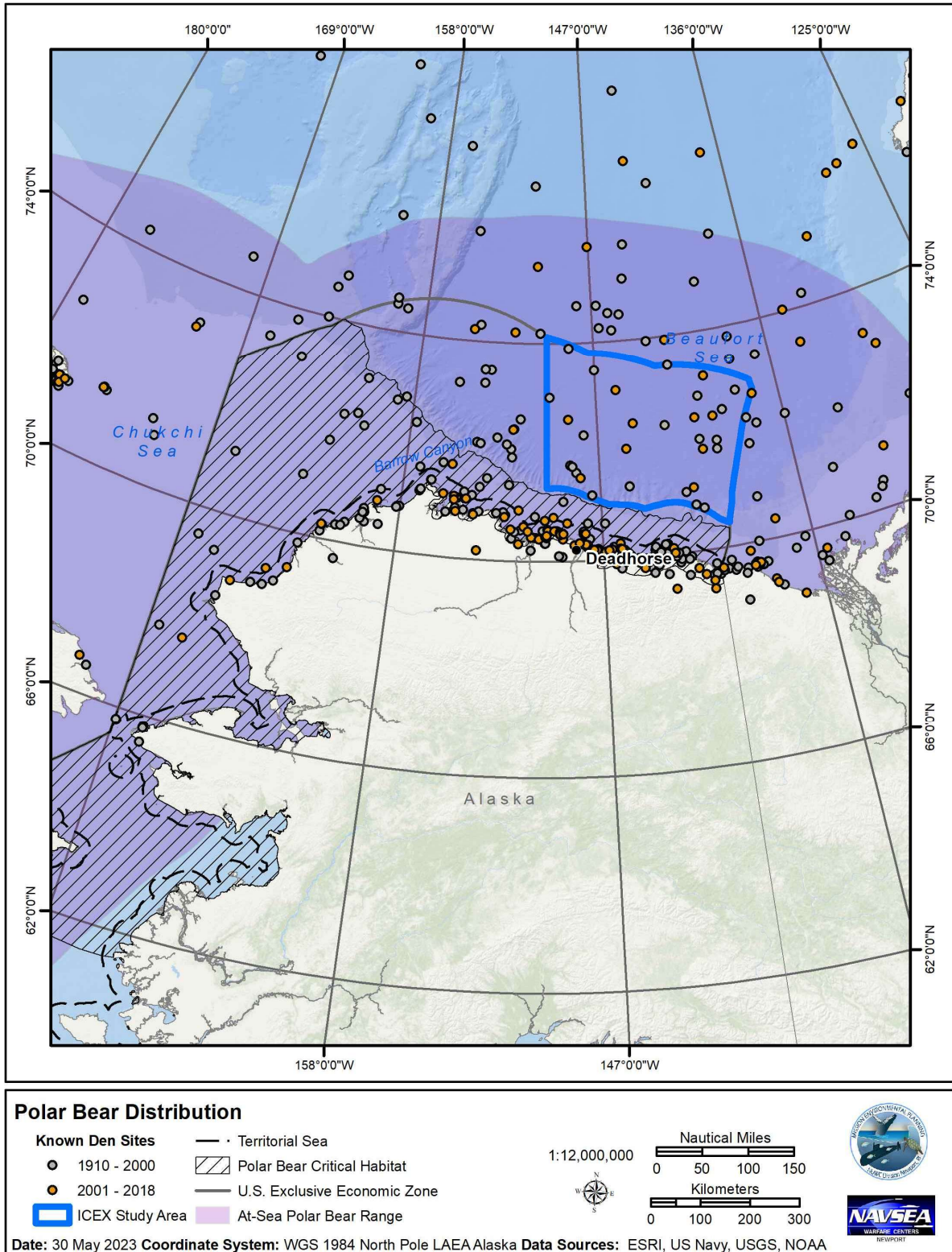


Figure 3-1. Ringed Seal Critical Habitat (Vacated)

### **3.1.1.3 Polar Bear**

Two polar bear stocks occur within the Study Area: (1) the Southern Beaufort Sea (SBS) stock and (2) the Chukchi/Bering Seas (CBS) stock. The SBS and CBS stocks are listed as depleted and classified as strategic under the MMPA. Both stocks are listed as threatened under the ESA (73 FR 28212; May 15, 2008). Polar bears from the SBS and CBS stocks may be present within the Study Area. There are no reliable population estimates for either stock. In 2010, USFWS designated 187,157 mi<sup>2</sup> (484,734 km<sup>2</sup>) of on-shore and off-shore critical habitat for polar bears (75 FR 76086). Polar bear critical habitat extends out from the shoreline into the Study Area. The designated critical habitat does not overlap with the Ice Camp Study Area (Figure 3-2). Only the transit between Deadhorse Airport and the ice camp would overlap with critical habitat. The physical and biological features that are necessary to conserve the Arctic subspecies, (i.e., sea ice habitat that allows for hunting and feeding, sea ice and terrestrial habitats that allow for traveling, sea ice and terrestrial habitats that allow for resting, terrestrial habitat that allows for reproduction, sea ice and terrestrial habitats that allow for denning, and primary prey organisms needed to maintain polar bears energy budgets), are not relevant to the flight corridor because there are no effects on habitat given the altitude transit occurs.



**Figure 3-2. At-Sea Distribution and Designated Critical Habitat for Polar Bears**

The CBS stock is widely distributed on the pack ice in the Chukchi Sea, northern Bering Sea, and adjacent coastal areas in Alaska and Russia. The CBS stock western boundary is north of the Kolyma River, Russia, and the eastern boundary is potentially as far as Camden Bay, Alaska (Garner et al. 1990; USFWS 2021a). An extensive area of overlap between the SBS stock and the CBS stock occurs between Point Barrow and Point Hope, centered near Point Lay (Amstrup 2000; Garner et al. 1994; Garner et al. 1990; USFWS 2021a). It is uncertain where the boundary occurs between the CBS and SBS stocks in the western Beaufort Sea and eastern Chukchi Sea (USFWS 2021a).

The SBS population spends the summer on pack ice and moves toward the coast during fall, winter, and spring (Durner et al. 2004; Griffen et al. 2022). Polar bears in the SBS concentrate in waters less than 984 ft (300 m) deep over the continental shelf and in areas with greater than 50 percent ice cover in all seasons except summer to access prey, such as ringed and bearded seals (Durner et al. 2004; Durner et al. 2006; Durner et al. 2009; Stern and Laidre 2016; Stirling et al. 1999). The exact location of the eastern boundary of the SBS stock is uncertain (USFWS 2021b). It has been suggested that the eastern boundary occurs south of Banks Island and east of the Baillie Islands, Canada (Amstrup et al. 2000), but capture-recapture and harvest data suggest that the eastern boundary is located farther west near Tuktoyaktuk, Canada (IUCN/SSC 2024; Regehr et al. 2006; Stirling et al. 2011). The western boundary of the SBS stock is near Icy Cape, Alaska (IUCN/SSC 2024; Smith et al. 2022; USFWS 2021b). The southern boundary of the SBS stock is defined by the limits of terrestrial denning sites inland of the coast, which follows the shoreline along the North Slope in Alaska and Canadian Arctic (Bethke et al. 1996). Polar bears could be within the Study Area at any time during the Proposed Action.

Mating occurs in late March through early May (Lønø 1970; Stirling et al. 2016), which overlaps with the timeframe of the Proposed Action. During the breeding season, males find estrous females by sniffing their footprint tracks (Owen et al. 2015). In November and December, pregnant females dig dens in pressure ridges in fast ice, drifting pack ice, or on land (up to 100 mi [161 km] inland). Females give birth to their cubs from December to January and stay within their dens until spring (Reeves et al. 2002). It is rare that CBS bears and SBS bears den within the same region (Durner 2020; Rode et al. 2015).

-Each year, only 25 percent of reproductively active females produce a litter. The U.S. Geological Survey has cataloged polar bear den locations for three regions (Beaufort Sea, Chukchi Sea, and northwestern Canada) between 1910 and 2018 based on previous studies (Durner 2020). Dens were found on land and in the sea for all three regions. Conclusions were not able to be drawn as to the frequency of dens on land versus sea due to biases in sampling efforts (Durner 2020). There were 11 dens identified in within the Ice Camp Study Area during aerial surveys and satellite radio telemetry data collected from 2001 to 2018. Polar bears do not show fidelity to specific den sites, but certain bears do show fidelity to denning on either land or sea ice. Denning sites in the Beaufort Sea and neighboring regions of Alaska are depicted in Figure 3-2 based off of the U.S. Geological Survey study (Durner 2020).

Non-denning females and male polar bears remain active throughout the whole year and roam the pack ice in the winter months to hunt for prey (Fischbach et al. 2007; National Wildlife Foundation (NWF) 2023). The size of a polar bear's range depends on a number of factors, including habitat quality, the amount of space a bear needs to reproduce, and the amount of available food (Auger-Méthé et al. 2016; Pagano et al. 2021; Polar Bears International 2015). Polar bears have large home ranges, partially because they feed on seals on drifting pack ice. Sea ice travels approximately 3.20 mi per day (5.14 km per day) in the Chukchi Sea and 2.80 mi per day (4.51 km per day) in the Beaufort Sea (Durner et al. 2017). Polar bears need to follow the pack ice as it moves in order to hunt their prey.

Polar bear primary prey is seals, particularly ringed seals (Rode et al. 2023). Occasionally, polar bears are known to prey upon walruses (*Odobenus rosmarus divergens*) or beluga whales trapped by ice, and they

may also consume carrion when prey is scarce (Dybas 2024; Griffen et al. 2022; Rode et al. 2023; USFWS 2014).

#### **3.1.1.4 Polar Bear Vocalization and Hearing**

Airborne hearing threshold measurements of polar bears have shown best hearing sensitivity between 8 and 14 kHz, with a rapid decline in sensitivity below 125 Hz and above 20 kHz (Bowles et al. 2008; Nachtigall et al. 2007; Owen and Bowles 2011). Like the pinnipeds, polar bears are amphibious mammals in the order Carnivora. Additionally, the polar bear ear is very similar to the otariid ear, and therefore, the polar bear is placed within the same hearing group as otariids (Nummela 2008a; Nummela 2008b). Hearing limits for otariid pinnipeds are 90 Hz to 40 kHz in air and 60 Hz to 68 kHz in water (NMFS 2024; Southall et al. 2007). Polar bear cubs have a nursing vocalization that ranges from 280 to 850 Hz (Derocher et al. 2010).

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## 4 Environmental Consequences

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This chapter discusses the potential environmental consequences of the Proposed Action to the natural and physical resources described in Chapter 3, for which the analysis or stressors differ from those analyzed in the 2022 Programmatic EA/OEA. The only stressor resulting from the Proposed Action that may potentially affect or harm the biological or physical environment that differs from the analysis in the 2022 Programmatic EA/OEA is active acoustic transmissions. Therefore, only active acoustic transmissions will be analyzed for the effects to those biological resources affected. The remaining environmental stressors were analyzed in the 2022 Programmatic EA/OEA:

- Acoustic stressors: aircraft noise, on-ice vehicle noise
- Physical stressors: aircraft strike, on-ice vehicle strike, in-water vessel and vehicle strike, human presence
- Expended Material stressors: bottom disturbance, entanglement, ingestion

Under the No Action Alternative, the Navy's Proposed Action would not occur, and no training or testing activities would take place. As a result, there are no anticipated adverse impacts to the environment from not implementing the Proposed Action. Under NMFS' No Action Alternative, the Proposed Action would not occur and therefore would not cause adverse impacts to biological and physical resources related to marine mammals, their prey, and their habitat.

The effects of acoustic transmissions on most resources is limited to qualitative analysis as there is insufficient data available for a quantitative analysis. The acoustic transmission changes associated with the Proposed Action would not create notable differences in the qualitative analysis, and therefore, these analyses would not change from the 2022 Programmatic EA/OEA and will not be included herein. However, quantitative analysis is feasible for marine mammals, and an updated analysis is necessary both under NEPA and for obtaining permits under the ESA and MMPA. Therefore, an updated analysis of the effects of acoustic transmissions on marine mammals is provided herein.

### 4.1 Acoustic Stressors to Phocids

-The only acoustic stressor analyzed from the Proposed Action is active acoustic transmissions. Both submarine training and research activities have acoustic transmissions that require quantitative analysis. Some acoustic sources are either above the known hearing range of marine species or have narrow beam widths and short pulse lengths that would not result in effects to marine species. Potential effects from these "*de minimis*" sources are analyzed qualitatively in accordance with current Navy policy. Navy acoustic sources are categorized based on frequency, source level, and mode of usage. The acoustic transmissions associated with submarine training can be high-frequency hull-mounted submarine sonars greater than 10 kHz but less than 200 kHz signals, hull-mounted submarine sonars that produce mid-frequency (1 to 10 kHz) signals, mid-frequency acoustic modems greater than 190 dB re 1  $\mu$ Pa, and heavyweight torpedoes. The parameters for the acoustic transmissions associated with unclassified research activities can be found in Table 2-2. All events would occur over an approximately four-week timeframe. Although details about submarine training events are classified, the analysis below includes both submarine training and research activities. Details on submarine training events can be found in the classified Appendix A for authorized individuals. In assessing the potential for effects to biological resources from acoustic transmissions, a variety of factors must be considered, including source characteristics, animal presence and associated density, duration of exposure, and thresholds for injury

and harassment for the species that may occur in the Study Area. The types of potential consequences to biological resources from acoustic sources can be grouped in the following categories:

**Non-auditory injury:** Non-auditory injury can occur to lungs and organs and can cause tissue damage. Resonance occurs when the frequency of the sound waves matches the frequency of vibration of the air-filled organ or cavity, causing it to resonate. This can, in certain circumstances, lead to damage to the tissue making up the organ or air-filled cavity. Tissue damage also can be inflicted directly by sound waves in cases of sound waves with high amplitude and rapid rise time.

**Auditory injury:** A potentially severe condition that occurs when sound intensity is very high or of such long duration that the result is a Permanent Threshold Shift (PTS) or permanent hearing loss on the part of the listener. PTS is a type of auditory injury (AINJ) (Navy 2025). In some cases, intense noise exposures have caused AINJ (e.g. loss of cochlear neuron synapses), despite thresholds eventually returning to normal (i.e., it is possible to have AINJ without a resulting PTS) (Fernandez et al. 2015; Houser 2021; Kujawa and Liberman 2006, 2009; Ryan et al. 2016). The intensity and duration of a sound that will cause AINJ varies across species and even between individual animals. AINJ, in the form of PTS, is a consequence of the death of sensory hair cells of the auditory epithelia of the ear and a resultant loss of hearing ability in the general vicinity of the frequencies of stimulation (Myrberg 1990; Richardson et al. 1995).

**Physiological disruption:** Sounds of sufficient loudness can cause a temporary condition impairing an animal's hearing for a period of time, called a Temporary Threshold Shift (TTS). After termination of the sound, TTS is characterized by the normal hearing ability returning over a period of time that may range anywhere from minutes to days, depending on many factors including the intensity and duration of exposure to the intense sound. The precise physiological mechanism for TTS is not well understood. It may result from fatigue of the sensory hair cells as a result of over-stimulation, or from some small damage to the cells that are repaired over time. Hair cells may be temporarily affected by exposure to the sound, but they are not permanently damaged. Thus, TTS is not considered to be an injury (Richardson et al. 1995), although animals may be at some disadvantage in terms of detecting predators or prey in affected frequency bands while the TTS persists.

**Behavioral disruption:** The response of a marine mammal to an anthropogenic sound will depend on the frequency, duration, temporal pattern and amplitude of the sound, as well as the animal's prior experience with the sound and the context in which the sound is encountered (i.e., what the animal is doing at the time of the exposure). The distance from the sound source and whether it is perceived as approaching or moving away also can affect the way an animal responds to a sound (Wartzok et al. 2003). Marine animals may exhibit short-term behavioral reactions, such as cessation of feeding, resting, or social interaction, and they may exhibit alertness or avoidance behavior (Richardson et al. 1995). Additionally, marine mammals may permanently abandon sites, such as their breeding or resting sites, and relocate to alternative areas to continue essential life-history functions.

**Masking:** The presence of intense sounds or sounds within a mammal's hearing range in the environment potentially can interfere with the animal's ability to hear relevant sounds. This effect, known as "auditory masking," could interfere with the animal's ability to detect biologically relevant sounds, such as those produced by predators or prey, thus increasing the likelihood of the animal being preyed upon or being unable to find food (Branstetter and Sills 2022; Myrberg 1981; Popper et al. 2004). Masking only occurs in the frequency band of the sound that causes the masking condition. Other relevant sounds with frequencies outside of this band would not be masked.

The only marine mammal susceptible to effects from acoustic transmissions from the Proposed Action would be ringed seals exposed to acoustic transmissions in the water column. In assessing the potential

effects on ringed seals from the Proposed Action, a variety of factors must be considered, including source characteristics, animal presence, animal hearing range, duration of exposure, and effect thresholds for species that may be present. Potential acoustic effects could include AINJ, TTS, or behavioral effects. To make these assessments, the Navy performed a quantitative analysis to estimate the potential number of exposures that could occur. The Navy then further analyzed the data and conducted an in-depth qualitative analysis of the species' distributions and likely responses to the acoustic transmissions based on available scientific literature. The determination of the effects to the ringed seal was based on this combination of quantitative and qualitative analyses.

#### **4.1.1 Quantitative Analysis**

The quantitative analysis herein is for the exposures associated with the proposed acoustic transmissions from both submarine training and research activities. The only marine mammal susceptible to affects from acoustic transmissions associated with the Proposed Action would be ringed seals. Polar bears would be expected to remain on the ice surface or be at a distance beyond the hearing range of the sound source and therefore not exposed to acoustic transmissions in the water column. Bearded seals are not expected to be within the vicinity of the Proposed Action.

No numerical data exist regarding the presence of ringed seals in the ICEX Study Area during the months of February, March, and April. Ringed seal presence in the ICEX Study Area was obtained using sighting data from the Ocean Biodiversity Information System (OBIS)- Spatial Ecological Analysis of Megavertebate Populations (SEAMAP) (Halpin et al. 2009). The ICEX Study Area was overlaid on the OBIS-SEAMAP ringed seal sightings map that included sightings from the years 2000 to 2007 and the year 2013. Sighting data were only available for the mid to late summer and fall months. To date, there have been no surveys to determine ringed seal presence in the Study Area during winter and spring months.

It is assumed that during the fall most ringed seals would migrate south and west from the Beaufort Sea to the Bering Sea and Chukchi Sea, with some ringed seals remaining in the Beaufort Sea. Additionally, some ringed seals would create subnivean lairs on landfast ice over the continental shelf during the winter and spring months, and move back into the Chukchi and Beaufort Seas during the summer and fall months (Boveng et al. 2025; Crawford et al. 2012; Frost and Lowry 1984; Harwood et al. 2012; Young et al. 2024). Therefore, the average number of individual ringed seals per year was assumed to be present in the ICEX Study Area during the Proposed Action, regardless of the time of year that the sighting occurred. Based on the sightings data, it is assumed that three ringed seals would be present in the Study Area.

To be conservative, the Navy has assumed that all three ringed seals would be exposed to acoustic transmissions above the threshold for Level B take. Because a marine mammal is only considered to be taken once in a 24-hour period, it is assumed that all three ringed seals would be exposed each day of the Proposed Action (42 days total). Therefore, the Navy requests 126 Level B takes of ringed seals (Table 4-1). All takes are classified as Level B and not further distinguished because the occurrence method used in this EA/OEA does not support the differentiation between behavioral or TTS exposures. No Level A takes are anticipated in ICEX26 as no previous ICEX iterations resulted in Level A takes, even in years when torpedoes were used. The numbers generated from the quantitative analysis provide conservative estimates of marine mammal exposures, the short duration, limited geographic extent of ICEX26 activities, and mitigation measures would further limit actual exposures.

**Table 4-1. Estimated Acoustic Exposures for ICEX26 Activities**

<i>Common Name</i>	<i>Level B Harassment</i>	<i>Level A Harassment</i>
Ringed seal	126	0

#### 4.1.2 Qualitative Analysis

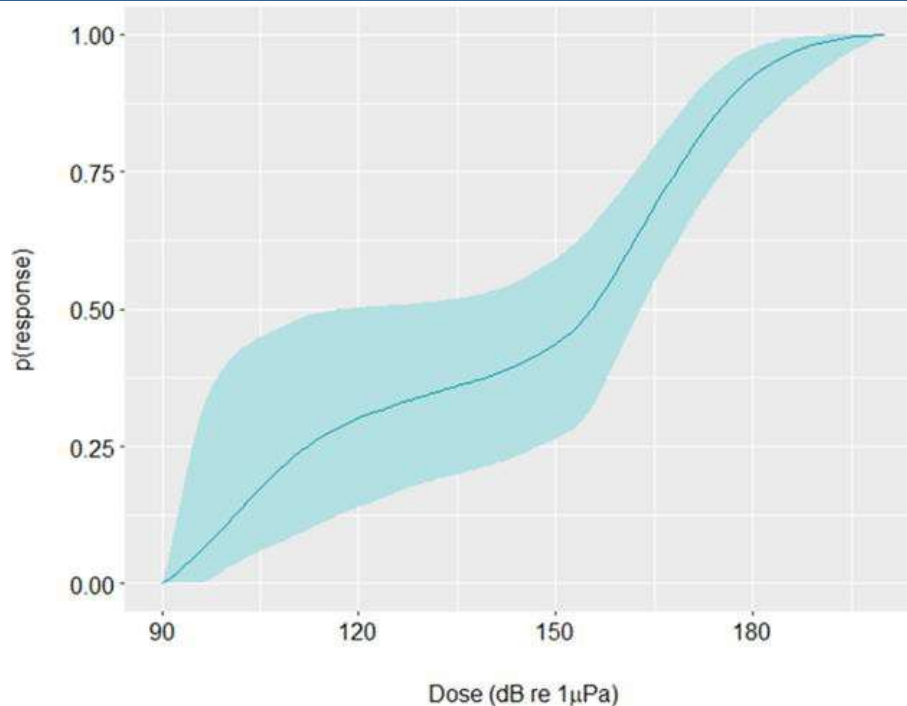
Limited or no research has been conducted on the potential behavioral responses of pinnipeds to the type of acoustic sources used during the Proposed Action. Data are available on (1) effects of non-impulsive sources (e.g., sonar transmissions) on other phocids in water, and (2) reactions of ringed seals while in subnivean lairs. All of this available information was assessed and incorporated into the findings of this analysis.

##### *Effects of Non-Impulsive Sources on Phocids in Water*

The response of a marine mammal to a non-impulsive source would depend on the frequency, duration, temporal pattern, and amplitude of the sound as well as the animal’s prior experience with the sound and the context in which the sound is encountered (i.e., what the animal is doing at the time of the exposure). The distance from the sound source and whether it is perceived as approaching or moving away also can affect the way an animal responds to a sound (Wartzok et al. 2003).

The Navy (2025) updated acoustic threshold levels at which AINJ and TTS is predicted to occur for phocids in water for non-impulsive signals. The acoustic threshold levels for non-impulsive sounds are defined as the cumulative sound exposure level (SEL) over a 24-hour period with the appropriate frequency weighting for the phocid hearing group. The cumulative SEL metric considers both received level and duration of exposure over the duration of the activity within a 24-hour period. A 20 dB offset was chosen to estimate AINJ onset criteria from TTS onset criteria for non-impulsive sources. The AINJ- and TTS-onset SEL (weighted) thresholds for phocids in water exposed to non-impulsive sounds are 195 and 175 dB referenced to 1 micropascal squared second (re 1  $\mu\text{Pa}^2\text{s}$ ), respectively (DoN 2025).

The Navy’s pinniped behavioral criteria is based on controlled exposure experiments on the following captive animals: hooded seal (*Cystophora cristata*), harbor seal (*Phoca vitulina*), and California sea lion (*Zalophus californianus*) (Houser et al. 2013; Kastelein et al. 2015; Kastelein et al. 2006; Kvadsheim et al. 2010). Overall exposure levels were 110 to 170 dB re 1  $\mu\text{Pa}$  for hooded seals, 107 to 160 dB re 1  $\mu\text{Pa}$  for harbor seals, and 125 to 185 dB re 1  $\mu\text{Pa}$  for California sea lions. Responses occurred at received levels ranging from 107 to 185 dB re 1  $\mu\text{Pa}$  (mean = 154 dB re 1  $\mu\text{Pa}$ ). Hooded seals were exposed to increasing levels of sonar until an avoidance response was observed. The harbor seals were exposed to a variety of contexts, frequencies, and received levels. Each individual California sea lion was exposed to the same received level ten times; these exposure sessions were combined into a single response value, with an overall response assumed if an animal responded in any single session. The pinniped Behavioral Response Function (Figure 4-1) shows that there is a 50 percent probability of response at 156 dB re 1  $\mu\text{Pa}$ . Additionally, to account for proximity to the source discussed above and based on the best scientific information, a conservative distance of 3 mi (5 km) is used beyond which exposures would not constitute a take under the military readiness definition (DoN 2025).



**Figure 4-1. Pinniped (in water) Biphasic Behavioral Response Function**

*The fifty-percent confidence interval is shaded in teal (X-Axis: Received Level [dB re 1 μPa], Y-Axis: Probability of Response). Source: Navy (2025)*

Southall et al. (2007) suggest that exposures of pinnipeds to sources between 90 and 140 dB re 1 μPa do not elicit strong behavioral responses; no data were available for exposures at higher received levels for Southall et al. (2007) to include in the severity scale analysis. Reactions of harbor seals were the only available data for which the responses could be ranked on the severity scale. For reactions that were recorded, the majority (17 of 18 individuals/groups) were ranked on the severity scale as a 4 (moderate change in movement, brief shift in group distribution, or moderate change in vocal behavior) or lower; the remaining response was ranked as a 6 (minor or moderate avoidance of the sound source). Southall et al. (2021) conducted a severity scale analysis on a study by Hastie et al. (2014). The authors noted the response of two captive gray seals (*Halichoerus grypus*) to two different sonar signals (200 and 375 kHz systems). The behavioral reactions were ranked on a severity scale as a 6 (sustained avoidance where seals spent more time hauled out) for one sonar system (200 kHz) and ranked as a 5 (onset of avoidance such as heading away and/or increasing range from the source but remaining in the water) for the other sonar system (375 kHz). Gray seals showed a change in behavior at 165.7 (one-third octave level; 200 kHz system) and 160.3 (one-third octave level; 375 kHz system) dB re 1 μPa at 1 m root mean square (Hastie et al. 2014; Southall et al. 2021).

Behavioral studies have been conducted specifically on ringed seals. In one study aimed to investigate the under-ice movements and sensory cues associated with under-ice navigation of ice seals, acoustic transmitters (60 to 69 kHz at 159 dB re 1 μPa at 1 m) were attached to ringed seals (Wartzok et al. 1992a; Wartzok et al. 1992b). An acoustic tracking system was installed in the ice to receive the acoustic signals and provide real-time tracking of ice seal movements. Although the frequencies used in this study were at the upper limit of ringed seal hearing, the ringed seals appeared unaffected by the acoustic transmissions, as they maintained normal behaviors (e.g., finding breathing holes). In another study, the diving behavior of three tagged ringed seals exposed to underwater anthropogenic noise

from a passenger ferry did not show evidence of a strong behavioral response for 94 percent of the dives which may be an indication of habituation to ship noise in the area. Two dive profiles at 35 m and 50 m had behavioral reactions that included responses such as diving deeper, shorter dive duration, and shorter surfacing time (Prawirasasra et al. 2022). The behavioral hearing threshold was estimated at 110 dB at 500 Hz one-third octave band (Prawirasasra et al. 2022).

Although a minor change to behavior may occur as a result of exposure to the acoustic transmissions associated with the Proposed Action, the Proposed Action takes place for a limited duration, causing no more than a short-term reaction by seals, after which time normal behavior would resume. Additionally, these behavioral changes largely would be within the normal range of behaviors for the animal (e.g., the use of a breathing hole further from the source, rather than one closer to the source) (Kelly et al. 1988).

#### *Effects on Ringed Seals within Subnivean Lairs*

Adult ringed seals spend up to 20 percent of their time in subnivean lairs during the timeframe of the Proposed Action (Kelly et al. 2010). Ringed seal pups spend about 50 percent of their time in the lair during the nursing period (Lydersen and Hammill 1993). Ringed seal lairs are typically used by individual seals (haul out lairs) or by a mother with a pup (birthing lairs); large lairs used by many seals for hauling out are rare (Smith and Stirling 1975). The quantitative analysis does not account for seals within subnivean lairs, and all animals are assumed to be in the water and susceptible to hearing acoustic transmissions 100 percent of the time. Therefore, the quantitative analysis output likely represents an overestimate given the percentage of time that ringed seals are expected to be in subnivean lairs, rather than in the water. Although the exact amount of transmission loss of sound traveling through ice and snow is unknown, it is clear that some sound attenuation would occur due to the environment itself (Richardson et al. 1995; van den Hoff et al. 2025). The best hearing sensitivity for ringed seals in air (i.e., in a subnivean lair) has been documented between 3 and 5 kHz; at higher frequencies, the hearing threshold rapidly increases (Sills et al. 2015b).

If the acoustic transmissions are heard and perceived as a threat, ringed seals within subnivean lairs could react to the sound in a similar fashion to their reaction to other threats, such as polar bears and Arctic foxes (*Vulpes lagopus*) (their primary predators); although the type of sound would be novel to them. Responses of ringed seals to a variety of human-induced noises (e.g., helicopter noise, snowmobiles, dogs (*Canis lupus familiaris*), people, and seismic activity) have been variable. Some seals entered the water, and some seals remained in the lair (Kelly et al. 1988). However, in all instances in which observed seals departed lairs in response to noise disturbance, they subsequently reoccupied the lair (Kelly et al. 1988).

The Proposed Action would overlap with the beginning of the ringed seal pupping season. The camp would be built prior to the start of the season, and the exercise would be concluded before the height of the pupping season. Ringed seal mothers have a strong bond with their pups and may physically move their pups from the birth lair to an alternate lair to avoid predation, sometimes risking their lives to defend their pups from potential predators (Smith 1987). Additionally, it is not unusual to find up to three birth lairs within 328 ft (100 m) of each other, probably made by the same female seal, as well as one or more haul out lairs in the immediate area (Smith et al. 1991). If a ringed seal mother perceives the acoustic transmissions as a threat, the network of multiple birth and haul out lairs allows the mother and pup to move to a new lair (Smith and Hammill 1981; Smith and Stirling 1975). However, the acoustic transmissions associated with the Proposed Action are unlike the low-frequency sounds and vibrations felt from approaching predators. The acoustic transmissions are not likely to impede a ringed seal from finding a breathing hole or lair, as captive seals have been found to primarily use vision to locate

breathing holes, and no effect to ringed seal vision would occur from the acoustic transmissions (Elsner et al. 1989; Wartzok et al. 1992a). It is anticipated that a ringed seal would be able to relocate to a different breathing hole or subnivean lair relatively easily without affecting their normal behavior patterns.

#### **4.1.3 Summary**

The behavioral responses of ringed seals to underwater sound vary. Non-impulsive sources have been shown to elicit minor or moderate avoidance responses from other phocids at the sound pressure levels potentially received from the Proposed Action.

Submarine training and research activities would occur over an approximate four-week period during ICEX26. During this time, the submarines, unmanned underwater vehicles, sound projectors, and transducers would conduct intermittent acoustic events, and even during these events, acoustic transmissions would not be constant. The training and testing would occur in different locations and at different depths and speeds depending on the objective of the event. Transmissions from the submarines would occur within different locations but within the general area around the ice camp, so that they are within the tracking range acoustic boundary. As such, the likelihood of a single lair or individual seal being exposed to the submarine activity for the entirety of the four-week period is low. Additionally, as the acoustic transmissions would not be conducted continuously for the four-week period, the short duration of the events would result in only short-term reactions by ringed seals, after which time normal behavior would resume (Harris et al. 2001; Kvadsheim et al. 2010).

An individual seal could potentially react to the acoustic transmissions by alerting to or temporarily avoiding the area close to the source (e.g., using a breathing hole/lair farther from the source), and an individual seal may alter its call amplitude to compensate for the transmissions. Data show that likely reactions would be within the normal repertoire of the animal's typical movements, as seals routinely utilize a complex of breathing holes and/or lairs (Kelly et al. 1986; Smith and Hammill 1981; Smith and Stirling 1975). They also are often exposed to anthropogenic noise due to the ever increasing industrialization of the Arctic (Fournet et al. 2021). As most ringed seal lairs are only used by single seals or by a mother-pup pair, acoustic transmissions would not result in abandonment of a haul-out location by many seals. These and similar reactions would not disrupt the animal's overall behavioral pattern (e.g., feeding or nursing) and would, therefore, not affect the animal's ability to survive, grow, or reproduce.

As described above, the sound sources associated with the Proposed Action would be expected to result in, at most, minor to moderate behavioral responses of animals, over short and intermittent periods of time, and behavioral reactions likely would not affect annual rates of recruitment or survival. The Proposed Action is not expected to cause significant disruptions, such as mass haul outs, or abandonment of breeding, that would result in significantly altered or abandoned behavior patterns.

Pursuant to NEPA, acoustic transmissions associated with the Proposed Action would have less than significant effects on ringed seals within the Study Area. Pursuant to EO 12114, acoustic transmissions associated with the Proposed Action would not significantly harm ringed seals within the Study Area.

In accordance with the MMPA, the Navy applied for an IHA from NMFS for Level B take of ringed seals on May 19, 2025. In accordance with the ESA, it was determined that the acoustic transmissions associated with the Proposed Action may affect, and are likely to adversely affect, ringed seals; the Navy submitted a Biological Assessment to NMFS on July 1, 2025.

## 4.2 Acoustic and Physical Stressors to Polar Bears

The quantitative analysis herein is for the incidental take associated with on-ice vehicles, aircraft, and human presence from the Proposed Action. Refer to the ICEX22 EA/OEA for a complete qualitative analysis of on-ice vehicle noise, aircraft, and human presence to bears.

### 4.2.1 Navy's Estimate of Potential Exposures from Snowmobiles and Human Presence to Denning Polar Bears

To assess the potential impact of in-air sound, the Navy used a conservative estimate of polar bear density within the Ice Camp Study Area (43,988 mi<sup>2</sup> [113,927 km<sup>2</sup>]). This estimate assumed a density of 0.00025 dens per mi<sup>2</sup>, based on the identification of 11 dens within the Study Area over a 17-year period (2001-2018) (Durner 2020). This approach likely overestimates the number of dens occupied in a single year, as it is improbable that all 11 dens would occur within the Study Area in a given year or be occupied simultaneously.

The following assumptions were used to calculate potential exposures to aircraft, snowmobiles, and human presence:

- The Ice Camp Study Area is 43,988 mi<sup>2</sup> (113,927 km<sup>2</sup>) in total. If 11 dens are assumed in that area, the density of dens is 0.0003 dens per mi<sup>2</sup> (0.000097 dens/km<sup>2</sup>).
- The ice camp would be up to 1 mi (1.6 km) in diameter, and nearly all research objectives would occur within 2 mi (3.2 km) from the edge of the ice camp. Therefore, the total area of human presence was calculated using a diameter of 5 mi (8 km); the total area of human presence was calculated to be 19.625 mi<sup>2</sup> (50.24 km<sup>2</sup>).

To determine the number of dens that could fall within the ice camp and scientific research area, the den density was multiplied by the area of the ice camp, which came to 0.006 dens. Due to the uncertainty of den locations in the deep Beaufort Sea, the Navy has rounded this value up to 1 den that could be exposed to the Proposed Action.

The results should be regarded as conservative estimates that are strongly influenced by assuming 11 dens would be found within the Ice Camp Study Area during the six-week ICEX26 event, even though the report was for a 17-year period. Additionally, polar bears prefer sea ice near the continental shelf likely because of higher prey within these regions (Durner et al. 2009; IUCN/SSC 2024; Stirling 1997). ICEX26 would occur over deep-water regions in the central Canada Basin, in habitat polar bears do not prefer, because deep water is needed for submarine testing and training activities. While the numbers generated from the quantitative analysis provide conservative overestimates of polar bear exposures, the short duration, limited geographic extent of ICEX activities, and mitigation measures would further limit actual exposures.

Navy consulted with USFWS to further refine the analysis. Taking into account the footprint of the Proposed Action and the number of potential dens in the area, the amount of time polar bears could potentially be exposed to each component of the Proposed Action was calculated and sequentially summed all estimated number of takes across all ICEX training, testing, and research activities for a single ICEX event (Table 4-2). The total number of polar bears incidentally taken by the Proposed Action was estimated to be six bears, which takes into account that a family group (female with cubs) could be encountered through surface interactions or aircraft overflights (Table 4-2).

**Table 4-2. Polar Bear Take Estimate for ICEX26 Activities**

<i>Number of Level B Harassments</i>	<i>Surface Interactions</i>	<i>Aircraft Overflights</i>	<i>In-Water Activities</i>	<i>Den Disturbance</i>	<i>Total</i>
	3	3	0	0	6

Total number of Level B takes requested for ICEX26 is for six polar bears, which equals 0.7 percent of the SBS stock taken per ICEX event, based on the population size estimate of 900 individuals (USFWS 2021b). The SBS is the dominant stock in the region of the ice camp, and therefore, assumed that take would be from that stock.

**4.2.2 Conclusion**

Pursuant to NEPA, on-ice vehicle noise, aircraft overflights, and human presence associated with the Proposed Action would not be likely to significantly affect polar bears. Pursuant to EO 12114, acoustic transmissions associated with the Proposed Action would not result in significant harm to polar bears. Since the Proposed Action may cause a behavioral effect, the Navy applied for an IHA from USFWS for Level B take of polar bears in accordance with the MMPA on April 4, 2025 and submitted an addendum on July 24, 2025. In accordance with the ESA, the Proposed Action may affect, but is not likely to adversely affect, polar bears.

**4.3 Summary of Analysis**

The analysis provided in Section 4 describes how the Proposed Action under NEPA would not result in significant effects to the physical or biological environment identified in Section 3. In accordance with EO 12114, the Proposed Action as analyzed above would not cause significant harm to the human or biological environment.

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## 5 Standard Operating Procedures and Mitigation Measures

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The Navy has identified multiple measures that would further reduce and avoid potential affects resulting from the Proposed Action. Both standard operating procedures and mitigation measures would be implemented during the Proposed Action. Standard operating procedures serve the primary purpose of providing for safety and mission success and are implemented regardless of their secondary benefits (e.g., to a resource), while mitigation measures are used to avoid or reduce potential effects.

Though the Proposed Action would utilize both standard operating procedures and mitigation measures in a variety of manners, the activities using active acoustics would utilize passive acoustic listening. Submarines conducting training activities would utilize passive acoustic sensors to listen for vocalizing marine mammals, and active transmissions would be halted in the event that vocalizing marine mammals are detected.

Additional mitigations were considered for research activities; however, because those activities that result in exposures to marine mammals occur under the ice, there are no methods to visually or acoustically monitor the area. Therefore, no additional mitigation is feasible.

### 5.1 Standard Operating Procedures

The following procedures would be implemented:

- The location for any air-dropped equipment and material would be visually surveyed prior to release of the equipment/material to ensure the landing zone is clear. Equipment and materials would not be released if any animal is observed within the landing zone.
- Air drop bundles would be packed within a plywood structure with honeycomb insulation to protect the material from damage.
- Spill response kits/material would be on-site prior to the air-drop of any hazardous material (e.g., fuel)
- Ice camp activities and personnel movement within the camp will occur during daylight hours as much as possible.
- • Aircraft pilots will make every attempt to avoid large flocks of birds (which are unlikely) in order to reduce the safety risk involved with a potential bird strike.

### 5.2 Mitigation Measures

In addition to the standard operating procedures above, the following mitigation measures would be implemented to reduce or avoid potential harm to marine resources.

Measures to avoid take during on-ice activities:

- The ice camp and runway would be established on multi-year ice without pressure ridges.
- Ice camp deployment would begin mid-February and be gradual, with activity increasing over the first five days. Set-up must be completed by March 15, 2026. This allows ringed seals to avoid the camp area prior to pupping and would not overlap with the time period when female polar bears give birth to cubs; this would further reduce potential affects.
- Passengers on all on-ice vehicles would observe for marine and terrestrial animals; any marine or terrestrial animal observed on the ice would be avoided by 328 ft (100 m). On-ice vehicles

would not be used to follow any animal, with the exception of actively deterring polar bears if the situation requires.

- Snowmobiles would follow established routes, when available. On-ice vehicles would not be used to follow any animal, with the exception of actively deterring polar bears if the situation requires.
- Personnel on foot and operating on-ice vehicles would avoid areas of deep snowdrifts near pressure ridges.
- All material (e.g., tents, unused food, excess fuel) and wastes (e.g., solid waste, hazardous waste) would be removed from the ice floe upon completion of the Proposed Action.
- Appropriate personnel (including civilian personnel) involved in mitigation and training or testing activity must complete Arctic Environmental and Safety Awareness Training. Modules include: Arctic Species Awareness and Mitigations, Environmental Considerations, Hazardous Materials Management, and General Safety
- Ice camp personnel must monitor for marine mammals in the vicinity of the ice camp and record all observations of marine mammals, regardless of distance from the ice camp, as well as the additional data indicated in the associated IHAs for ICEX26.

#### Shutdown and Delay Measures:

- Navy personnel would begin passive acoustic monitoring 15 minutes prior to the start of activities involving active acoustic transmissions from submarines and torpedoes.
- Navy personnel would delay active acoustic transmissions if a marine mammal is detected during pre-activity passive acoustic monitoring and must shutdown active acoustic transmissions if marine mammals are detected during acoustic transmissions.
- Navy personnel would not restart acoustic transmissions until 15 minutes have passed with no marine mammal detections.

#### Mitigation required for aircraft activities:

- Fixed wing aircraft would operate at highest altitudes practicable, taking into account safety of personnel, meteorological conditions, and the need to support safe operations of a drifting ice camp. Aircraft would not reduce altitude if a marine mammal is observed on the ice. In general, cruising elevation would be 1,500 ft (305 m) or higher.
- Unmanned Aircraft Systems would maintain a minimum altitude of at least 50 ft (15.2 m) above the ice. They would not be used to track or follow marine mammals.
- Helicopter flights would use prescribed transit corridors when traveling to/from Prudhoe Bay and the ice camp. Helicopters would not hover or circle above or within 1,500 ft (457 m) of groups of marine mammals.
- Aircraft would maintain a minimum separation distance of 1 mi (1.6 km) from groups of five or more seals.
- Aircraft would not land on ice within 0.5 mi (0.8 km) of a polar bear or of hauled out pinnipeds.

#### General Camp Mitigations:

- Dish and hand soap would be selected from the U.S. Environmental Protection Agency's "Safer Choice" list.
- All cooking and food consumption would occur within designated facilities to minimize attraction of nearby animals.
- All personnel would be required to complete environmental compliance training, including environmental health and safety procedures.

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Appendix A    **SUBMARINE TRAINING AND TESTING ACTIVITIES**

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Details on the activities conducted by the participating submarines are classified. This appendix will be provided to authorized personnel upon request.

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**Appendix B LIST OF PREPARERS**

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<i>Name</i>	<i>Role</i>	<i>Education and Experience</i>
Naval Undersea Warfare Center, Division Newport		
Code 1023, Environmental Branch, Mission Environmental Planning Program		
Emily Robinson	Project Lead; Project Coordination; Document Development	Masters of Environmental Science and Management; B.S. Integrated Science and Technology; Experience: 10 years Environmental Planning
Jessica Greene	GIS Analyst	B.S. Fisheries Science and Management; Experience: 10 years GIS Analysis
McLaughlin Research Corporation		
Kayla Anatone-Ruiz	Document Development	Ph.D. in Biology; Masters of Environmental Science and Management Wetlands Biology; B.S. in Environmental Science; Experience: 3 years Environmental Planning, 10 years Biological Research

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## Appendix C    REFERENCES

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