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3.7 Marine Mammals

MARINE MAMMALS SYNOPSIS

Stressors on marine mammals that could result from the Proposed Action were considered, and the following conclusions have been reached for the Preferred Alternative (Alternative 1).

- Acoustics: Marine mammals may be exposed to multiple acoustic stressors, including sonars and other transducers (hereinafter called sonars), air guns, pile driving, vessel noise, aircraft noise, and weapons noise. The potential for exposure varies for each marine mammal population present in the Study Area. Exposures to sound-producing activities may cause auditory masking, physiological stress, or minor behavioral responses. Exposure to some sonars, air guns, and pile driving may also affect hearing (TTS or AINJ) and cause a range of behavioral reactions. The number of auditory and behavioral effects are estimated for each stock. Susceptibility to these effects differs among marine mammal auditory and behavioral groups. Although individual marine mammals would be affected, no adverse effects to marine mammal populations are anticipated. Therefore, activities that include the use of acoustics would result in less than significant effects.
- Explosives: The potential for exposure to explosives (in the water or near the water's surface) varies for each marine mammal population present in the Study Area. The impulsive, broadband sounds from explosions introduced into the marine environment may cause auditory effects (TTS or AINJ), auditory masking, physiological stress, and behavioral responses. Explosions in the water or near the water's surface present a risk to marine mammals located near the explosion, because the resulting shock waves can result in the injury or mortality of an animal. The number of auditory (TTS and AINJ), non-auditory injury and mortality, and behavioral effects are estimated for each stock. Susceptibility to these effects differs among marine mammal species and auditory groups. Although individual marine mammals would be affected, no adverse effects to marine mammal populations are anticipated. Therefore, activities that include the use of in-water explosives would result in less than significant effects.
- Energy: Based on the relatively weak strength of the electromagnetic field created by Navy activities, a marine mammal would have to be in close proximity for there to be any effect, and adverse effects on marine mammal migratory behaviors and navigational patterns are not anticipated. Potential adverse effects from high-energy lasers are not expected due to the automatic shut-off feature of the system. Adverse effects from and high-power microwave devices would only be possible for marine mammals directly struck by the microwave beam. Statistical probability analyses demonstrate with a high level of certainty that no marine mammals would be struck by a high-power microwave device. Energy stressors are temporary and localized in nature, limiting any potential interaction between the stressor and a marine mammal. Therefore, there would be no reasonably foreseeable adverse effects from energy stressors on marine mammals.
- Physical disturbance and strike: Historical data on Navy and USCG ship strike records demonstrate a low occurrence of interactions with marine mammals relative to the level of vessels use. Since vessel use will remain similar to vessel use over the past decade, the potential for striking a marine mammal remains similarly low. The probability of whale strikes by Navy and USCG vessels was calculated based on an analysis of past strike data and anticipated future training and testing vessel use at-sea. The results of the analysis indicate a non-zero probability

Results of the MEM strike probability analysis indicated a very low probability that a marine mammal would be struck by any MEM. Adverse effects to individuals or long-term consequences to marine mammal populations from physical disturbance and strike stressors associated with miliary readiness activities are not anticipated. The use of vessels and in-water devices and MEM during military readiness activities would have less than significant adverse effects on marine mammals. A vessel strike on an individual marine mammal would be considered a significant adverse effect on the individual even if the strike does not result in mortality. Nevertheless, the probability of a vessel strike remains low, and even if a strike were to occur the effects on the population would be less than significant.

- Entanglement: Physical characteristics of wires and cables, decelerators/parachutes, and nets and other obstacles, combined with the sparse distribution of these items throughout the Study Area indicate a very low potential for marine mammals to encounter and become entangled in them. The installation of seafloor cables during range sustainment and modernization activities would occur from slowly moving vessels over a brief period (several days) and under observation. Nets deployed during obstacle avoidance activities would be tethered to a vessel, monitored continuously, and retrieved immediately following the activity. Therefore, marine mammals are not likely to be exposed to entanglement stressors, and there would be no reasonably foreseeable adverse effects.
- Ingestion: Adverse effects from ingestion of MEM would be limited to the unlikely event that a marine mammal would be harmed by ingesting an item that becomes embedded in tissue or is too large to be passed through the digestive system. The likelihood that a marine mammal would encounter and subsequently ingest a military expended item residing in deep water on the seafloor is considered low. Large buoyant MEM (e.g., parachutes) that remain at the surface or in the water column before sinking to the seafloor have a greater potential to be encountered; however, ingestion of MEM that is dissimilar to prey is unlikely. Therefore, marine mammals are not likely to be exposed to ingestion stressors, and there would be no reasonably foreseeable adverse effects.

3.7.1 Introduction

The following sections describe marine mammal species and populations occurring in the Study Area and the analysis of potential adverse effects from the proposed military readiness activities on marine mammals.

3.7.2 Affected Environment

The affected environment provides the context for evaluating the effects of the proposed military readiness activities on marine mammals occurring in the Study Area. The affected environment includes training and testing activities previously analyzed in the 2018 HSTT EIS/OEIS and the 2022 PMSR EIS/OEIS. The potential effects on marine mammals from military readiness activities conducted in the NOCAL Range Complex have not previously been analyzed; however, the activities that occur there are same types of activities occurring in the SOCAL Range Complex and PMSR. Additionally, the species and stocks occurring in the NOCAL Range Complex are the same species and stocks that occur in the PMSR and HSTT Study Areas.

Information describing each marine mammal species and stock or DPS is presented in Section C.6 of Appendix C. The content of the section is focused on information necessary to support the analysis of adverse effects on marine mammals from the Proposed Action. A summary of the types of background information described in Section C.6 is shown in Table 3.7-1.

While all potential adverse effects from the Proposed Action are analyzed in this section, the primary quantitative analysis focuses on potential effects from acoustic stressors, explosive stressors, and ship strike.

Table 3.7-1: Information on Marine Mammals Presented in Appendix C

Appendix C Section C.6 Topic	Section Content Description
Status and Management	Includes Endangered Species Act (ESA) listing status and stock or Distinct Population Segment information. If applicable, information on critical habitat and recovery goals are described.
Habitat and Distribution	Includes a brief description of the habitat features a species associates with (e.g., seamounts, bathymetry, substrate type, temperature ranges, upwelling zones, sea grasses, kelp, rocky shoreline). Foraging habitat and behaviors are described to support a discussion of ingestion and entanglement stressors. Migratory routes and Biologically Important Areas are described in this section. Distribution is briefly discussed with details presented in the *U.S. Navy Marine Species Density Database Phase IV for the Hawaii-California Training and Testing Study Area* (U.S. Department of the Navy, 2024d).
Population Trends	Describes population abundance and trends, if data are available. The primary source of information is the National Marine Fisheries Service's marine mammal stock assessment reports (e.g., Carretta et al. (2023)). Unusual mortality events, if applicable, are discussed.
Population Threats	Describes natural and anthropogenic threats. For many marine mammal species, threats are similar and are discussed generally. For ESA-listed species, some quantitative information may be presented, if available in species' recovery plans.

3.7.2.1 Marine Mammals in the Study Area

There are 40 marine mammal species with known occurrence in the Study Area and an additional group of six Mesoplodont beaked whale species analyzed collectively within the California Study Area. Survey data are insufficient to estimate species-specific abundances and densities for those six species off California. The forty species include 7 mysticetes (baleen whales), 25 odontocetes (dolphins, porpoises, and toothed whales), 7 pinnipeds (seals, fur seals, and sea lions), and the southern sea otter. Among these species, there are multiple stocks and DPSs managed by NMFS in the U.S. EEZ, and one species, the southern sea otter, is managed by the USFWS.

These species, stocks, and DPSs are presented in Table 3.7-2 with an abundance estimate, an associated coefficient of variation (CV) value (if available) measuring uncertainty, and a minimum abundance estimate. The information is based mainly on the NMFS 2022 Stock Assessment Reports (SARs) (Carretta et al., 2023; Young, 2023) but does include recent information from the draft 2023 SARs for those species with updated reports (Carretta et al., 2024; Young, 2024). Out of the 40 species, 11 are listed under the ESA as either threatened or endangered, and 4 species are organized into DPSs, which identify discrete subpopulations that are particularly vulnerable and distinguishes them from more robust subpopulations not listed under the ESA.

Table 3.7-2: Marine Mammal Occurrence Within the Study Area

Common Name	Scientific Name	Stock/DPS	Status		Occurrence in the Study Area	Seasonal Absence	Stock Abundance (CV)/Minimum Population
			MMPA	ESA			
Blue whale	*Balaenoptera musculus*	Eastern North Pacific	Depleted	Endangered	California	-	1,898 (0.085)/ 1,767
		Central North Pacific	Depleted	Endangered	Hawaii	Summer	133 (1.09)/63
Bryde's whale	*Balaenoptera edeni*	Eastern Tropical Pacific	-	-	California	-	Unknown
		Hawaii	-	-	Hawaii	-	791 (0.29)/623
Fin whale	*Balaenoptera physalus*	California, Oregon, and Washington	Depleted	Endangered	California	-	11,065 (0.405)/7,970
		Hawaii	Depleted	Endangered	Hawaii	Summer	203 (0.99)/101
Gray whale	*Eschrichtius robustus*	Eastern North Pacific stock/DPS	-	-	California	-	29,960 (0.05)/25,849
		Western North Pacific stock/DPS	Depleted	Endangered	California	-	290 (271-311)/271
Humpback whale	*Megaptera novaeangliae*	Central America/ Southern Mexico - California-Oregon-Washington Stock[1]	Depleted	Endangered	California	-	1,496 (0.171)/ 1,284
		Mainland Mexico - California-Oregon-Washington Stock[1]	Depleted	Threatened	California	-	3,477 (0.101)/3,185
		Hawaii	-	-	Hawaii	Summer	11,278 (0.56)/7,265
Minke whale	*Balaenoptera acutorostrata*	California, Oregon, and Washington	-	-	California	-	915 (0.792)/509
		Hawaii	-	-	Hawaii	Summer	438 (1.05)/212
Sei whale	*Balaenoptera borealis*	Eastern North Pacific	Depleted	Endangered	California	-	864 (0.40)/625
		Hawaii	Depleted	Endangered	Hawaii	Summer	391 (0.90)/204

Table 3.7-2: Marine Mammal Occurrence Within the Study Area (continued)

Common Name	*Scientific Name*	*Stock/DPS*	*Status*		*Occurrence in the Study Area*	*Seasonal Absence*	*Stock Abundance (CV)/Minimum Population*
Sperm whale	*Physeter macrocephalus*	California, Oregon, and Washington	Depleted	Endangered	California	-	2,606 (0.135)/2,011
		Hawaii	Depleted	Endangered	Hawaii	-	5,707 (0.23)/4,486
Pygmy sperm whale	*Kogia breviceps*	California, Oregon, and Washington	-	-	California	-	4,111 (1.12)/1,924
		Hawaii	-	-	Hawaii	-	42,083 (0.64)/25,695
Dwarf sperm whale	*Kogia sima*	California, Oregon, and Washington	-	-	California	-	Unknown
		Hawaii	-	-	Hawaii	-	37,440 (0.78) but estimate considered outdated /20,593
Baird's beaked whale	*Berardius bairdii*	California, Oregon, and Washington	-	-	California	-	1,363 (0.533)/894
Blainville's beaked whale	*Mesoplodon densirostris*	Hawaii	-	-	Hawaii	-	1,132 (0.99)/564
Cuvier's (goose-) beaked whale[3]	*Ziphius cavirostris*	California, Oregon, and Washington	-	-	California	-	5,454 (0.27)/4,214
		Hawaii	-	-	Hawaii	-	4,431 (0.41)/3,180
Longman's beaked whale	*Indopacetus pacificus*	Hawaii	-	-	Hawaii	-	2,550 (0.67)/1,527
Mesoplodont beaked whales[4]	*Mesoplodon spp.*	California, Oregon, and Washington	-	-	California	-	3,044 (0.54)/1,967

Table 3.7-2: Marine Mammal Occurrence Within the Study Area (continued)

Common Name	*Scientific Name*	*Stock/DPS*	*Status*		*Occurrence in the Study Area*	*Seasonal Absence*	*Stock Abundance (CV)/Minimum Population*
Common Bottlenose dolphin	*Tursiops truncatus*	California Coastal	-	-	California	-	453 (0.06)/346
		California, Oregon, and Washington Offshore	-	-	California	-	3,477 (0.696)/2,048
		Hawaiian Pelagic	-	-	Hawaii	-	24,669 (0.57)/15,783
		Kauai and Niihau	-	-	Hawaii	-	112 (0.24)/92
		Oahu	-	-	Hawaii	-	112 (0.17)/97
		Maui Nui	-	-	Hawaii	-	64 (0.15)/56
		Hawaii Island	-	-	Hawaii	-	136 (0.43)/96
False killer whale	*Pseudorca crassidens*	Main Hawaiian Islands Insular stock/DPS	Depleted	Endangered	Hawaii	-	138 (0.08)/129
		Hawaii Pelagic	-	-	Hawaii	-	2,038 (0.35)/1,531
		Northwestern Hawaiian Islands	-	-	Hawaii	-	477 (1.71)/178
		Eastern Tropical Pacific[2,5]	-	-	California[9]	-	2,962 (0.71)[8]/NA
Fraser's dolphin	*Lagenodelphis hosei*	Hawaii	-	-	Hawaii	-	40,960 (0.70)/24,068
Killer whale	*Orcinus orca*	Eastern North Pacific Offshore	-	-	California	-	300 (0.10)/276
	Orcinus rectipinnus	Eastern North Pacific Transient/West Coast Transient	-	-	California	-	349 (0)/349
	Orcinus ater	Eastern North Pacific Southern Resident stock/DPS	Depleted	Endangered	California	Summer & Fall	73 (0)/73
	Orcinus orca	Hawaii	-	-	Hawaii	-	161 (1.06)/78
Long-beaked common dolphin	*Delphinus delphis bairdii*	California	-	-	California	-	83,379 (0.216)/ 69,636
Melon-headed whale	*Peponocephala electra*	Hawaiian Islands	-	-	Hawaii	-	40,647 (0.74)/23,301
		Kohala Resident	-	-	Hawaii	-	447 (0.12) but estimate considered outdated/NA

Table 3.7-2: Marine Mammal Occurrence Within the Study Area (continued)

Common Name	***Scientific Name***	***Stock/DPS***	***Status***		***Occurrence in the Study Area***	***Seasonal Absence***	***Stock Abundance (CV)/Minimum Population***
Northern right whale dolphin	*Lissodelphis borealis*	California, Oregon, & Washington	-	-	California	-	29,285 (0.717)/17,024
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	California, Oregon, & Washington	-	-	California	-	34,999 (0.222)/29,090
Pantropical spotted dolphin	*Stenella attenuata*	Oahu	-	-	Hawaii	-	Unknown
		Maui Nui	-	-	Hawaii	-	Unknown
		Hawaiian Island	-	-	Hawaii	-	Unknown
		Hawaii Pelagic	-	-	Hawaii	-	67,313 (0.67)/53,839
		Eastern Tropical Pacific[5]	-	-	California[9]	-	105,416 (0.46)[8]/NA
Pygmy killer whale	*Feresa attenuata*	Eastern Tropical Pacific[5]	-	-	California	Winter & Spring	229 (1.11)[10]/NA
		Hawaii	-	-	Hawaii	-	10,328 (0.75)/5,885
Risso's dolphins	*Grampus griseus*	California, Oregon, & Washington	-	-	California	-	6,336 (0.32)/4,817
		Hawaii	-	-	Hawaii	-	6,979 (0.29)/5,283
Rough-toothed dolphin	*Steno bredanensis*	Hawaii	-	-	Hawaii	-	83,915 (0.49)/5,6782
Short-beaked common dolphin	*Delphinus delphis delphis*	California, Oregon, and Washington	-	-	California	-	1,056,308 (0.207)/888,971
Short-finned pilot whale	*Globicephala macrorhynchus*	California, Oregon, & Washington	-	-	California	-	836 (0.79)/466
		Hawaii	-	-	Hawaii	-	19,242 (0.23)/15,894

Table 3.7-2: Marine Mammal Occurrence Within the Study Area (continued)

Common Name	*Scientific Name*	*Stock/DPS*	*Status*		*Occurrence in the Study Area*	*Seasonal Absence*	*Stock Abundance (CV)/Minimum Population*
Spinner dolphin	*Stenella longirostris*	Hawaii Pelagic	-	-	Hawaii	-	3,351 (0.74) but estimate considered outdated/ NA
		Hawaii Island	-	-	Hawaii	-	665 (0.09)/617
		Oahu and 4-Islands	-	-	Hawaii	-	355 (0.09) but estimate considered outdated/NA
		Kauai and Niihau	-	-	Hawaii	-	601 (0.20) but estimate considered outdated/NA
		Kure and Midway	-	-	Hawaii	-	260 (NA) but estimate considered outdated /NA
		Pearl and Hermes	-	-	Hawaii	-	Unknown
Striped dolphin	*Stenella coeruleoalba*	California, Oregon, and Washington	-	-	California	-	29,998 (0.299)/23,448
		Hawaii	-	-	Hawaii	-	64,343 (0.28)/51,055
Dall's porpoise	*Phocoenoides dalli*	California, Oregon, and Washington	-	-	California	-	16,498 (0.608)/10,286
Harbor Porpoise	*Phocoena phocoena*	Northern California-Southern Oregon	-	-	California	-	15,303 (0.575)/9,759
		San Francisco- Russian River	-	-	California	-	7,777 (0.620)/4,811
		Monterrey Bay	-	-	California	-	3,760 (0.561)/2,421
		Morro Bay	-	-	California	-	4,191 (0.561)/2,698
Harbor seal	*Phoca vitulina*	California	-	-	California	-	30,968 (0.157)/27,348
Hawaiian monk seal	*Neomonachus schauinslandi*	N/A	Depleted	Endangered	Hawaii	-	1,564 (0.05)/1,444
Northern elephant seal	*Mirounga angustirostris*	California Breeding	-	-	California	-	187,386 (161,876–214,418)/85,369
California sea lion	*Zalophus californianus*	U.S.	-	-	California	-	257,606 (233,515—273,211)/233,515

Table 3.7-2: Marine Mammal Occurrence Within the Study Area (continued)

Common Name	*Scientific Name*	*Stock/DPS*	*Status*		*Occurrence in the Study Area*	*Seasonal Absence*	*Stock Abundance (CV)/Minimum Population*
Stellar sea lion	*Eumetopias jubatus*	Eastern[6]	-	-	California	Summer	Unknown/36,308
Guadalupe fur seal[7]	*Arctocephalus townsendi*	N/A	Depleted	Threatened	California	-	48,780 (NA)/37,940
Northern fur seal	*Callorhinus ursinus*	California	-	-	California	-	14,050 (NA)/7,524
		Eastern Pacific	Depleted	-	California	Summer	626,618 (0.2)/530,376
Southern sea otter	*Enhydra lutris nereis*	N/A	Depleted	Threatened[11]	California	-	2,962 (NA)/2,962

Note: Unless otherwise noted, abundance estimates are from the Final 2022 or Draft 2023 Pacific stock assessment reports (Carretta et al., 2024; Carretta et al., 2023), the draft 2023 Pacific stock assessment report (Carretta et al., 2024), or the Alaska stock assessment reports (Young, 2024). NA = Not Applicable
[1]Humpback whales in the Central America/Southern Mexico - California-Oregon-Washington Stock make up the endangered Central America DPS, and humpback whales in the Mainland Mexico - California-Oregon-Washington Stock are part of the threatened Mexico DPS, along with whales from the Mexico-North Pacific Stock, which do not occur in the Study Area.
[2]Abundance estimate is from Wade and Gerrodette (1993) derived specifically for waters off Southern California.
[3]The species *Ziphius cavirostris* is known by two common names: Cuvier's beaked-whale and goose-beaked whale.
[4]Mesoplodont beaked whales are analyzed as a group in the California Study Area due to insufficient data available to estimate species-specific densities. The six species known to occur in the California Study Area are: Blainville's beaked whale (*M. densirostris*), Perrin's beaked whale (*M. perrini*), Lesser beaked whale (M. *peruvianus*), Stejneger's beaked whale (*M. stejnegeri*), Gingko-toothed beaked whale (*M. gingkodens*), and Hubbs' beaked whale (*M. carlhubbsi*).
[5]The Eastern Tropical Pacific populations of false killer whale, pantropical spotted dolphin, and pygmy killer whales are not recognized stocks in NMFS Pacific stock assessment report (Carretta et al., 2024), but separate density estimates were derived to support the Navy's analysis.
[6]The Alaska SARs (Young, 2024, 2023) do not provide an abundance estimate for the Eastern stock of Steller sea lions. However, the 2022 pup count for only the U.S. portion of the Eastern stock was 10,667 and the non-pup count was 26,158 for a total of 36,308 sea lions. The counts do not include sea lions at sea and therefore are not an accurate estimate of abundance but can be considered the minimum abundance.
[7]Unpublished abundance estimate for Guadalupe fur seal provided by Norris (2022).
[8]Abundance estimate is from Ferguson and Barlow (2003), derived specifically for waters off the Baja California Peninsula, Mexico.
[9]Regular occurrence is only expected in waters off the Baja California Peninsula, Mexico.
[10]Abundance estimate for pygmy killer whale is from Barlow (2016) derived specifically for waters off Southern California.
[11]Refer to Appendix C for information on the exempted status under the ESA of the subpopulation of southern sea otter at SNI.

3.7.2.2 Critical Habitat in the Study Area

Critical habitat has been designated for four ESA-listed marine mammal species in the Study Area: Humpback whale Central America and Mexico DPSs, Southern Resident killer whale DPS, main Hawaiian Islands (MHI) insular false killer whale, and Hawaiian monk seal. A description of the essential features defining critical habitat for each species and maps showing where the critical habitat occurs in relation to the Study Area is presented in Appendix C.

3.7.2.3 Biologically Important Areas in the Study Area

Biologically Important Areas (BIAs) for specific marine mammal behaviors have been identified in the Study Area for several species in both Hawaii and California waters (Calambokidis et al., 2024; Kratofil et al., 2023). Table 3.7-3 lists the species with BIAs identified in the Study Area and the specific behavior for which the BIA is defined. A more detailed description of each BIA is provided in Appendix C along with a map showing the extent of the BIA in relation to the Study Area and the timeframe during the year when the BIA is relevant.

Table 3.7-3: Biologically Important Areas Identified in the HCTT Study Area

Species	BIA Behavior	Location	Timeframe
California Study Area			
Blue Whale	Feeding (Parent & Core)	West Coast	June–November
Humpback Whale	Feeding (Parent & Core)	West Coast	March–November
Fin Whale	Feeding (Parent & Core)	West Coast	June–November
Gray Whale (Eastern North Pacific)	Feeding (Parent & Core)	Pacific Feeding Group	June–November
	Migratory (Parent)	West Coast to Gulf of Alaska	November–June
	Migratory (Child)	West Coast (Southbound)	November–February
	Migratory (Child)	West Coast (Northbound Phase A)	January–May
	Migratory (Child)	West Coast (Northbound Phase B)	March–May
	Reproductive	West Coast (Northbound Phase B)	March–May
Killer Whale	Small and Resident (Parent & Core)	West Coast	Year-round
Harbor Porpoise	Small and Resident	Morro Bay and Monterey Bay	Year-round
Hawaii Study Area			
Rough-toothed dolphin	Small and Resident (Parent & Child)	Kauai/Niihau-Oahu	Year-round
	Small and Resident	Maui Nui-Hawaii Island	Year-round

Table 3.7-3: Biologically Important Areas Identified in the HCTT Study Area

Species	BIA Behavior	Location	Timeframe
Common Bottlenose Dolphin	Small and Resident	Hawaii island	Year-round
	Small and Resident (Parent & Child a, b, & c)	Kauai/Niihau-Oahu-Maui Nui	
Pantropical Spotted Dolphin	Small and Resident (Parent & Child a, b, & c)	Oahu-Maui Nui-Hawaii Island	Year-round
Spinner Dolphin	Small and Resident	Hawaii island	Year-round
		Kauai and Niihau	Year-round
		Kuaihelani/Hōlanikū (Midway/Kure Atolls)	Year-round
		Manawai (Pearl and Hermes Reef)	Year-round
		Oahu and Maui Nui	Year-round
Pygmy Killer Whale	Small and Resident	Hawaii island	Year-round
Melon-Headed Whale	Small and Resident	Kohala Residents - Hawaii Island	Year-round
False Killer Whale	Small and Resident Parent & Child)	Main Hawaiian Islands Insular Stock	Year-round
	Small and Resident	Northwestern Hawaiian Islands Insular Stock	Year-round
Short-Finned Pilot Whale	Small and Resident (Parent & Child a, b, & c)	Main Hawaiian Islands	Year-round
Dwarf Sperm Whale	Small and Resident (Parent & Child)	Hawaii island	Year-round
Cuvier's (Goose-) Beaked Whale	Small and Resident (Parent & Child)	Hawaii island	Year-round
Blainville's Beaked Whale (Parent and Child)	Small and Resident	Oahu-Maui Nui-Hawaii Island	Year-round
Humpback Whale	Reproductive (Parent & Child)	Main Hawaiian Islands	December–May

Note: A core BIA is defined as a core area of use. A child BIA does not represent a core area of use but rather a phase-specific important area (Calambokidis et al., 2024).

3.7.3 Environmental Consequences

None of the proposed military readiness activities would be conducted under the No Action Alternative. Therefore, baseline conditions of the existing environment for marine mammals would either remain unchanged or would improve slightly after cessation of ongoing military readiness activities. As a result, the No Action Alternative is not analyzed further within this section.

This section evaluates how, and to what degree, the activities and stressors described in Chapter 2 and Section 3.0.3.3 potentially affect marine mammals within the Study Area. The proposed military readiness activities and the locations where they would take place in the Study Area are presented in a series of tables in Chapter 2 for both Alternatives 1 and 2 and described in greater detail in Appendix A.

A review of changes in regulatory status and scientific information since 2018 that could alter the results of the stressor-based analysis presented in the 2018 HSTT and 2022 PMSR EIS/OEISs was conducted. The same stressor-based analysis was used in the analysis of adverse effects from the Proposed Action, and for most stressors, the adverse effects were generally similar to the previous analyses. The most substantive differences between the results of the previous analyses and the results from the analysis of the Proposed Action were from acoustic, explosives, and physical disturbance and strike stressors. New research on the affected environment and how marine mammals respond to underwater sound prompted the reanalysis of adverse effects from acoustic and explosives stressors. Vessel strikes off California by naval vessels since 2018 resulted in the reinitiation of consultations with NMFS and a reanalysis of the probability of vessels strikes in the Study Area.

The stressors on marine mammals listed below would vary in intensity, frequency, duration, and location within the Study Area coincident with the varying characteristics and locations of activities conducted in the Study Area (see above referenced tables in Chapter 2). General characteristics of all stressors were introduced in Section 3.0.3.3, and living resources' general susceptibilities to stressors are discussed in Appendix F, Section F.1. The stressors analyzed with updated information and data for marine mammals are:

- **acoustic** (sonar and other transducers; air guns; pile driving; vessel noise; aircraft noise; and weapons noise)
- **explosives** (explosions in-water)
- **physical disturbance and strike** (vessels and in-water devices; MEM; seafloor devices; pile driving)
- **secondary** (adverse effects on habitat; adverse effects on prey availability)
- **combined** (adverse effects from all stressors)

The analyses for these stressors and sub-stressors are derived from the 2018 HSTT and 2022 PMSR EIS/OEISs and updated as appropriate for changes to the Proposed Action.

The analyses for the following stressors (i.e., energy, entanglement, and ingestion) and any associated sub-stressors are also derived from the 2018 HSTT and 2022 PMSR EIS/OEISs and were reevaluated for the Proposed Action. A summary of these stressors and their potential adverse effects is provided in this section, but a complete reanalysis under each alternative was deemed unnecessary.

- **energy** (in-water electromagnetic devices; high-energy lasers; high-power microwave devices)
- **entanglement** (decelerators/parachutes; wires and cables)
- **ingestion** (MEM–munitions; MEM other than munitions)

Energy, entanglement, and ingestion stressors have been analyzed by the Navy since 2001 in multiple study areas across the Pacific and Atlantic, and the analysis has repeatedly and consistently concluded that there would be no significant adverse effects from these stressors on marine mammals. Regulations and authorizations issued pursuant to the MMPA by NMFS, Biological Opinions from NMFS and findings from the USFWS issued pursuant to the ESA, and the review of applicable best available since those analyses were conducted have continued to support those conclusions. The Navy and NMFS have repeatedly determined in previous analyses pursuant to the MMPA spanning more than a decade that these stressors are not likely to result in incidental takes of marine mammals as defined by the MMPA and are likely to have only discountable, less than significant, or negligible effects on ESA-listed marine mammals (National Oceanic and Atmospheric Administration, 2022; U.S. Department of the Navy, 2002, 2008, 2010a, 2010b, 2012, 2013a, 2013b, 2013c, 2013d, 2014, 2018, 2021b, 2022c).

The Navy's analysis and conclusions for the 2018 HSTT and 2022 PMSR EIS/OEISs (U.S. Department of the Navy, 2018, 2022c), which comprise the majority of the HCTT Study Area, were found by NMFS to be complete and supportable. NMFS also determined that ESA-listed marine mammals in the HSTT Study Area and PMSR Study Area were not likely to be adversely affected by these same stressors (National Marine Fisheries Service, 2018, 2022).

There are no substantive differences in the way military readiness activities with these stressors are conducted in the HSTT Study Area or the PMSR Study Area compared to how they would be conducted under the Proposed Action in the HCTT Study Area. While the HCTT Study Area would be expanded off California compared to the size of the California portion of the HSTT Study Area, a large part of that expansion is the inclusion of the PMSR, and, as noted above, the analysis of effects on marine mammals from energy, entanglement, and ingestion stressors due to activities in the PMSR concluded that there would be no reasonably foreseeable adverse effects on marine mammals. Fewer activities potentially effecting marine mammals are conducted in the NOCAL Range Complex and the airspace extensions W-293 and W-294 compared with the level of activity in the PMSR and SOCAL Range Complex, so the potential for adverse effects is lower from activities in those areas, which are predominantly used for aircraft activities. In addition, all marine mammal species occurring in the HCTT Study Area were previously analyzed in either or both the 2018 HSTT and 2022 PMSR EIS/OEISs (U.S. Department of the Navy, 2018, 2022c).

As stated in Section 3.0.2, a significance determination is only required for activities that may have reasonably foreseeable adverse effects on the human environment based on the significance factors in 40 CFR 1501.3(d). The same conclusions reached repeatedly over the last decade by the Navy and NMFS regarding energy, entanglement, and ingestion stressors found that there were no reasonably foreseeable adverse effects on the human environment from those stressors. Therefore, only acoustic, explosives, and physical disturbance and strike stressors, would have a reasonably foreseeable adverse effect, thus requiring further analysis in this section and a significance determination.

A stressor is considered to have a significant effect on the human environment based on an examination of the context of the action and the intensity of the effect. Regarding marine mammals, the effects of acoustic, explosives, and physical disturbance and strike stressors would be considered significant if the effects have short-term or long-term changes well outside the limits of natural variability in terms of space and the species' ability to meet nutritional, physiological, or reproductive requirements within the Study Area. A significant effect finding would be appropriate if a marine mammal species would be adversely affected over the long term or permanently such that the population in the Study Area would no longer be sustainable.

In this analysis, marine mammal species may be grouped together based on similar biology (e.g., hearing sensitivity) or behaviors (e.g., feeding or expected reaction to stressors) when most appropriate for the analysis. For some stressors, species are grouped based on their taxonomic relationship and discussed as follows: mysticetes (baleen whales), odontocetes (toothed whales, dolphins, and porpoises), pinnipeds (seals, fur seals, and sea lions), and the southern sea otter. When adverse effects are expected to be similar for all species or when it is determined there would be no adverse effect on any species, the discussion will be general and not species-specific. However, when adverse effects are not the same to certain species or groups of species, the discussion will be as specific as the best available science allow. In addition, if military readiness activities only occur in or will be concentrated in certain areas, the discussion will be geographically focused. Based on acoustic thresholds and criteria developed with NMFS, adverse effects from sound sources as acoustic and explosive stressors will be quantified at the species or stock level as is required pursuant to authorization under the MMPA.

3.7.3.1 Mitigation Summary

The analysis considers standard operating procedures and mitigation measures that would be implemented under Alternative 1 and Alternative 2 of the Proposed Action.

Mitigation measures are specifically applicable to activities with explosives, acoustic, and physical disturbance and strike stressors as summarized in Table 3.7-4, along with standard operating procedures, and discussed in detail in Chapter 5. The development of geographic mitigation measures are discussed in detail in Appendix K.

Table 3.7-4: Summary of Standard Operating Procedures and Mitigation for Marine Mammals

Applicable Stressor	Requirements Summary and Protection Focus	Section Reference
Explosives	The Action Proponents will not detonate any in-water explosives within a horizontal distance of 350 yd from shallow-water coral reefs and precious coral beds.	Section 5.7.1 (Shallow-Water Coral Reef and Precious Coral Bed Mitigation Areas)[1]
	The Action Proponents will not detonate any in-water explosives within a horizontal distance of 350 yd from artificial reefs, biogenic habitat, and shipwrecks, except in designated locations where these resources will be avoided to the maximum extent practical.	Section 5.7.2 (Artificial Reef, Hard Bottom Substrate, and Shipwreck Mitigation Areas)[1]
	The Action Proponents will conduct visual observations for large schools of fish during events with the largest net explosive weights involving explosive torpedoes and ship shock trials.	Section 5.6 (Activity-based Mitigation)[2]
	The Action Proponents will not deploy non-explosive ordnance against surface targets too close to shallow-water coral reefs	Section 5.7.1 (Shallow-Water Coral Reef and Precious Coral Bed Mitigation Areas)[1]
	The Action Proponents will not place non-explosive seafloor devices directly on artificial reefs, biogenic hard bottom, submerged aquatic vegetation, or shipwrecks	Section 5.7.2 (Artificial Reef, Hard Bottom Substrate, and Shipwreck Mitigation Areas)[1]
	Conduct visual observations for events involving 10 explosive mitigation categories.	Section 5.6 (Activity-based Mitigation)

Table 3.7-4: Summary of Standard Operating Procedures and Mitigation for Marine Mammals (continued)

Applicable Stressor	Requirements Summary and Protection Focus	Section Reference
Explosives (continued)	Restrictions on use of explosive stressors within mitigation areas, marine mammal foraging, reproduction, migration, and critical habitat.	Section 5.7.3 (Hawaii Island Marine Mammal Mitigation Area) Section 5.7.4 (Hawaii 4-Islands Marine Mammal Mitigation Area) Section 5.7.6 (Hawaii Humpback Whale Awareness Messages) Section 5.7.9 (Southern California Blue Whale Mitigation Area) Section 5.7.10 (California Large Whale Awareness Messages)
Acoustics	Conduct visual observations for events involving active acoustic sources, air guns, pile driving, and weapons firing noise.	Section 5.6 (Activity-based Mitigation)
	Restrictions on use of active acoustic stressors within mitigation areas, marine mammal foraging, reproduction, migration, and critical habitat.	Section 5.7.3 (Hawaii Island Marine Mammal Mitigation Area) Section 5.7.4 (Hawaii 4-Islands Marine Mammal Mitigation Area) Section 5.7.5 (Hawaii Humpback Whale Special Reporting Mitigation Area) Section 5.7.6 (Hawaii Humpback Whale Awareness Messages) Section 5.7.8 (Central California Large Whale Mitigation Area) Section 5.7.9 (Southern California Blue Whale Mitigation Area) Section 5.7.9 (California Large Whale Awareness Messages)
Physical disturbance and strike	The Action Proponents will not 1. set vessel anchors within an anchor swing circle radius that overlaps shallow-water coral reefs (except in designated anchorages) 2. place other seafloor devices too close to shallow-water coral reefs	Section 5.7.1 (Shallow-Water Coral Reef and Precious Coral Bed Mitigation Areas)[1]
	The Action Proponents will not 1. set vessel anchors within an anchor swing circle radius that overlaps artificial reefs, biogenic hard bottom, submerged aquatic vegetation, and shipwrecks (except in designated anchorages) 2. place other seafloor devices (that are not precisely placed) too close to artificial reefs, biogenic hard bottom, submerged aquatic vegetation, and shipwrecks (except for vessel anchors, precisely placed seafloor devices, and as described in Section 5.7.2, Table 5-8)	Section 5.7.2 (Artificial Reef, Hard Bottom Substrate, and Shipwreck Mitigation Areas)[1]
	Conduct visual observations for events involving 8 mitigation categories.	Section 5.6 (Activity-based Mitigation)

Table 3.7-4: Summary of Standard Operating Procedures and Mitigation for Marine Mammals (continued)

Applicable Stressor	Requirements Summary and Protection Focus	Section Reference
Physical disturbance and strike (continued)	Restrictions on use of physical disturbance and strike stressors within mitigation areas for marine mammal foraging, reproduction, and migration, and critical habitat.	Section 5.7.6 (Hawaii Humpback Whale Awareness Messages) Section 5.7.10 (California Large Whale Awareness Messages) Section 5.7.11 (California Real-Time Notification Large Whale Mitigation Area)
In-air missile or air vehicle launch noise	Restrictions on launch noise (e.g., seasonal scheduling and annual caps) and physical disturbance to pinnipeds hauled out on beaches.	Section 5.7.12 (San Nicholas Island Pinniped Haulout Mitigation Area)

[1]The mitigation was developed to protect specific habitats, which also protects fish that are associated with those habitats.
[2]The mitigation was developed to protect possible indicators of marine mammal presence, which includes large schools of fish.

3.7.3.2 Acoustic Stressors

This section summarizes the potential adverse effects of acoustic stressors used during military readiness activities within the Study Area. The acoustic sub-stressors included for analysis are (1) sonar and other transducers (hereafter referred to as sonars), (2) air guns, (3) pile driving, (4) vessel noise, (5) aircraft noise, and (6) weapons noise. Table 3.7-5 contains brief summaries of background information relevant to the analyses of adverse effects for each acoustic sub-stressor. Detailed information on acoustic terminology used in this analysis and acoustic effects categories in general, as well as a summary of best available science on effects to marine mammals specific to each sub-stressor, are provided in Appendix D.

Due to updated criteria and thresholds used to assess auditory and behavioral effects; densities (animals per unit area); and acoustic effects modeling, as well as changes to the proposed use of certain acoustic sub-stressors, the quantitative analyses of effects due to sonars, air guns, and pile driving in this section supplant the quantitative analyses in the 2018 HSTT EIS/OEIS. The detailed assessment of these acoustic stressors under this Proposed Action is in Appendix E.

In addition to changes in the Proposed Action, changes in the predicted acoustic effects due to sonars, air guns, and pile driving are due to the following:

- Improvements to criteria used to determine if exposures to acoustic stressors may cause auditory effects and behavioral responses. Changes to the auditory effects criteria include changes to some hearing group divisions and names. The Low Frequency (LF) cetacean group containing mysticete cetaceans was split into two auditory groups: Very Low Frequency (VLF) cetaceans and LF cetaceans. The group previously called the Mid-frequency (MF) cetaceans (most odontocetes) is now called the High Frequency (HF) cetaceans. The group previously called the HF cetaceans (harbor porpoises and *kogia* species) is now called the Very High Frequency (VHF) cetaceans. For non-impulsive sounds like sonars, the HF cetacean, Phocid in

Water (PCW), and Otariid in Water (OCW) groups have increased susceptibility to auditory effects; the VHF cetaceans have decreased susceptibility to auditory effects; and the new LF group is more susceptible to effects at higher frequencies than the VLF group. For impulsive sounds like air guns and impact pile driving, HF cetaceans are more susceptible to auditory effects, especially at low to mid-frequencies, where most explosive energy is concentrated. Peak pressure thresholds increased for VLF and LF cetaceans (mysticetes) and decreased for PCW. For behavioral response criteria, the behavioral response functions for sonars were revised to include experimental behavioral response data available since the prior analysis. Beaked whales and harbor porpoises were placed in a new Sensitive behavioral group with an associated behavioral response function. The cut-off conditions for the behavioral response functions were also revised. A summary of these changes is in Appendix E. For additional details see the technical report *Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase IV)* (U.S. Department of the Navy, 2024a).

- Revisions to the modeling of acoustic effects due to sonars and air guns in the Navy Acoustic Effects Model, including incorporation of a new sonar avoidance model. A summary of these changes is in Appendix E. For additional details see the technical report *Quantifying Acoustic Impacts on Marine Mammals and Sea Turtles: Methods and Analytical Approach for Phase IV Training and Testing* (U.S. Department of the Navy, 2024c).
- Updates to data on marine mammal presence, including estimated density of each species or stock (number of animals per unit area), group size, and depth distribution. For additional details see the technical reports *U.S. Navy Marine Species Density Database Phase IV for the Hawaii-California Training and Testing Study Area* (U.S. Department of the Navy, 2024d) and *Dive Distribution and Group Size Parameters for Marine Species Occurring in the U.S. Navy's Atlantic and Hawaii- California Training and Testing Study Areas* (U.S. Department of the Navy, 2024b).
- Changes in how mitigation is considered in reducing predicted effects. The number of model-predicted auditory injuries are not reduced due to activity-based mitigation, unlike in prior analyses.

As discussed in Chapter 5, the Action Proponents will implement activity-based mitigation under Alternative 1 and Alternative 2 to reduce potential adverse effects from acoustic stressors on marine mammals. The Action Proponents will also implement geographic mitigation to reduce potential acoustic effects within important marine mammal habitats as identified in the geographic mitigation section of Chapter 5.

Table 3.7-5: Acoustic Stressors Information Summary

Sub-Stressor	Summary
Sonar and other transducers	Sonar and other transducers may result in hearing loss, masking, physiological stress, or behavioral reactions. Behavioral responses can depend on the characteristics of the signal, behavioral state of the animal, sensitivity and previous experience of an individual, and other contextual factors including distance of the source, movement of the source, physical presence of vessels, time of year, and geographic location. Different groups of marine mammals may respond in different ways to sonar and other transducers: • Mysticetes: Mysticetes are in the Low Frequency (LF) hearing group. LF and mid-frequency active sonar may cause masking, behavioral responses, and adverse auditory effects. Mysticetes are less like to be affected by high frequency sonars, and very high frequency sonars are outside of their hearing range. Mysticetes are more adaptive while migrating, while sonar could have a greater effect to whale behavior on seasonal foraging and breeding grounds. Little is known about possible physiological stress responses. • Odontocetes: Odontocetes are in the High Frequency (HF) and Very High Frequency (VHF) hearing groups. Active sonars may result in masking, behavioral responses, noise-induced vocal modification, and adverse auditory effects. Mid-frequency active and high-frequency active sonars are more likely to result in masking and adverse auditory effects than other sonars. Harbor porpoises and beaked whales are more sensitive to disturbance than other odontocetes. • Pinnipeds: Pinnipeds are in two hearing groups: the phocid carnivores in water and in air (PCW and PCA: true seals) and otariid carnivores and other non-phocid marine carnivores in water and air (OCW and OCA: sea lions, fur seals, walruses, sea otters, polar bears). Compared to LF active sonars, mid-frequency and HF active sonars are more likely to result in hearing loss. In addition, mid-frequency active sonar could mask underwater vocalizations. VHF active sonars are outside of the hearing range of pinnipeds and other marine carnivores. Pinnipeds are most likely to respond to nearby or approaching sonar, although reactions to sonar, pingers or seal scarers have been reported. • Sea otter: Sea otters are in the otariid hearing group. Mid-frequency and HF active sonar may result in hearing loss and masking; however, sea otters spend considerable time resting and feeding at the water's surface with their heads above water. Little information is available on sea otter responses to sonars and other transducers.

Table 3.7-5: Acoustic Stressors Information Summary (continued)

Sub-Stressor	Summary
Vessel noise	Vessel noise may result in masking, physiological stress, or behavioral reactions. Behavioral responses to vessels can be caused by multiple factors. Vessel sound exposure is rarely decoupled from the physical presence of a surface vessel. In some more industrialized or populated areas, vessel noise is a chronic and frequent stressor. Different groups of marine mammals may respond in different ways to vessels disturbance. • Mysticetes: Vocalizations are likely to be masked or otherwise affected (noise-induced vocal modification) by vessel noise, resulting in decreased communication space. Responses to vessel noise is varied and include not responding at all to approaching vessels, as well as both horizontal (swimming away) and vertical (increased diving) avoidance. • Odontocetes: Communication calls are more likely to be masked by vessel noise than echolocation, but masking of echolocation is possible. Responses to vessel noise includes both attraction (e.g., bowriding) and avoidance behaviors by more sensitive species (e.g., Kogia whales and beaked whales) or individuals. Many noise-induced vocal modifications and short-term response to boat traffic have been documented. • Pinnipeds: Underwater vocalizations may be masked by vessel noise. Responses to vessel noise is varied and include avoidance, alerting, and reduced time feeding, resting, or nursing. Others demonstrate in-water attraction or a lack of significant reaction when hauled out, suggesting habituation to or tolerance of vessels. • Sea otters: Sea otters occur close to shore in habitat typically less than 50 m in depth and often adjacent to kelp beds. Large military vessels would not occur in these areas. Smaller boats approaching rafting sea otters may cause them to dive, interrupting feeding or resting behaviors. Visual cues from an approaching vessel may also cause a similar response. Avoidance by sea otters or a lack of response is more likely when vessels are moving more slowly.
Aircraft noise	Aircraft noise may result in masking, physiological stress, or behavioral reactions. Aircraft sound exposure is rarely decoupled from the physical presence of an aircraft. Different groups of marine mammals may respond in different ways to aircraft noise. • Mysticetes: Typically whales either ignore or occasionally dive in response to aircraft overflights. Some whales may avoid helicopters or fixed-wing aircraft, but UAVs have not produced responses in any mysticete species. • Odontocetes: Responses to aircraft noise is varied, but overall little change in behavior has been observed. Some odontocetes will fluke, flipper slap or avoid the noise source, particularly sensitive species like beaked whales or Kogia whales. Although for deep-diving species not frequently at the surface (beaked whales), adverse effects would be less expected. Helicopters may elicit a greater reaction in odontocetes, but do not appear responsive to smaller UAVs except at low altitudes. • Pinnipeds: Responses are dependent on aircraft variables (e.g., altitude, distance, noise abruptness), and pinniped life cycle stage (e.g., breeding and molting). Pinnipeds may be more responsive to UAVs at low altitudes since they could resemble predatory birds, but have generally the same possible reactions to all type of aircraft. They may startle, orient towards the sound source, increase vigilance, or briefly re-enter the water, but are generally unresponsive to crewed overflights and typically remain hauled out or immediately return to their haul out location. • Sea Otters: Sea otters spend most of their time on the surface of the water and will most likely be exposed to aircraft noise. They may flush into the water and dive below the surface to avoid aircraft noise or remain unresponsive as dive behaviors are very energetically costly to sea otters. Helicopter noise does not seem to affect sea otter foraging success or daily activity patterns, and no adverse effects have been reported for a colony of sea otters near a Naval landing field at San Nicolas Island.

Table 3.7-5: Acoustic Stressors Information Summary (continued)

Sub-Stressor	Summary
Impulsive noise (includes air guns, pile driving, and weapons noise)	Impulsive noise may result in hearing loss, masking, physiological stress, or behavioral reaction. The intermittent nature of most impulsive sounds would result in very limited probability of any masking effects. Due to the rapid rise time and higher instantaneous peak pressure of impulsive noise, nearby noise is more likely to cause startle or avoidance responses. Different groups of marine mammals may respond in different ways to impulsive noise: • Mysticetes: LF species are likely affected since low frequency explosive noise propagates long distances and overlaps with the range of best hearing for mysticetes. They have shown a variety of responses to impulsive noise, including avoidance, habitat displacement, reduced surface intervals, altered swimming behavior, and changes in vocalization rates. • Odontocetes: Impulsive noise can result in hearing loss for VHF and HF odontocetes, with the VHF group exhibiting greater sensitivity. Masking effects are possible but release from masking during the silent period between sounds is likely. Most odontocetes are behaviorally less sensitive to impulsive noise than mysticetes, with responses occurring at much closer distances, with the exception of harbor porpoises that avoid both stationary and moving impulsive sources. • Pinnipeds: Pinnipeds may experience hearing effects from underwater and in-air noises. Pinnipeds are among the least behaviorally sensitive taxonomic group in the Study Area and are only likely to respond to loud impulsive noises at close ranges by startling, jumping into the water when hauled out, or ceasing foraging (in the water), but only for brief periods before returning to their previous behavior. • Behavioral responses from hauled-out pinnipeds on SNI due to noise from land-based missile or air vehicle launches have been documented and are likely to continue. Responses observed at SNI have included flushing into the water, moving down the beach, alert reactions, or no reaction, largely dependent on species. • Behavioral responses from Hawaiian monk seals at PMRF may occur from air vehicle and missile launches and artillery firing from land-based sites. No AINJ or TTS effects on hauled out monk seals are anticipated. Like pinnipeds on SNI, behavioral responses could include an alert response (lifting the head), moving on the beach, flushing into the water, or no response. • Sea Otters: Like pinnipeds, sea otters show little if any response to noise. Sea otters require long periods of undisturbed rest to counterbalance the high metabolic costs of their foraging strategy. Responses to underwater noises may also be reduced since sea otters spend most of their time on the surface and have less hearing sensitivity underwater compared to pinnipeds. If responsive, otters may raise their heads, focus attention on the sound source, swim away, or startle dive.

Notes: OCA = other marine carnivores in air, OCW = other marine carnivores in Water, PCA = phocid carnivores in air, PCW = phocid carnivores in water, UAV = unmanned aerial vehicle, TTS = temporary threshold shift, AINJ = auditory injury, SNI = San Nicolas Island

3.7.3.2.1 Effects from Sonars and Other Transducers

Table 3.7-5 contains a summary of the background information used to analyze the potential effects of sonars and other transducers (hereinafter inclusively referred to as sonars) on marine mammals. Other transducers include items such as acoustic projectors and countermeasure devices. As discussed, in Section 3.0.3.3.1, a detailed comparison of sonar quantities analyzed in the 2018 HSTT EIS/OEIS with sonar quantities under this Proposed Action is not feasible due to changes in the source binning process.

The below information briefly summarizes information relevant to the assessment of the effects of sonars on marine mammals under the Proposed Action. A more extensive assessment of the effects on marine mammals due to exposure to sonars under this Proposed Action is in Appendix E.

Sonars have the potential to affect marine mammals by causing auditory injuries, TTS, masking, non-injurious physiological responses (such as stress), or behavioral reactions. Low- (less than 1 kHz), mid- (1 to 10 kHz) frequency sonars, and some high (10 to 100 kHz) frequency sonars are within hearing range of all marine mammals. Additionally, all high- and very high-frequency (100 to 200 kHz) sonars are in the hearing range of all odontocetes (HF and VLF hearing groups).

Sonars with higher source levels, longer durations, higher duty cycles, and frequencies near the best range of hearing are more likely to affect hearing. Due to their high source levels and low transmission loss (compared to higher frequency sources), anti-submarine warfare sonar sources, including hull-mounted sonar (MF1) and high duty cycle hull-mounted sonar (MF1C), have large zones of effects. The ranges to auditory effects for MF1, MF1C, and other selected sonars are in in Appendix E.

In general, the estimated number of predicted auditory effects have increased since the 2018 HSTT EIS/OEIS. While some increases may be attributable to changes in the Proposed Action and increase in action areas (e.g., inclusion of NOCAL Range Complex), many increases are due to changes in methodologies used to model effects that are listed in Section 3.7.3.1. Notably, the updated criteria for the HF cetacean auditory group, which includes delphinids and most other odontocetes, and the PCW auditory group indicate increased susceptibility to auditory effects at low and mid-frequencies compared to the prior auditory criteria. Consequently, predicted auditory effects due to most anti-submarine warfare sonars are substantially higher for these groups than in prior analyses of the same activities. The change in susceptibility to auditory effects due to sonars is less pronounced for other auditory groups. For most auditory groups, the revision to the avoidance model, which assumes that some marine mammals may avoid sound levels that can cause auditory injury, has also resulted in increased estimates of auditory injuries for certain activities, particularly certain high duty cycle sources. The revised avoidance method bases the initiation of an avoidance response on the behavioral response criteria. The ability to avoid a sonar exposure that may cause auditory effects in the model depends on a species' susceptibility to auditory effects, a species' sensitivity to behavioral disturbance, and characteristics of the sonar source, including duty cycle, source level, and frequency. Thus, predicted auditory effects for species that are less sensitive to disturbance compared to susceptibility to auditory effects have increased.

Most anti-submarine warfare sonars are composed of individual sounds which are short, lasting up to a few seconds each. Systems typically operate with low-duty cycles for most tactical sources, but some systems may operate nearly continuously or with higher duty cycles. Some testing activities may also use sonars with high duty cycles. These higher duty cycle sources would pose a greater risk of masking than intermittent sources. Most anti-submarine warfare activities are geographically dispersed, have a limited duration, and intermittently use sonars with a narrow frequency band. These factors reduce the potential for significant or extended masking in marine mammals.

The number of predicted behavioral effects has changed for all stocks since the prior analysis. These changes are primarily due to revisions to the behavioral response functions. The updated behavioral response functions predict greater sensitivity for the pinniped behavioral group and lower sensitivity for the odontocete and mysticete behavioral groups compared to the previous behavioral response functions. The new function for the sensitive species behavioral group predicts greater sensitivity at lower received levels for beaked whales and harbor porpoises. In addition, the cut-off conditions for predicting behavioral responses have been revised. These factors interact in complex ways that make comparing the predicted behavioral responses in this analysis to the prior analyses challenging.

As discussed in Section 3.7.3, the Action Proponents will implement activity-based mitigation under Alternative 1 and Alternative 2 to reduce potential effects from sonar on marine mammals. While model-predicted effects are not reduced to account for activity-based mitigation, opportunities to mitigate model-predicted effects were identified by determining if the closest points of approach associated with predicted auditory injuries were also within the mitigation zone. This analysis is presented in Appendix E.

The Action Proponents will also implement geographic mitigation to reduce potential acoustic effects within important marine mammal habitats as identified in Table 3.7-4.

3.7.3.2.1.1 Effects from Sonar and Other Transducers Under Alternative 1

Training and Testing. Under Alternative 1, the overall use of sonar and other transducers would increase from the 2018 HSTT EIS/OEIS for both training and testing activities for most sources. For regular duty cycle (MF1) hull-mounted sonar, the maximum year of training and testing activities includes greater than 20 percent more hours in the California Study Area and greater than 10 percent hours more in the Hawaii Study Area compared to the prior analysis. For high duty cycle (MF1C) hull-mounted sonar, the maximum year of training and testing activities includes approximately 50 percent more hours in the California Study Area and greater than 60 percent more hours in the Hawaii Study Area compared to the prior analysis.

The number of effects to each stock due to exposure to sonar during testing and training under Alternative 1 are shown in Table 3.7-6 for a maximum year of activities and in Table 3.7-7 for 7 years of activities. Depending on the stock, effects on individuals may be permanent (auditory injuries) or temporary (TTS, masking, stress, or behavioral response). Behavioral patterns of some individuals, which may include communication, foraging, or breeding, are likely to be temporarily disrupted. Individuals or groups may avoid areas around sonar activities and be temporarily displaced from a preferred habitat. Displacement may be brief for short duration activities or extended for multi-day events and would depend on the behavioral sensitivity of the species. Sensitive species, particularly beaked whales, may avoid for farther distances and for longer durations. Most activities do not occur for extended multi-day periods and would occur over small areas relative to population ranges. The average rate of predicted effects on individuals in most populations would range from less than once per year to several times per year. Individuals of some behaviorally sensitive species or in populations concentrated near range complexes in the Pacific may have higher repeated effects. These effects are not expected to interfere with feeding, reproduction, or other biologically important functions such that the continued viability of the population would be threatened.

Modernization and Sustainment of Ranges. Sonar would not be used during modernization and sustainment of ranges.

Conclusion. Because effects are not expected to interfere with feeding, reproduction, or other biologically important functions, activities that include the use of sonar and other transducers under Alternative 1 would result in less than significant effects.

3.7.3.2.1.2 Effects from Sonar and Other Transducers Under Alternative 2

Under Alternative 2, there would be no meaningful difference in the use of sonar during testing and training activities compared to Alternative 1. Slightly more very high frequency sonar sources (185–205 dB), high-frequency sonar sources (185–205 dB), mid-frequency sources (> 185 dB), and low frequency sources (185–205 dB) would be used. However, the increases would not result in substantive changes to the potential for or types of effects on marine mammals. Overall effects are not meaningfully different from Alternative 1 for marine mammals' stocks. Therefore, activities that include the use of sonar and other transducers under Alternative 2 would result in less than significant effects.

The number of effects to each marine mammal stock due to exposure to sonar during testing and training under Alternative 2 are shown in Table 3.7-6 for a maximum year of activities and in Table 3.7-7 for seven years of activities.

Table 3.7-6: Effects Due to a Maximum Year of Sonar Testing and Training Activity Under Alternative 1 and Alternative 2

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
ESA-Listed							
Blue whale	Eastern North Pacific	1,360	3,018	24	1,361	3,019	25
	Central North Pacific	16	75	1	16	75	1
Fin whale	Hawai'i	19	65	1	19	65	1
	California/Oregon/Washington	3,530	9,614	43	3,543	9,622	43
Gray whale	Western North Pacific	69	95	2	70	95	2
Humpback whale	Mainland Mexico - California/Oregon/Washington	1,207	3,061	39	1,210	3,062	39
	Central America/Southern Mexico - California/Oregon/Washington	516	1,303	17	517	1,304	17
Sei whale	Hawai'i	37	214	2	37	214	2
	Eastern North Pacific	76	216	2	76	216	3
False killer whale	Main Hawaiian Islands Insular	104	63	-	104	63	-
Killer whale	Southern Resident	0	-	-	0	-	-
Sperm whale	Hawai'i	1,234	410	0	1,234	410	0
	California/Oregon/Washington	2,995	887	1	2,998	887	1
Guadalupe fur seal	Mexico	128,555	39,296	17	128,651	39,299	17
Hawaiian monk seal	Hawai'i	516	128	1	516	132	1
Non ESA-Listed							
Bryde’s whale	Hawai'i	65	338	3	65	338	3
	Eastern Tropical Pacific	96	169	3	96	169	3
Gray whale	Eastern North Pacific	6,794	9,112	129	6,794	9,113	130
Humpback whale	Hawai'i	1,135	1,716	15	1,136	1,723	17
Minke whale	Hawai'i	41	250	3	41	250	3
	California/Oregon/Washington	904	1,960	22	906	1,961	22
Bottlenose dolphin	O'ahu	7,079	102	1	7,079	102	2
	Maui Nui (formerly 4-Islands)	307	14	0	309	15	0
	Kaua'i/Ni'ihau	1,221	238	-	1,221	238	-
	Hawai'i Pelagic	37,096	5,882	4	37,155	5,921	6
	Hawai'i Island	5	3	-	5	3	-
	California/Oregon/Washington Offshore	21,186	6,778	4	21,194	6,778	4
	California Coastal	1,297	28	-	1,297	28	-
Dall’s porpoise	California/Oregon/Washington	12,790	45,151	744	12,821	45,211	746
Dwarf sperm whale	Hawai'i	10,462	33,778	702	10,463	33,780	702
	California/Oregon/Washington	1,471	4,089	63	1,472	4,091	63

Table 3.7-6: Effects Due to a Maximum Year of Sonar Testing and Training Activity Under Alternative 1 and Alternative 2 (continued)

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
False killer whale	Northwest Hawaiian Islands	128	63	-	128	63	-
	Hawai'i Pelagic	935	733	1	935	733	1
	Eastern Tropical Pacific Nsd	1,709	825	1	1,709	825	1
Fraser's dolphin	Hawai'i	19,838	15,613	2	19,842	15,613	3
Killer whale	West Coast Transient	27	28	-	27	28	-
	Hawai'i	57	70	-	57	70	-
	Eastern North Pacific Offshore	822	185	0	822	185	0
Long-beaked common dolphin	California	253,603	42,536	26	253,789	42,555	26
Melon-headed whale	Kohala Resident	40	14	-	40	14	-
	Hawaiian Islands	16,179	15,264	10	16,180	15,264	11
Northern right whale dolphin	California/Oregon/Washington	23,855	21,634	15	23,901	21,638	15
Pacific white-sided dolphin	California/Oregon/Washington	45,468	23,535	16	45,523	23,542	17
Pantropical spotted dolphin	O'ahu	6,238	155	2	6,238	155	2
	Northeastern Offshore Nsd	60,767	36,786	39	60,767	36,786	39
	Maui Nui (formerly 4-Islands)	2,169	171	1	2,181	186	1
	Hawai'i Pelagic	24,205	20,140	11	24,211	20,146	11
	Hawai'i Island	2,899	3,113	3	2,899	3,113	3
Pygmy killer whale	Hawai'i	4,650	4,239	2	4,650	4,239	2
	California Nsd	620	171	-	621	171	-
Pygmy sperm whale	Hawai'i	10,534	34,247	723	10,535	34,248	723
	California/Oregon/Washington	1,506	3,990	66	1,507	3,992	66
Risso's dolphin	Hawai'i	3,561	2,991	2	3,561	2,991	2
	California/Oregon/Washington	33,156	10,593	4	33,177	10,595	5
Rough-toothed dolphin	Hawai'i	57,829	38,838	21	57,860	38,860	21
Short-beaked common dolphin	California/Oregon/Washington	1,498,000	668,121	447	1,499,057	668,226	448
Short-finned pilot whale	Hawai'i	11,613	5,665	3	11,617	5,669	3
	California/Oregon/Washington	3,345	918	2	3,347	918	2
Spinner dolphin	O'ahu/4 Islands	1,151	41	0	1,154	44	1
	Kaua'i Ni'ihau	3,561	882	1	3,561	882	1
	Hawai'i Pelagic	2,176	2,365	2	2,176	2,365	2
	Hawai'i Island	59	49	-	59	50	-
Striped dolphin	Hawai'i Pelagic	18,606	19,153	7	18,606	19,153	8
	California/Oregon/Washington	81,017	52,307	34	81,047	52,310	34

Table 3.7-6: Effects Due to a Maximum Year of Sonar Testing and Training Activity Under Alternative 1 and Alternative 2 (continued)

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
Baird's beaked whale	California/Oregon/Washington	10,111	60	-	10,132	60	-
Blainville's beaked whale	Hawai'i	7,507	33	-	7,507	33	-
Cuvier's (goose-) beaked whale	Hawai'i	30,225	126	-	30,228	126	-
	California/Oregon/Washington	166,190	596	-	166,313	596	-
Harbor porpoise	San Francisco Russian River	9,894	35	0	9,894	35	1
	Northern California/ Southern Oregon	481	0	-	482	1	-
	Morro Bay	4,078	49	1	4,127	50	1
	Monterey Bay	2,179	0	-	2,179	0	-
Longman's beaked whale	Hawai'i	18,217	95	-	18,219	95	-
Mesoplodont beaked whales	California/Oregon/Washington	92,410	412	0	92,517	412	0
California sea lion	United States	1,606,187	253,948	131	1,608,326	254,025	132
Harbor seal	California	49,041	16,918	6	49,048	16,921	6
Northern elephant seal	California Breeding	64,685	52,856	22	64,894	52,891	22
Northern fur seal	Eastern Pacific	23,084	10,059	3	23,211	10,064	3
	California	15,836	6,221	2	15,961	6,225	2
Steller sea lion	Eastern	832	153	1	832	153	1

Notes: BEH = Significant Behavioral Response, TTS = Temporary Threshold Shift, AINJ = Auditory Injury
A dash (-) indicates a (true zero), and zero (0) indicates a rounded value less than 0.5.
Stocks are not shown if no effects are estimated.
Nsd = No stock designation under MMPA.

Table 3.7-7: Effects Due to Seven Years of Sonar Testing and Training Activity Under Alternative 1 and Alternative 2

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
ESA-Listed							
Blue whale	Eastern North Pacific	7,962	15,664	132	8,671	18,951	165
	Central North Pacific	91	432	2	97	503	2
Fin whale	Hawai'i	110	374	1	116	445	1
	California/Oregon/Washington	20,282	46,161	225	22,713	58,169	281
Gray whale	Western North Pacific	423	415	5	435	427	6
Humpback whale	Mainland Mexico - California/Oregon/Washington	7,288	14,923	196	7,746	18,795	254
	Central America/Southern Mexico - California/Oregon/Washington	3,110	6,345	88	3,316	8,053	110
Sei whale	Hawai'i	223	1,208	5	233	1,446	5
	Eastern North Pacific	442	1,110	8	485	1,367	10
False killer whale	Main Hawaiian Islands Insular	634	369	-	665	429	-
Killer whale	Southern Resident	0	-	-	0	-	-
Sperm whale	Hawai'i	7,303	2,299	0	8,007	2,749	0
	California/Oregon/Washington	16,284	4,271	1	19,177	5,607	1
Guadalupe fur seal	Mexico	720,161	197,760	88	855,905	258,368	111
Hawaiian monk seal	Hawai'i	3,473	791	1	3,506	887	1
Non ESA-Listed							
Bryde's whale	Hawai'i	384	1,955	11	407	2,265	13
	Eastern Tropical Pacific	575	931	9	619	1,078	10
Gray whale	Eastern North Pacific	41,395	40,761	763	42,491	41,847	818
Humpback whale	Hawai'i	7,225	10,496	97	7,473	11,731	112
Minke whale	Hawai'i	249	1,437	13	261	1,686	15
	California/Oregon/Washington	5,495	9,789	124	5,830	12,101	148
Bottlenose dolphin	O'ahu	49,365	667	1	49,495	704	2
	Maui Nui (formerly 4-Islands)	2,036	84	0	2,077	87	0
	Kaua'i/Ni'ihau	7,657	1,656	-	8,051	1,661	-
	Hawai'i Pelagic	249,778	35,045	27	254,912	40,374	33
	Hawai'i Island	27	16	-	28	18	-
	California/Oregon/Washington Offshore	121,747	35,289	17	134,836	43,006	21
	California Coastal	8,443	154	-	8,578	154	-
Dall's porpoise	California/Oregon/Washington	73,069	221,810	3,812	81,091	293,698	4,844
Dwarf sperm whale	Hawai'i	65,282	190,808	3,772	67,954	223,799	4,109
	California/Oregon/Washington	8,376	21,082	337	9,453	26,647	399

Table 3.7-7: Effects Due to Seven Years of Sonar Testing and Training Activity Under Alternative 1 and Alternative 2 (continued)

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
False killer whale	Northwest Hawaiian Islands	775	390	-	823	432	-
	Hawai'i Pelagic	5,717	4,143	1	6,133	4,931	1
	Eastern Tropical Pacific [Nsd]	9,539	4,341	1	11,249	5,402	2
Fraser's dolphin	Hawai'i	122,161	88,199	9	130,513	106,038	10
Killer whale	West Coast Transient	137	124	-	182	190	-
	Hawai'i	337	396	-	366	473	-
	Eastern North Pacific Offshore	5,007	983	0	5,326	1,209	0
Long-beaked common dolphin	California	1,586,668	213,496	138	1,660,182	262,964	162
Melon-headed whale	Kohala Resident	246	79	-	268	88	-
	Hawaiian Islands	98,184	85,528	61	105,922	103,519	73
Northern right whale dolphin	California/Oregon/Washington	125,910	97,976	69	154,101	141,024	96
Pacific white-sided dolphin	California/Oregon/Washington	253,644	106,095	81	289,015	150,332	113
Pantropical spotted dolphin	O'ahu	42,963	1,018	4	43,327	1,074	5
	Northeastern Offshore [Nsd]	341,124	194,080	199	401,032	240,600	257
	Maui Nui (formerly 4-Islands)	13,958	1,018	1	14,520	1,151	2
	Hawai'i Pelagic	148,173	113,705	59	158,107	136,209	71
	Hawai'i Island	17,809	17,707	9	19,218	21,454	11
Pygmy killer whale	Hawai'i	28,287	23,744	5	30,368	28,641	6
	California [Nsd]	3,497	857	-	3,855	1,026	-
Pygmy sperm whale	Hawai'i	65,566	193,260	3,889	68,266	226,831	4,258
	California/Oregon/Washington	8,564	20,559	347	9,685	25,821	420
Risso's dolphin	Hawai'i	21,353	16,666	3	23,110	20,091	3
	California/Oregon/Washington	187,838	52,471	24	207,015	64,590	27
Rough-toothed dolphin	Hawai'i	366,233	220,198	117	384,568	262,158	138
Short-beaked common dolphin	California/Oregon/Washington	8,461,512	3,320,903	2,347	9,459,620	4,190,410	2,922
Short-finned pilot whale	Hawai'i	72,239	32,374	13	76,621	38,216	14
	California/Oregon/Washington	19,642	4,791	2	21,015	5,887	2
Spinner dolphin	O'ahu/4 Islands	7,910	241	0	7,961	259	1
	Kaua'i Ni'ihau	22,186	6,136	5	23,368	6,169	5
	Hawai'i Pelagic	13,143	13,391	4	14,164	16,011	5
	Hawai'i Island	355	280	-	403	346	-
Striped dolphin	Hawai'i Pelagic	112,635	106,837	42	120,995	128,655	50
	California/Oregon/Washington	453,023	270,669	172	530,989	338,036	220
Baird's beaked whale	California/Oregon/Washington	55,853	285	-	67,165	392	-

Table 3.7-7: Effects Due to Seven Years of Sonar Testing and Training Activity Under Alternative 1 and Alternative 2 (continued)

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
Blainville's beaked whale	Hawai'i	45,808	193	-	49,325	230	-
Cuvier's (goose-) beaked whale	Hawai'i	184,300	712	-	198,316	861	-
	California/Oregon/Washington	935,914	2,907	-	1,070,470	3,682	-
Harbor porpoise	San Francisco Russian River	48,533	163	0	67,427	237	1
	Northern California/ Southern Oregon	2,339	0	-	3,311	1	-
	Morro Bay	24,414	240	1	28,540	345	1
	Monterey Bay	10,934	0	-	14,908	0	-
Longman's beaked whale	Hawai'i	111,608	536	-	119,855	640	-
Mesoplodont beaked whales	California/Oregon/Washington	518,845	1,991	0	597,667	2,557	0
California sea lion	United States	9,199,575	1,157,268	724	9,920,558	1,496,394	857
Harbor seal	California	266,058	89,926	27	274,603	90,747	32
Northern elephant seal	California Breeding	376,726	243,548	109	416,179	324,578	146
Northern fur seal	Eastern Pacific	114,097	44,387	10	157,486	67,771	15
	California	78,458	27,594	8	108,018	41,882	12
Steller sea lion	Eastern	4,570	693	1	5,373	1,002	2

Notes: BEH = Significant Behavioral Response, TTS = Temporary Threshold Shift, AINJ = Auditory Injury
A dash (-) indicates a (true zero), and zero (0) indicates a rounded value less than 0.5.
Stocks are not shown if no effects are estimated.
Nsd = No stock designation under MMPA.
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3.7.3.2.2 Effects from Air Guns

Table 3.7-5 contains a summary of the background information used to analyze the potential effects of air guns on marine mammals. Air guns create intermittent, broadband, impulsive sounds.

The below information briefly summarizes information relevant to the assessment of the effects of air guns on marine mammals under the Proposed Action. A more extensive assessment of the effects on marine mammals due to exposure to air guns under this Proposed Action is in Appendix E.

The broadband impulses from air guns are within the hearing range of all marine mammals. Potential effects from air guns could include auditory injuries, TTS, behavioral reactions, physiological response, and masking. Single, small air guns lack the peak pressures that could cause auditory injuries for most auditory groups. The ranges to auditory effects and behavioral responses for air guns are in in Appendix E.

While studies have observed marine mammal responses to large, commercial air gun arrays, the small single air guns used in the Proposed Action would be used over a much shorter period and more limited area. Reactions to air gun use in the Proposed Action are less likely to occur or rise to the same level of severity as observed during seismic use.

As discussed in Section 3.7.3, the Action Proponents will implement activity-based mitigation under Alternative 1 and Alternative 2 to reduce potential effects from air guns on marine mammals.

3.7.3.2.2.1 Effects from Air Guns Under Alternative 1

Training and Testing. Air guns would not be used during training activities. The proposed use of air guns increased for testing from the 2018 HSTT EIS/OEIS. Air gun use during military readiness activities is limited and unlike large-scale seismic surveys that use multiple large air guns. Air gun use would occur nearshore in the SOCAL Range Complex and greater than 3 NM from shore in the Hawaii, NOCAL, and SOCAL Range Complexes.

The number of effects on each stock due to exposure to air guns during testing under Alternative 1 is shown in Table 3.7-8 for a maximum year of activities and in Table 3.7-9 for seven years of activities. Appendix E provides additional detail on modeled effects on each stock, including seasons and regions in which effects are most likely to occur; which activities are most likely to cause effects; overlap with biologically important areas; and analysis of effects to designated critical habitat for ESA-listed species, where applicable. Appendix E also explains how effects are summed to estimate maximum annual and seven-year total effects.

Table 3.7-8: Effects Due to a Maximum Year of Air Gun Testing Activity Under Alternative 1 and Alternative 2

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
ESA-Listed							
Blue whale	Eastern North Pacific	0	-	-	0	-	-
Fin whale	California/Oregon/Washington	0	0	-	0	0	-
Humpback whale	Mainland Mexico - California/Oregon/Washington	0	0	-	0	0	-
Humpback whale	Central America/Southern Mexico - California/Oregon/Washington	0	-	-	0	-	-
Sperm whale	Hawai'i	1	-	-	1	-	-
Guadalupe fur seal	Mexico	1	-	-	1	-	-
Non ESA-Listed							
Gray whale	Eastern North Pacific	0	-	-	0	-	-
Humpback whale	Hawai'i	1	-	-	1	-	-
Minke whale	California/Oregon/Washington	0	-	-	0	-	-
Bottlenose dolphin	Hawai'i Pelagic	1	-	-	1	-	-
Bottlenose dolphin	California/Oregon/Washington Offshore	1	-	-	1	-	-
Dall’s porpoise	California/Oregon/Washington	9	8	1	10	8	1
Dwarf sperm whale	Hawai'i	8	5	1	8	6	1
Dwarf sperm whale	California/Oregon/Washington	1	1	-	1	1	-
Long-beaked common dolphin	California	3	-	-	3	-	-
Melon-headed whale	Hawaiian Islands	1	-	-	1	-	-
Northern right whale dolphin	California/Oregon/Washington	1	-	-	1	-	-
Pacific white-sided dolphin	California/Oregon/Washington	1	-	-	1	-	-
Pantropical spotted dolphin	Northeastern Offshore [Nsd]	2	-	-	2	-	-
Pantropical spotted dolphin	Hawai'i Pelagic	1	-	-	1	-	-
Pantropical spotted dolphin	Hawai'i Island	1	-	-	1	-	-
Pygmy killer whale	California [Nsd]	1	-	-	1	-	-
Pygmy sperm whale	Hawai'i	6	6	1	6	6	1
Pygmy sperm whale	California/Oregon/Washington	1	1	-	1	1	-
Risso’s dolphin	California/Oregon/Washington	1	-	-	1	-	-
Rough-toothed dolphin	Hawai'i	1	-	-	1	-	-
Short-beaked common dolphin	California/Oregon/Washington	17	-	-	17	-	-
Short-finned pilot whale	Hawai'i	1	-	-	1	-	-
Striped dolphin	Hawai'i Pelagic	-	1	-	-	1	-
Striped dolphin	California/Oregon/Washington	1	-	-	1	-	-
Cuvier’s (goose-) beaked whale	Hawai'i	1	-	-	1	-	-

Table 3.7-8: Effects Due to a Maximum Year of Air Gun Testing Activity Under Alternative 1 and Alternative 2 (continued)

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
Harbor porpoise	San Francisco Russian River	1	2	1	1	2	1
Mesoplodont beaked whales	California/Oregon/Washington	0	-	-	0	-	-
California sea lion	United States	8	1	-	8	1	-
Northern elephant seal	California Breeding	1	-	-	1	-	-
Northern fur seal	Eastern Pacific	1	-	-	1	-	-
	California	1	-	-	1	-	-

Notes: BEH = Significant Behavioral Response, TTS = Temporary Threshold Shift, AINJ = Auditory Injury
A dash (-) indicates a (true zero) and zero (0) indicates a rounded value less than 0.5.
Stocks are not shown if no effects are estimated.
Nsd = No stock designation under MMPA.

Table 3.7-9: Effects Due to Seven Years of Air Gun Testing Activity Under Alternative 1 and Alternative 2

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
ESA-Listed							
Blue whale	Eastern North Pacific	0	-	-	0	-	-
Fin whale	California/Oregon/Washington	0	0	-	0	0	-
Humpback whale	Mainland Mexico - California/Oregon/Washington	0	0	-	0	0	-
	Central America/Southern Mexico - California/Oregon/Washington	0	-	-	0	-	-
Sperm whale	Hawai'i	1	-	-	1	-	-
Guadalupe fur seal	Mexico	3	-	-	3	-	-
Non ESA-Listed							
Gray whale	Eastern North Pacific	0	-	-	0	-	-
Humpback whale	Hawai'i	1	-	-	1	-	-
Minke whale	California/Oregon/Washington	0	-	-	0	-	-
Bottlenose dolphin	Hawai'i Pelagic	3	-	-	3	-	-
	California/Oregon/Washington Offshore	2	-	-	2	-	-
Dall’s porpoise	California/Oregon/Washington	58	48	4	66	54	5
Dwarf sperm whale	Hawai'i	50	34	1	56	38	1
	California/Oregon/Washington	4	3	-	5	4	-
Long-beaked common dolphin	California	13	-	-	14	-	-
Melon-headed whale	Hawaiian Islands	2	-	-	2	-	-
Northern right whale dolphin	California/Oregon/Washington	2	-	-	2	-	-

Table 3.7-9: Effects Due to Seven Years of Air Gun Testing Activity Under Alternative 1 and Alternative 2 (continued)

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
Pacific white-sided dolphin	California/Oregon/Washington	5	-	-	5	-	-
Pantropical spotted dolphin	Northeastern Offshore Nsd	9	-	-	9	-	-
	Hawai'i Pelagic	1	-	-	1	-	-
	Hawai'i Island	1	-	-	1	-	-
Pygmy killer whale	California Nsd	1	-	-	1	-	-
Pygmy sperm whale	Hawai'i	34	37	3	39	42	4
	California/Oregon/Washington	3	6	-	3	7	-
Risso's dolphin	California/Oregon/Washington	6	-	-	6	-	-
Rough-toothed dolphin	Hawai'i	1	-	-	1	-	-
Short-beaked common dolphin	California/Oregon/Washington	85	-	-	92	-	-
Short-finned pilot whale	Hawai'i	1	-	-	1	-	-
Striped dolphin	Hawai'i Pelagic	-	1	-	-	1	-
	California/Oregon/Washington	5	-	-	6	-	-
Cuvier's (goose-) beaked whale	Hawai'i	1	-	-	1	-	-
Harbor porpoise	San Francisco Russian River	6	12	1	7	13	1
Mesoplodont beaked whales	California/Oregon/Washington	0	-	-	0	-	-
California sea lion	United States	33	1	-	35	1	-
Northern elephant seal	California Breeding	3	-	-	3	-	-
Northern fur seal	Eastern Pacific	2	-	-	2	-	-
	California	1	-	-	1	-	-

Notes: BEH = Significant Behavioral Response, TTS = Temporary Threshold Shift, AINJ = Auditory Injury
A dash (-) indicates a (true zero), and zero (0) indicates a rounded value less than 0.5.
Stocks are not shown if no effects are estimated.
Nsd = No stock designation under MMPA.

Overall, the number of potential effects to marine mammals is very low. A small number of auditory effects are predicted for species in the most sensitive hearing group, the VHF cetaceans, which has a substantially lower threshold for auditory effects than other auditory groups for exposure to peak pressures from impulsive sounds. A small number of behavioral responses are also predicted for several species, especially those with large population abundances (e.g., short-beaked common dolphins, California sea lions).

Although air gun effects are limited, there is a potential for long-term effects on any individual with an auditory injury. Most effects, however, are expected to be TTS or temporary behavioral responses. The average risk of effect on individuals in any population is extremely low. Effects due to air guns are unlikely to affect survival, growth, recruitment, or reproduction of any marine mammal populations.

Modernization and Sustainment of Ranges. Air guns would not be used during modernization and sustainment of ranges.

Conclusion. Because air gun use would be unlikely to affect survival, growth, recruitment, or reproduction of any marine mammal populations, activities that include the use of air guns under Alternative 1 would result in less than significant effects.

3.7.3.2.2.2 Effects from Air Guns Under Alternative 2

Air guns would not be used during training activities. Under Alternative 2, there would be no meaningful difference in amount of air gun use during training activities compared to Alternative 1. However, since the level of activities in Alternative 1 are expected to fluctuate from year to year, and the level in Alternative 2 is proposed to be a maximum level every year, there are a greater number of air gun counts in Alternative 2 compared to Alternative 1 over a seven-year period. Effects from air guns under Alternative 2 are not meaningfully different from Alternative 1 and therefore the analysis conclusions are the same for testing activities using air guns under Alternative 2.

The number of effects on each stock due to exposure to air guns during testing under Alternative 2 is shown in Table 3.7-8 for a maximum year of activities and in Table 3.7-9 for seven years of activities.

3.7.3.2.3 Effects from Pile Driving

Table 3.7-5 contains a summary of the background information used to analyze the potential effects of pile driving noise on marine mammals. Only the Port Damage Repair training activity includes pile driving. Additional information on the assessment of these acoustic stressors under this Proposed Action is in Appendix E.

The below information briefly summarizes information relevant to the assessment of the effects of pile driving on marine mammals under the Proposed Action. A more extensive assessment of the effects on marine mammals due to exposure to pile driving under this Proposed Action is in Appendix E.

The impact and vibratory pile driving hammers would expose marine mammals to impulsive and continuous non-impulsive broadband sounds, respectively. Potential effects could include auditory injuries, TTS, behavioral reactions, physiological responses (stress), and masking. This analysis applies NMFS’ recommended thresholds for behavioral responses to impact and vibratory pile driving. The ranges to auditory effects and behavioral responses for pile driving are in in Appendix E.

As discussed in Section 3.7.3, the Action Proponents will implement activity-based mitigation under Alternative 1 and Alternative 2 to reduce potential effects from pile driving on marine mammals.

3.7.3.2.3.1 Effects from Pile Driving Under Alternative 1

Training and Testing. Impact and vibratory pile driving would not occur during testing activities. Pile driving would occur as part of Port Damage Repair activities in Port Hueneme, California. Impact and vibratory pile driving during Port Damage Repair training activities can occur over a period of 14 days during each training event, and up to 12 times per year. Pile driving activities would occur intermittently in very limited areas and would be of temporary duration. The activity location is in a highly urbanized all quay wall port. Only two species are anticipated to be present in the nearshore waters by Port Hueneme: California sea lions and harbor seals.

The pile driving mitigation zone encompasses the relatively short ranges to auditory injuries and TTS for the OCW and PCW hearing groups and soft start procedures are employed. Auditory effects are unlikely, but masking, physiological responses, or behavioral reactions may occur over limited periods at farther distances. Pile driving would occur in an industrialized location with existing higher ambient noise levels. Depending on where the activity occurs at Port Hueneme, transmission of pile driving noise may be reduced by existing pier structures. The number of effects on each stock due to exposure to pile driving during training under Alternative 1 are shown in Table 3.7-10 for a maximum year of activities and in Table 3.7-11 for seven years of activities.

Due to the low number of days the activity would occur and the intermittent use of pile driving hammers, effects are expected to be minor and temporary (lasting minutes to hours) or short-term (day).

Modernization and Sustainment of Ranges. Pile driving would not be used during modernization and sustainment of ranges.

Conclusions. Because pile driving activities would be infrequent, localized, and temporary, effects under Alternative 1 would be less than significant.

3.7.3.2.3.2 Effects from Pile Driving Under Alternative 2

Pile driving would not occur during testing activities. The number of effects to each stock due to exposure to pile driving during training under Alternative 2 is shown in Table 3.7-10 for a maximum year of activities and in Table 3.7-11 for seven years of activities. Effects from pile driving during training under Alternative 2 are no different from Alternative 1 and therefore the analysis conclusions are the same for training activities with pile driving under Alternative 2.

Table 3.7-10: Effects Due to a Maximum Year of Pile Driving Training Activity Under Alternative 1 and Alternative 2

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
Non ESA-Listed							
California sea lion	United States	16,992	1,891	61	16,992	1,891	61
Harbor seal	California	952	183	20	952	183	20

Notes: BEH = Significant Behavioral Response, TTS = Temporary Threshold Shift, AINJ = Auditory Injury

Stocks are not shown if no effects are estimated.

Table 3.7-11: Effects Due to Seven Years of Pile Driving Training Activity Under Alternative 1 and Alternative 2

Species	Stock or Population	Alternative 1			Alternative 2		
		BEH	TTS	AINJ	BEH	TTS	AINJ
Non ESA-Listed							
California sea lion	United States	118,938	13,237	423	118,938	13,237	423
Harbor seal	California	6,664	1,281	138	6,664	1,281	138

Notes: BEH = Significant Behavioral Response, TTS = Temporary Threshold Shift, AINJ = Auditory Injury

Stocks are not shown if no effects are estimated.

3.7.3.2.4 Effects from Vessel Noise

Table 3.7-5 contains a summary of the background information used to analyze the potential effects of vessel noise on marine mammals. Vessels produce broadband, non-impulsive, continuous noise during operation and transit. Additional information on the assessment of this acoustic stressor under the Proposed Action is in Appendix E.

3.7.3.2.4.1 Effects from Vessel Noise Under Alternative 1

Training or Testing. This section analyzes the potential effects of vessel noise during training or testing activities within the Study Area. Marine mammals may be exposed to vessel-generated noise throughout the Study Area. Military readiness activities with vessel-generated noise would be conducted as described in the *Proposed Activities* and *Activity Descriptions* sections.

Based on the updated background and previous analysis for training and testing under Alternative 1, vessel noise effects on marine mammals could include brief behavioral reactions and short periods of masking while in the proximity of a vessel. Vessels do not purposefully approach marine mammals and are not expected to elicit significant behavioral responses (entanglement response is not a military readiness activity).

Modernization and Sustainment of Ranges. Vessel noise would be produced during SOAR modernization activities; SWTR installation; Sustainment of Undersea Ranges; deployment of fiber optic cables and instrumentation off SCI, Oahu, and Kauai; installation and maintenance of mine warfare and other training areas; and installation and maintenance of the underwater platform. Vessel noise may result in masking, physiological stress, or behavioral reactions. During installation activities, vessels would move slowly (1–5 knots) which would limit ship-radiated noise from propeller cavitation and water flow across the hull.

Conclusion. Activities that include the use of vessels under Alternative 1 would result in less than significant effects.

3.7.3.2.4.2 Effects from Vessel Noise Under Alternative 2

Although the number of activities with associated vessel noise would increase in all range complexes under Alternative 2 compared to Alternative 1, effects from vessel noise under Alternative 2 are not meaningfully different from Alternative 1 and therefore the analysis conclusions are the same for training and testing activities under Alternative 2.

3.7.3.2.5 Effects from Aircraft Noise

Table 3.7-5 contains a summary of the background information used to analyze the potential effects of aircraft noise on marine mammals. Aircrafts produce broadband, non-impulsive, continuous noise during operation and transit. Additional information on the assessment of this acoustic stressor under the Proposed Action is in Appendix E.

3.7.3.2.5.1 Effects from Aircraft Noise Under Alternative 1

Training or Testing. This section analyzes the potential effects of aircraft noise during military readiness activities within the Study Area. Fixed- and rotary-wing (e.g., helicopters) aircraft are used for a variety of military readiness activities, and marine mammals may be exposed to aircraft-generated noise throughout the Study Area. Military readiness activities with aircraft would be conducted as described in the *Proposed Activities* and *Activity Descriptions* sections.

Based on the updated background and previous analysis for training and testing under Alternative 1, aircraft noise may cause brief temporary changes in the behavior of marine mammals. Marine mammals at or near the surface when an aircraft flies overhead at low altitude may startle, divert their attention to the aircraft, or avoid the immediate area by swimming away or diving. No long-term consequences for individuals would be expected.

Modernization and Sustainment of Ranges. Aircraft would not be used during modernization and sustainment of ranges.

Conclusion. Activities that include the use of aircraft under Alternative 1 would result in less than significant effects.

3.7.3.2.5.2 Effects from Aircraft Noise Under Alternative 2

Effects from aircraft noise under Alternative 2 are not meaningfully different from Alternative 1 and therefore the analysis conclusions are the same for training and testing activities under Alternative 2.

3.7.3.2.6 Effects from Weapons Noise

Table 3.7-5 contains a summary of information used to analyze the potential effects of weapons noise on marine mammals in-water and in-air. Firing of guns, vibrations from the hull of ships, items that impact the water's surface, and items launched from underwater may produce weapons noise and affect marine mammals in the water or underwater. Missile and air vehicle launches and artillery firing at PMRF and air vehicle and missile launches at SNI would result in in-air noise that may affect hauled out pinnipeds hauled out at SNI and Hawaiian monk seals at PMRF.

As discussed in Section 3.7.3, the Action Proponents will implement activity-based mitigation under Alternative 1 and Alternative 2 to reduce potential effects from weapons noise on marine mammals. The Action Proponents will also implement geographic mitigation to reduce potential acoustic effects within important marine mammal habitats as identified in Table 3.7-4.

3.7.3.2.6.1 Effects from Weapons Noise Under Alternative 1

Training or Testing. This section analyzes the potential effects of weapons noise during military readiness activities within the Study Area. Marine mammals may be exposed to sounds caused by the firing of weapons, objects in flight, and impact of non-explosive munitions on the water surface during activities conducted at sea. This incidental noise is collectively called weapons noise. Military readiness activities using gunnery and other weapons that generate firing noise would be conducted as described in the *Proposed Activities* and *Activity Descriptions* sections.

Based on the updated background and previous analysis for training and testing under Alternative 1, the effect of weapon noise on marine mammals would be limited to temporary behavioral responses. Marine mammals may startle or avoid the immediate area. Because firing of medium and large caliber gunnery would occur greater than 12 NM from shore, effects to coastal species are unlikely.

Pinnipeds hauled out on the shoreline of SNI have been observed to behaviorally react to the sound of launches of targets and missiles from launch pads on the island (Naval Air Warfare Center Weapons Division, 2018; U.S. Department of the Navy, 2020c, 2022c, 2023). The estimation of the number of behavioral responses that would be expected to occur as a result of in-air noise from launches was based on observations of pinnipeds over three monitoring seasons (2015–2017) divided by the number of launch events over that time period. The Navy determined that the numbers presented in Table 3.7-12 represent the number of pinnipeds expected to be hauled out at SNI based on surveys in the five-year period between 2014 and 2019 (U.S. Department of the Navy, 2020b) and the average number of effects observed per launch event (U.S. Department of the Navy, 2020c, 2022c, 2023).

Table 3.7-12: Behavioral Effects From In-Air Weapons Noise Due to Launches of Targets and Missiles from San Nicolas Island Under Alternative 1 and Alternative 2

Species	Stock	Annual	7-Year Total
Family Otariidae (eared seals)			
California sea lion	U.S.	11,000	77,000
Family Phocidae (true seals)			
Harbor seal	California	480	3,360
Northern elephant seal	California Breeding	40	280

Hawaiian monk seals hauled out on the beach at PMRF on the island of Kauai, Hawaii, may be exposed to sound from aerial target and missile launches and artillery firing occurring at launch sites located inland of the beach.

Based on an analysis of acoustic data collected at sites on the beach during a missile launch, the ranges to TTS and AINJ effects were estimated, and the results of the analysis showed that the ranges to auditory effects would not extend to the beach where monks seals could haulout (see Appendix E.1). The range to behavioral effects would extend to the beach, and, if a monk seal were to be present during a launch, the seal could be disturbed and respond to the noise as summarized in Table 3.7-5. No acoustic data have been collected at PMRF during artillery firing events. However, data presented by Wiri et al. (2023) were used to estimate a range to TTS and AINJ effects from artillery firing, and the results of the analysis showed that the ranges to auditory effects would not reach haulout sites on the beach (Appendix E.1). The range to behavioral effects would include haulout sites on the beach, and a seal present during an artillery firing event could be disturbed by the noise (Appendix E.1).

From 2020 to 2023, an annual average of 215 monk seals were counted hauled out on the beach at PMRF (unpublished Navy data). The maximum number of seals observed during a single observation was five and the minimum was zero; on most observations no hauled out seals were observed. Based on the observational data, the Action Proponents estimate that weapons firing noise at PMRF would result in 215 behavioral effects annually on hauled out monk seals (Table 3.7-13). The analysis conservatively assumes that 1) at least one monk seal is hauled out when a launch or firing event would occur, an assumption contradicted by the observational data, which indicates that most frequently no monk seals are hauled out on the beach and 2) that a monk seal would be disturbed and behavioral respond during each event. Monk seal in-air hearing is less sensitive than hearing in other phocid seals (Ruscher et al., 2021; Ruscher, In Review), suggesting that monk seals may be less likely to respond to in-air noise (Appendix E.1).

Table 3.7-13: Behavioral Effects From In-Air Weapons Noise Due to Launches of Targets and Missiles and Artillery Firing from PMRF Under Alternative 1 and Alternative 2

Species	Stock	Annual	7-Year Total
Family Phocidae (true seals)			
Hawaiian monk seal	NA	215	1,505

Modernization and Sustainment of Ranges. Weapons would not be used during modernization and sustainment of ranges.

Conclusion. Activities that include weapons noise under Alternative 1 would result in less than significant effects on marine mammals. Weapons noise would result in a negligible effect on marine mammals in the water and a minor effect on four pinniped species when hauled out at SNI during a launch or at PMRF during a launch or artillery firing event.

3.7.3.2.6.2 Effects from Weapons Noise Under Alternative 2

Effects from weapons noise under Alternative 2 are not meaningfully different from Alternative 1 and therefore the analysis conclusions are the same for training and testing activities under Alternative 2.

3.7.3.3 Explosive Stressors

This section summarizes the potential effects of explosives used during military readiness activities within the Study Area. Explosives analyzed for effects to marine mammals include those in water and those that detonate within 10 m of the water surface, which are analyzed as in-water explosives. Table 3.7-14 contains brief summaries of background information that is relevant to the analyses of effects for explosives. New applicable and emergent science regarding explosive effects is presented in Appendix D.

Due to updates to criteria and thresholds used to assess effects, densities (animals per unit area), acoustic effects modeling, and changes to the proposed use of explosives, the quantitative analyses effects due to explosives in this section supplant the analyses in the 2018 HSTT and 2022 PMSR EIS/OEISs. The detailed assessment of explosive stressors under this Proposed Action is in Appendix E.

In addition to changes in the Proposed Action, changes in the predicted explosive effects since the 2018 HSTT EIS/OEIS are due to the following:

- Updates to criteria used to determine if an exposure to explosive energy may cause auditory effects; non-auditory injury (including mortality); and behavioral responses. Changes to auditory criteria for explosives are the same as for other impulsive sounds. Behavioral response thresholds are related to TTS thresholds and were revised accordingly. Non-auditory injury criteria are unchanged, but the onset thresholds were applied. A summary of these changes is in Appendix. For additional details see the technical report *Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase IV) (U.S. Department of the Navy, 2024a)*.
- Revisions to the modeling of explosive effects in the Navy Acoustic Effects Model, including an updated explosive propagation model. See the technical report *Quantifying Acoustic Impacts on Marine Mammals and Sea Turtles: Methods and Analytical Approach for Phase IV Training and Testing (U.S. Department of the Navy, 2024c)*.
- Updates to data on marine mammal presence, including estimated density of each species or stock (number of animals per unit area), group size, and depth distribution. For additional details see the technical reports *U.S. Navy Marine Species Density Database Phase IV for the Hawaii-California Training and Testing Study Area* (U.S. Department of the Navy, 2024d) and *Dive Distribution and Group Size Parameters for Marine Species Occurring in the U.S. Navy's Atlantic and Hawaii-Southern California Training and Testing Study Areas* (Oliveira et al., 2024).
- Changes in how mitigation is considered in reducing predicted effects. The number of model-predicted mortalities are not reduced due to activity-based mitigation, unlike in prior analyses.

Table 3.7-14: Explosive Stressors Information Summary

Stressor	Summary
Explosives	Explosives may result in mortality and non-auditory injury. Direct injury due to explosives depends on the charge size, the geometry of the exposure (e.g., distance and depth), and the size of the animal. The intermittent nature of most impulsive sounds would result in very limited probability of any masking effects. Due to the rapid rise time and higher instantaneous peak pressure of impulsive noise, nearby noise is more likely to cause startle or avoidance responses. Few studies on reactions to explosives exist, but responses to seismic surveys, pile driving and other impulsive noises have been recorded. Different groups of marine mammals may respond in different ways to impulsive noise, as summarized in Table 3.7-5.

As discussed in Chapter 5 the Action Proponents will implement activity-based mitigation under Alternative 1 and Alternative 2 to reduce potential effects from explosives on marine mammals. The Action Proponents will also implement geographic mitigation to reduce potential explosive effects within important marine mammal habitats as identified in the geographic mitigation discussion in Chapter 5.

3.7.3.3.1 Effects from Explosives

For information on the size and quantity of explosives under each alternative, see Table 3.0-10.

The below information briefly summarizes information relevant to the assessment of the effects of explosives on marine mammals under the Proposed Action. A more extensive assessment of the effects on marine mammals due to exposure to explosives under this Proposed Action is in Appendix E.

Explosions produce loud, impulsive, broadband sounds with sharp pressure peaks that can be injurious. Potential effects from explosive energy and sound include non-auditory injury (including mortality), auditory effects (AINJ and TTS), behavioral reactions, physiological response, and masking. Ranges to effects for mortality, non-auditory injury, and behavioral responses are shown in Appendix E.

Explosive noise is very brief and intermittent. Detonations usually occur in a limited area over a brief period rather than being widespread. The potential for masking is limited. Marine mammals may behaviorally respond, but responses to single detonations or clusters may be limited to startle responses.

As discussed in Section 3.7.3, the Action Proponents will implement activity-based mitigation under Alternative 1 and Alternative 2 to reduce potential effects from explosives on marine mammals. An assessment of the potential opportunities to mitigate mortalities due to explosives under this Proposed Action is in Appendix E.

The Action Proponents will also implement geographic mitigation to reduce potential acoustic effects within important marine mammal habitats as identified in Table 3.7-4.

3.7.3.3.2 Effects from Explosives Under Alternative 1

Training or Testing. The use of in-water explosives would increase from the 2018 HSTT EIS/OEIS for training activities and would decrease slightly for testing. There is an overall reduction in the use of most of the largest explosive bins (bin E8 [> 60–100 lb. NEW] and above) for training and a decrease in two of the largest explosive bins (bin E10 [> 250–500 lb. NEW] and E11 [> 500–650 lb. NEW]) under testing activities. There would be notable increases in the smaller explosive bins (E7 [> 20–60 lb. NEW] and below) under training and testing activities, except for bin E1 (0.1–0.25 lb. NEW) which would decrease under testing activities. Small ship shock trials (bin E16 [> 7,250–14,500 lb. NEW]) not previously analyzed are currently proposed under testing activities.

Most activities involving in-water (including surface) explosives associated with large caliber naval gunfire, missiles, bombs, or other munitions are conducted more than 12 NM from shore. This includes Small Ship Shock Trials that could occur in the SOCAL Range Complex. Sinking Exercises are conducted greater than 50 NM from shore. Certain activities with explosives may be conducted close to shore at locations identified in Appendix A and Appendix H, including certain Mine Warfare and Expeditionary Warfare activities. In the Hawaii Range Complex explosive activities could occur at specified ranges and designated locations around Oahu, including the Puuloa Underwater Range and designated locations in and near Pearl Harbor. In the SOCAL Range Complex, explosive activities could occur near San Clemente Island, in the SSTC, and in other designated mine training areas along the southern California coast.

The number of effects to each stock due to exposure to explosives during testing and training under Alternative 1 is shown in Table 3.7-15 for a maximum year of activities and in Table 3.7-16 for seven years of activities. Appendix E provides additional detail on modeled effects to each stock, including seasons and regions in which effects are most likely to occur; which activities are most likely to cause effects; and analysis of effects to designated critical habitat for ESA-listed species, where applicable. Appendix E also shows total effects to each stock due to training or testing activities under this alternative and explains how effects are summed to estimate maximum annual and seven-year total effects. The number of effects to marine mammals are over-estimated in this analysis by modeling explosions at or near the water surface as underwater explosions.

Nearly all predicted training mortalities and a portion of the testing mortalities are attributable to Mine Warfare. A large portion of the testing mortalities are attributable to Small Ship Shock Trial. Both activities have extensive pre- and during event visual observation requirements as described in Chapter 5 that would reduce the risk that these mortalities would occur. The Action Proponents conduct extensive visual observations for ship shock trials in accordance with NMFS-reviewed activity-based mitigation and monitoring plans (see Chapter 5). Adherence to these plans increases the likelihood that Lookouts would sight surface active marine mammals within the ship shock trial mitigation zone. For other explosive activities, the Action Proponents will also implement mitigation to relocate, delay, or cease detonations when a marine mammal is sighted within or entering a mitigation zone to avoid or reduce potential explosive effects.

Depending on the stock, effects to individuals may be permanent (auditory injuries or mortality) or temporary (non-auditory injury, TTS, masking, stress, or behavioral response). The behavioral patterns of a limited number of individuals may be interrupted. Individuals or groups may temporarily avoid areas around explosive activities if multiple detonations occur. Activities would be relatively brief and occur over small areas relative to population ranges. Permanent effects would be present in low enough numbers such that the continued viability of populations is not threatened. The total effects are not expected to interfere with feeding, reproduction, or other biologically important functions such that the continued viability of the population would be threatened.

Modernization and Sustainment of Ranges. Explosives would not be used during modernization and sustainment of ranges.

Conclusion. Because effects are not expected to interfere with feeding, reproduction, or other biologically important functions of marine mammals, activities that include the use of in-water explosives under Alternative 1 would result in less than significant effects.

Table 3.7-15: Effects Due to a Maximum Year of Explosive Testing and Training Activity Under Alternative 1 and Alternative 2

Species	Stock or Population	Alternative 1					Alternative 2				
		BEH	TTS	AINJ	INJ	MORT	BEH	TTS	AINJ	INJ	MORT
ESA-Listed											
Blue whale	Eastern North Pacific	87	106	3	-	-	87	106	3	-	-
	Central North Pacific	1	-	-	-	-	1	-	-	-	-
Fin whale	Hawai'i	2	0	0	-	-	2	0	0	-	-
	California/Oregon/Washington	174	183	11	1	-	175	184	12	1	-
Gray whale	Western North Pacific	3	2	0	-	-	3	2	0	-	-
Humpback whale	Mainland Mexico - California/Oregon/Washington	67	114	4	1	-	67	114	4	1	-
	Central America/Southern Mexico - California/Oregon/Washington	31	38	2	-	-	32	38	2	-	-
Sei whale	Hawai'i	1	1	0	-	-	1	1	0	-	-
	Eastern North Pacific	7	3	1	-	-	7	3	1	-	-
False killer whale	Main Hawaiian Islands Insular	1	1	-	-	-	1	1	-	-	-
Sperm whale	Hawai'i	2	2	1	-	-	2	2	1	-	-
	California/Oregon/Washington	4	5	2	-	-	4	5	2	-	-
Guadalupe fur seal	Mexico	60	72	8	2	0	62	73	8	2	0
Hawaiian monk seal	Hawai'i	20	25	3	1	0	20	25	3	1	0
Non ESA-Listed											
Bryde’s whale	Hawai'i	3	3	0	-	-	3	3	0	-	-
	Eastern Tropical Pacific	15	42	2	-	-	15	42	2	-	-
Gray whale	Eastern North Pacific	357	448	38	0	-	357	448	38	0	-
Humpback whale	Hawai'i	91	91	9	-	-	91	91	9	-	-
Minke whale	Hawai'i	3	2	0	-	-	3	2	0	-	-
	California/Oregon/Washington	38	91	10	-	0	38	91	10	-	0
Bottlenose dolphin	O'ahu	29	22	4	1	1	29	22	4	1	1
	Maui Nui (formerly 4-Islands)	2	3	-	-	-	2	3	-	-	-
	Kaua'i/Ni'ihau	0	1	0	0	-	0	1	0	0	-
	Hawai'i Pelagic	187	147	19	2	1	187	147	19	2	1
	Hawai'i Island	0	1	-	-	-	0	1	-	-	-
	California/Oregon/Washington Offshore	45	48	10	1	0	45	48	10	1	0
	California Coastal	9	16	6	1	-	9	16	6	1	-
Dall’s porpoise	California/Oregon/Washington	595	1,066	490	2	0	603	1,074	491	2	0

Table 3.7-15: Effects Due to a Maximum Year of Explosive Testing and Training Activity Under Alternative 1 and Alternative 2 (continued)

Species	Stock or Population	Alternative 1					Alternative 2				
		BEH	TTS	AINJ	INJ	MORT	BEH	TTS	AINJ	INJ	MORT
Dwarf sperm whale	Hawai'i	410	561	211	1	0	422	573	212	1	0
	California/Oregon/Washington	33	69	31	-	0	33	70	31	-	0
False killer whale	Hawai'i Pelagic	1	1	0	-	-	1	1	0	-	-
	Eastern Tropical Pacific Nsd	1	2	1	0	-	2	2	1	0	-
Fraser's dolphin	Hawai'i	16	13	4	2	-	16	13	4	2	-
Killer whale	Hawai'i	-	0	0	-	-	-	0	0	-	-
	Eastern North Pacific Offshore	8	8	4	0	-	8	8	4	0	-
Long-beaked common dolphin	California	346	390	102	24	4	346	390	102	24	4
Melon-headed whale	Kohala Resident	1	1	-	-	-	1	1	-	-	-
	Hawaiian Islands	7	5	3	0	0	7	5	3	0	0
Northern right whale dolphin	California/Oregon/Washington	11	13	4	2	1	12	13	4	2	1
Pacific white-sided dolphin	California/Oregon/Washington	102	104	22	4	2	102	104	22	4	2
Pantropical spotted dolphin	O'ahu	17	16	3	1	-	17	16	3	1	-
	Northeastern Offshore Nsd	40	31	6	2	2	40	32	6	2	2
	Maui Nui (formerly 4-Islands)	22	11	3	0	-	22	11	3	0	-
	Hawai'i Pelagic	25	19	5	3	0	25	19	5	3	0
	Hawai'i Island	2	9	3	1	-	2	9	3	1	-
Pygmy killer whale	Hawai'i	4	2	1	0	-	4	3	1	0	-
	California Nsd	1	2	0	0	-	1	2	0	0	-
Pygmy sperm whale	Hawai'i	414	580	211	1	0	427	592	212	1	0
	California/Oregon/Washington	42	75	41	0	-	42	76	41	0	-
Risso's dolphin	Hawai'i	3	3	2	0	-	3	3	2	0	-
	California/Oregon/Washington	34	49	13	4	0	34	49	13	4	0
Rough-toothed dolphin	Hawai'i	117	88	10	5	2	117	89	10	5	2
Short-beaked common dolphin	California/Oregon/Washington	1,844	1,572	359	71	18	1,850	1,578	360	71	18
Short-finned pilot whale	Hawai'i	12	13	3	1	0	12	13	3	1	0
	California/Oregon/Washington	8	8	7	2	1	8	8	7	2	1
Spinner dolphin	O'ahu/4 Islands	5	4	1	0	0	5	4	1	0	0
	Kaua'i Ni'ihau	0	3	1	0	0	0	3	1	0	0
	Hawai'i Pelagic	1	2	0	0	-	1	2	0	0	-
	Hawai'i Island	1	1	1	0	-	1	1	1	0	-
Striped dolphin	Hawai'i Pelagic	14	8	3	2	-	14	8	3	2	-
	California/Oregon/Washington	28	46	8	2	1	29	46	8	2	1

Table 3.7-15: Effects Due to a Maximum Year of Explosive Testing and Training Activity Under Alternative 1 and Alternative 2 (continued)

Species	Stock or Population	Alternative 1					Alternative 2				
		BEH	TTS	AINJ	INJ	MORT	BEH	TTS	AINJ	INJ	MORT
Baird’s beaked whale	California/Oregon/Washington	1	2	0	-	-	1	2	0	-	-
Blainville’s beaked whale	Hawai'i	1	1	-	-	-	1	1	-	-	-
Cuvier’s (goose-) beaked whale	Hawai'i	4	3	0	-	-	4	3	0	-	-
	California/Oregon/Washington	14	16	2	0	-	14	16	2	0	-
Harbor porpoise	San Francisco Russian River	3	25	25	-	-	3	26	25	-	-
	Morro Bay	74	172	86	1	0	74	172	86	1	0
	Monterey Bay	0	-	-	-	-	0	-	-	-	-
Longman’s beaked whale	Hawai'i	2	2	1	-	-	2	2	1	-	-
Mesoplodont beaked whales	California/Oregon/Washington	9	8	2	0	0	9	8	2	0	0
California sea lion	United States	4,098	5,624	474	57	5	4,102	5,629	475	57	5
Harbor seal	California	1,681	2,208	228	7	1	1,681	2,208	228	7	1
Northern elephant seal	California Breeding	369	563	87	2	0	373	566	87	2	0
Northern fur seal	Eastern Pacific	20	31	8	1	0	21	32	8	1	0
	California	16	24	7	1	0	16	25	7	1	0
Steller sea lion	Eastern	5	9	2	-	-	5	9	2	-	-

Notes: BEH = Significant Behavioral Response, TTS = Temporary Threshold Shift, AINJ = Auditory Injury, INJ = Non-Auditory Injury, MORT = Mortality
A dash (-) indicates a (true zero) and zero (0) indicates a rounded value less than 0.5.
Stocks are not shown if no effects are estimated.
Nsd = No stock designation under MMPA.

Table 3.7-16: Effects due to Seven Years of Explosive Testing and Training Activity Under Alternative 1 and Alternative 2

Species	Stock or Population	Alternative 1					Alternative 2				
		BEH	TTS	AINJ	INJ	MORT	BEH	TTS	AINJ	INJ	MORT
ESA-Listed											
Blue whale	Eastern North Pacific	551	631	18	-	-	552	632	18	-	-
	Central North Pacific	1	-	-	-	-	1	-	-	-	-
Fin whale	Hawai'i	3	0	0	-	-	3	0	0	-	-
	California/Oregon/Washington	1,084	1,031	74	1	-	1,087	1,037	75	1	-
Gray whale	Western North Pacific	11	3	0	-	-	11	3	0	-	-
Humpback whale	Mainland Mexico - California/Oregon/Washington	413	746	23	1	-	416	749	23	1	-
	Central America/Southern Mexico - California/Oregon/Washington	195	248	8	-	-	196	250	8	-	-
Sei whale	Hawai'i	4	2	0	-	-	4	2	0	-	-
	Eastern North Pacific	45	14	1	-	-	46	14	1	-	-
False killer whale	Main Hawaiian Islands Insular	3	3	-	-	-	3	3	-	-	-
Sperm whale	Hawai'i	9	7	1	-	-	9	7	1	-	-
	California/Oregon/Washington	20	31	4	-	-	20	31	4	-	-
Guadalupe fur seal	Mexico	386	463	49	7	0	398	469	49	7	0
Hawaiian monk seal	Hawai'i	122	162	18	1	0	122	162	19	1	0
Non ESA-Listed											
Bryde's whale	Hawai'i	8	9	0	-	-	8	10	0	-	-
	Eastern Tropical Pacific	89	279	5	-	-	89	279	5	-	-
Gray whale	Eastern North Pacific	2,204	2,932	247	0	-	2,205	2,939	249	0	-
Humpback whale	Hawai'i	602	621	54	-	-	603	622	54	-	-
Minke whale	Hawai'i	10	2	0	-	-	11	2	0	-	-
	California/Oregon/Washington	240	592	69	-	0	240	593	69	-	0
Bottlenose dolphin	O'ahu	200	143	26	3	1	200	144	26	3	1
	Maui Nui (formerly 4-Islands)	13	18	-	-	-	13	18	-	-	-
	Kaua'i/Ni'ihau	0	1	0	0	-	0	1	0	0	-
	Hawai'i Pelagic	1,284	1,009	124	12	2	1,284	1,011	124	12	2
	Hawai'i Island	0	1	-	-	-	0	1	-	-	-
	California/Oregon/Washington Offshore	281	309	63	3	0	281	309	64	3	0
	California Coastal	59	105	41	1	-	59	105	41	1	-
Dall's porpoise	California/Oregon/Washington	3,794	6,653	2,965	5	0	3,850	6,731	2,982	5	0

Table 3.7-16: Effects due to Seven Years of Explosive Testing and Training Activity Under Alternative 1 and Alternative 2 (continued)

Species	Stock or Population	Alternative 1					Alternative 2				
		BEH	TTS	AINJ	INJ	MORT	BEH	TTS	AINJ	INJ	MORT
Dwarf sperm whale	Hawai'i	2,601	3,626	1,329	1	0	2,687	3,719	1,345	1	0
	California/Oregon/Washington	203	425	180	-	0	206	432	181	-	0
False killer whale	Hawai'i Pelagic	2	3	0	-	-	2	3	0	-	-
	Eastern Tropical Pacific Nsd	1	7	1	0	-	2	7	1	0	-
Fraser's dolphin	Hawai'i	87	79	23	2	-	87	80	23	2	-
Killer whale	Hawai'i	-	0	0	-	-	-	0	0	-	-
	Eastern North Pacific Offshore	46	53	23	0	-	46	53	23	0	-
Long-beaked common dolphin	California	2,114	2,502	666	148	17	2,116	2,507	666	148	17
Melon-headed whale	Kohala Resident	4	3	-	-	-	4	3	-	-	-
	Hawaiian Islands	34	25	7	0	0	35	26	7	0	0
Northern right whale dolphin	California/Oregon/Washington	72	79	21	6	1	76	82	22	6	1
Pacific white-sided dolphin	California/Oregon/Washington	631	674	137	24	2	636	676	138	24	2
Pantropical spotted dolphin	O'ahu	118	101	18	1	-	118	101	18	1	-
	Northeastern Offshore Nsd	264	204	33	7	2	268	207	34	7	2
	Maui Nui (formerly 4-Islands)	149	67	17	0	-	149	67	17	0	-
	Hawai'i Pelagic	155	121	18	4	0	157	122	18	4	0
	Hawai'i Island	10	57	14	2	-	12	57	14	2	-
Pygmy killer whale	Hawai'i	15	13	3	0	-	16	14	3	0	-
	California Nsd	1	2	0	0	-	1	2	0	0	-
Pygmy sperm whale	Hawai'i	2,637	3,788	1,328	1	0	2,729	3,888	1,344	1	0
	California/Oregon/Washington	263	473	262	0	-	266	479	264	0	-
Risso's dolphin	Hawai'i	11	10	2	0	-	11	10	2	0	-
	California/Oregon/Washington	217	315	83	18	0	218	316	83	18	0
Rough-toothed dolphin	Hawai'i	787	600	58	21	2	789	603	59	22	2
Short-beaked common dolphin	California/Oregon/Washington	11,815	10,108	2,287	441	107	11,862	10,159	2,301	443	107
Short-finned pilot whale	Hawai'i	75	83	12	1	0	76	83	12	1	0
	California/Oregon/Washington	49	50	42	12	4	49	50	42	12	4
Spinner dolphin	O'ahu/4 Islands	32	22	2	0	0	32	22	2	0	0
	Kaua'i Ni'ihau	0	12	1	0	0	0	12	2	0	0
	Hawai'i Pelagic	2	3	0	0	-	2	3	0	0	-
	Hawai'i Island	7	2	1	0	-	7	2	1	0	-

Table 3.7-16: Effects due to Seven Years of Explosive Testing and Training Activity Under Alternative 1 and Alternative 2 (continued)

Species	Stock or Population	Alternative 1					Alternative 2				
		BEH	TTS	AINJ	INJ	MORT	BEH	TTS	AINJ	INJ	MORT
Striped dolphin	Hawai'i Pelagic	75	46	6	4	-	77	47	6	4	-
	California/Oregon/Washington	181	296	50	9	1	185	300	51	9	1
Baird's beaked whale	California/Oregon/Washington	5	6	0	-	-	5	6	0	-	-
Blainville's beaked whale	Hawai'i	2	1	-	-	-	2	1	-	-	-
Cuvier's (goose-) beaked whale	Hawai'i	18	8	0	-	-	19	8	0	-	-
	California/Oregon/Washington	86	105	4	0	-	86	106	4	0	-
Harbor porpoise	San Francisco Russian River	15	171	168	-	-	20	176	169	-	-
	Morro Bay	495	1,167	587	2	0	495	1,174	589	2	0
	Monterey Bay	0	-	-	-	-	0	-	-	-	-
Longman's beaked whale	Hawai'i	4	4	4	-	-	4	4	4	-	-
Mesoplodont beaked whales	California/Oregon/Washington	47	55	6	0	0	48	55	7	0	0
California sea lion	United States	25,621	36,466	3,056	369	27	25,661	36,566	3,066	369	27
Harbor seal	California	10,255	13,645	1,433	44	7	10,259	13,794	1,456	44	7
Northern elephant seal	California Breeding	2,371	3,612	534	2	0	2,398	3,637	535	2	0
Northern fur seal	Eastern Pacific	118	192	43	2	0	124	197	44	2	0
	California	94	151	36	3	0	96	153	37	3	0
Steller sea lion	Eastern	31	52	12	-	-	31	53	12	-	-

Notes: BEH = Significant Behavioral Response, TTS = Temporary Threshold Shift, AINJ = Auditory Injury, INJ = Non-Auditory Injury, MORT = Mortality
A dash (-) indicates a (true zero), and zero (0) indicates a rounded value less than 0.5.
Stocks are not shown if no effects are estimated.
Nsd = No stock designation under MMPA.

3.7.3.3.3 Effects from Explosives Under Alternative 2

Under Alternative 2, the use of explosives during training activities would be nearly identical to Alternative 1. Under Alternative 2, there would be a very slight increase in use of a few low explosive weight bins (E1 and E3) compared to Alternative 1. This would not result in an increase in effects to any stock as shown in Table 3.7-15 and Table 3.7-16. Still, effects from explosives in water under Alternative 2 are not meaningfully different from Alternative 1 and therefore the analysis conclusions are the same for training and testing activities under Alternative 2.

3.7.3.4 Energy Stressors

Table 3.7-17 summarizes the potential adverse effects of energy stressors used during military readiness activities within the Study Area, which includes an analysis of the potential adverse effects of (1) in-water electromagnetic devices, (2) high-energy lasers, and (3) high-power microwave devices. For information on the types of training and testing activities that create an in-water electromagnetic field, refer to Appendix B, and for information on locations and the number of activities proposed for each alternative, see Table 3.0-11. There are no reasonably foreseeable adverse effects from energy stressors on marine mammals, and therefore further analysis is not warranted. Background information on energy stressors is provided in Appendix F.

Table 3.7-17: Energy Stressors Information Summary

Sub-Stressor	Summary
In-water electromagnetic devices	Adverse effects to marine mammals from the use of in-water electromagnetic devices are not expected for the following reasons: (1) The in-water devices designed to produce an electromagnetic field are towed by a vessel or unmanned mine countermeasure systems, (2) the electromagnetic field is produced to simulate a vessel's magnetic field. In an actual mine-clearing operation, the intent is that the electromagnetic field would trigger an enemy mine designed to sense a vessel's magnetic field, (3) adverse effects from the use of in-water electromagnetic devices are not anticipated, because the electromagnetic field is the simulation of a ship's magnetic field, having no greater effect than that of a passing ship, a common occurrence in the marine environment, and (4) there is no evidence to suggest the magnetic field from a passing vessel would adversely affect marine mammals.
High-energy lasers	High-energy lasers would have no effect marine mammals for the following reasons: (1) precision targeting high-energy lasers are fired over relatively short ranges, (2) marine mammals spend up to 90 percent of their time under the water limiting opportunities to be exposed to the laser beam, (3) marine mammals are unlikely to remain stationary and may avoid activities at the target area prior to and during the military readiness activity, (4) the very small diameter of the laser beam limits the probability of exposure, and (5) the laser is designed not to miss the intended target and would automatically shut down if target-lock is lost, preventing the laser from striking anything but the target.
High-power microwave devices	High-power microwave devices are used in a similar manner and with a similar purpose as high-energy lasers, and some of the same reasoning explaining why adverse effects are unlikely applies to the analysis of effects from high-power microwave devices. Specifically, reasons 1 through 4 for high-energy laser are also applicable for high-power microwave devices. High-power microwave devices do not have an automated shutdown capability if target-lock is lost and would need to be turned off by the operator. While it is possible to miss the target, if only briefly, the probability analysis is Appendix I shows that the likelihood is extremely low and is considered discountable.

3.7.3.5 Physical Disturbance and Strike Stressors

This section analyzes the potential adverse effects of the various types of physical disturbance, including the potential for strike during military readiness activities within the Study Area from (1) vessels; (2) in-water devices; (3) MEM, including non-explosive practice munitions and fragments from high-explosive munitions; (4) seafloor devices, including cables and equipment associated with range modernization; and (5) pile driving.

The way a physical disturbance may affect a marine mammal would depend in part on the relative size of the object, the speed of the object, the location of the marine mammal in the water column, and reactions of marine mammals to anthropogenic activity, which may include avoidance or attraction. It is not known at what point or through what combination of stimuli (visual, acoustic, or through detection in pressure changes) an animal becomes aware of a vessel or other potential physical disturbances before reacting or being struck. Refer to Appendix E for further discussion of the potential for disturbance from acoustic stimuli.

A physical disturbance should be very rare and brief, the cost from the response is likely to be within the normal variation experienced by an animal in its daily routine unless the animal is struck (see Table 3.7-18). If a strike does occur, the cost to the individual could range from slight injury to mortality. For a summary of background studies on physical disturbance and strike stressors, refer to Appendix F.

Table 3.7-18: Physical Disturbance and Strike Stressors Summary Information

Sub-Stressor	Summary
Vessels and in-water devices	Vessel strikes may adversely affect marine mammal species, particularly large whales, but mitigation measures are in place which should reduce the potential for a strike to occur. • Vessel strikes from commercial, recreational, and military vessels are known to have resulted in serious injury and occasional fatalities to cetaceans. Most military readiness activities under all alternatives involve some level of vessel activity. • An examination of vessel traffic within the Study Area determined that military vessel occurrence is approximately 4 percent of total vessel traffic in the Study Area. • Standard operating procedures for vessel safety will benefit marine mammals through a reduction in the potential for vessel strike, as well as additional mitigation measures. It is possible that marine mammal species that occur in areas that overlap with in-water device use associated with the Proposed Action may experience some level of physical disturbance, but it is not expected to result in more than a momentary behavioral response. • In-water devices are generally smaller (several inches to about 60 ft) and less massive than most vessels. • Devices that could pose a higher probability of collision risk to marine mammals are those operated at high speeds and are unmanned. Since some in-water devices are identical to support craft, which are typically less than 50 feet in length, marine mammals could respond to the physical presence of the device similar to how they respond to the physical presence of a vessel. • Some in-water devices are larger (e.g., large USVs) and can range up to about 300 feet. Larger devises typically travel between 1 and 15 knots, but can "sprint" up to 50 knots for brief periods of time.

Table 3.7-18: Physical Disturbance and Strike Stressors Summary Information (continued)

Sub-Stressor	Summary
Military expended materials	While no strike from MEM has ever been reported or recorded, the possibility of a strike still exists. • The primary concern is the potential for a marine mammal to be hit with a MEM at or near the water's surface, which could result in injury or death. • While disturbance or strike from an item falling through the water column is possible, it is not very likely given the objects generally sink slowly through the water and could be avoided by most marine mammals. Therefore, the discussion of MEM strikes focuses on the potential of a strike at the surface of the water. • The potential for marine mammals to be struck by MEM was evaluated using statistical probability modeling to estimate potential direct strike exposures to a marine mammal under a worst-case scenario. See Appendix I.
Seafloor devices	Seafloor devices are unlikely to affect marine mammals. • The likelihood of any marine mammal species encountering seafloor devices is considered low because these items are either stationary or move very slowly along the bottom and most marine mammals are do not interact with the bottom, particularly in deeper waters, and can maneuver easily in the water to avoid a stationary of slowly moving object. • In the unlikely event that a marine mammal is in the vicinity of a seafloor device, the stationary or very slowly moving devices would not be expected to physically disturb or alter natural behaviors of marine mammals. • The only time a seafloor device used during military readiness activities has the potential to strike a marine mammal at or near the surface or in the water column is during deployment from a surface vessel. Deployment is typically a controlled event to allow a level of precision in the placement of the device on the seafloor and a marine mammal is unlikely to encounter the device during the brief period that the device is in the water column. Cables installed on the seafloor as part of range sustainment and modernization activities are highly unlikely to adversely affect marine mammals. • The cables installed at underwater ranges are thick armored for durability and abrasion resistance and would remain on the seafloor after installation. • Most marine mammals do not forage on the seafloor and would not encounter the cables after installation. • The cable-laying process occurs once, not annually, and typically lasts for approximately 40 days. • The cable-laying vessel travels slowly (1–5 knots). • The fiber optic cables installed at Kaneohe Bay and off SCI would be secured to the seafloor in shallow water and are not expected to be entrained into the water column.
Pile Driving	Pile-driving activities at Port Hueneme are unlikely to affect marine mammals. • Sea lions and harbor seals spend much of their time hauled out on structures outside of the water. • When in the water, sea lions and harbor seals will likely avoid pile-driving sites due to acoustic stressors and pile-driving equipment at and above the surface. • Mitigation measures (Chapter 5) would be implemented to reduce the potential for adverse effects.

3.7.3.5.1 Effects from Vessels and In-Water Devices

Vessel strike to marine mammals is not associated with any specific training or testing activity but rather an inadvertent, limited, sporadic, and incidental result of Navy and USCG vessel movement within the Study Area. A detailed analysis of vessel strike data is presented in Appendix I and includes probability calculations used to predict the potential for a vessel strike in the 7-year period from December 2025 – December 2032.

The Navy and USCG do not anticipate vessel strikes to be a significant threat to marine mammal populations within the Study Area. This assessment is based on the probability of strike analysis presented in Appendix I (and summarized below), the cumulative low recent history of Navy vessel strikes from 2017 to 2023, establishment and updates to the Navy's Marine Species Awareness Training, and adaptation of additional mitigation measures since 2018.

In-water devices could pose a collision risk to marine mammals when operated at high speeds or are unmanned. In-water devices, such as unmanned underwater vehicles, and in-water devices towed from unmanned platforms that move slowly through the water are highly unlikely to strike marine mammals because the mammal could easily avoid the object. In-water devices towed by manned platforms would have observers stationed on the towing platform to implement mitigation and standard safety measures employed when towing in-water devices (see Chapter 5). Torpedoes (a type of in-water device) are generally smaller (several inches to 111 ft.) than most vessels. The Navy reviewed torpedo design features and a large number of previous anti-submarine warfare torpedo exercises to assess the potential of torpedo strikes on marine mammals. The tactical software that guides U.S. Navy torpedoes is sophisticated and would not identify a marine mammal as a target. All non-explosive torpedoes are recovered after being fired and are reconfigured for re-use. In thousands of exercises in which torpedoes were fired or in-water devices used, there have been no recorded or reported instances of a marine mammal strike.

Since some in-water devices are identical to support craft, marine mammals could respond to the physical presence of the device similar to how they respond to the physical presence of a vessel. It is possible that marine mammal species that occur in areas that overlap with in-water device use and may experience some level of physical disturbance, but it is not expected to result in more than a momentary behavioral response.

3.7.3.5.1.1 Effects from Vessels and In-Water Devices Under Alternative 1

Training and Testing. Table 3.0-17 provides estimates of relative vessel and in-water device use and locations in the Study Area. The concentration of vessels in the Study Area and the manner of training and testing would remain consistent with the levels and types of activities undertaken in the Study Area over the last decade even though the Study Area off California has been expanded to include the PMSR and NOCAL Range Complex. The analysis of adverse effects from in-water devices on marine mammals presented in the 2018 HSTT and 2022 PMSR EIS/OEISs remains valid and is applicable to the NOCAL Range Complex, considering the limited number of activities using in-water devices occurring there, and expanded warning areas adjacent to the SOCAL Range Complex.

The probability of whale strikes by Navy and USCG vessels was calculated based on an analysis of past strike data and anticipated future training and testing vessel use at-sea. The results of the analysis indicate a range of probabilities of strike that could result in injury or mortality to large whale species (Table 3.7-19). Details of the probability calculations are presented in Appendix I. Species potentially affected are: blue whale (Eastern North Pacific Stock), fin whale (California/Oregon/Washington Stock), gray whale (Eastern Pacific Stock), humpback whale (Mainland Mexico-California-Oregon-Washington Stock and Central North Pacific stock), and sperm whale (Hawaii stock).

Table 3.7-19: Probability of Vessel Strikes on Large Whales by Navy and USCG Vessels During Training and Testing Activities From 2025 to 2032

Number of Whales	Percent Probability of Strike by Navy Vessel in a 7-Year Period	Percent Probability of Strike by USCG Vessel in a 7-Year Period
0	3	7
1	11	20
2	19	25
3	22	22
4	19	14
5	13	NA

NA = Not applicable.

Physical disturbance and strike from large vessels and in-water devices would be more likely in waters over the continental shelf than in the open ocean farther from shore, because of the concentration of large vessel traffic and in-water device activities are greater as are marine mammal densities for most cetacean species (U.S. Department of the Navy, 2024d). Marine mammal species that tend to occur over the continental shelf would therefore have a greater potential to be adversely affected. Large vessels may occasionally be required to operate at speeds that are higher than average operating speeds, which may pose a greater strike risk to marine mammals, because there would be less time for the vessel crew to detect a marine mammal and maneuver to avoid a strike, and there would be less time over a given distance for the animal to react and avoid the vessel. Two of the three recent Navy vessel strikes of whales that occurred in the California Study Area were associated with vessels operating at higher speeds; however, the third strike in 2023 occurred when a vessel was traveling at a relatively low speed.

The use of small crafts traveling at higher speeds (i.e., greater than 10 knots) during military readiness activities occurs more frequently, although not exclusively, in nearshore waters, ports, and harbors than in offshore waters far from shore. One notable exception is the use of small range boats to recover torpedoes at SOAR and Barking Sands Tactical Underwater Range/Barking Sands Underwater Range Expansion underwater ranges. These ranges have both offshore and nearshore components. Nearshore waters in the Study Area are generally more confined waterways where species that prefer deep, offshore waters do not regularly occur. As stated in Section 3.7.3.5.1, odontocetes known to occur in nearshore waters, such as bottlenose dolphins and harbor porpoises, are not as susceptible to vessel strikes as mysticetes; although strikes are known to occur to these species. No vessel strikes of marine mammals have been reported due to vessel activities in nearshore waters and ports and harbors.

Physical disturbance from small crafts operating at higher speeds would be limited to areas where those vessels tend to operate on a regular basis, specifically, closer to shore, in ports and harbors, and at the offshore underwater ranges (see Table 3.0-17). Marine mammal species with the highest densities in these areas (e.g., bottlenose dolphins, harbor porpoises, and California sea lions off California, and humpback whales and spinner dolphins off Hawaii) would have a higher potential for vessel strike by small craft.

Military readiness activities involving vessels and in-water devices may occur year-round; therefore, adverse effects from physical disturbance would depend on each species' seasonal patterns of occurrence or degree of residency, primarily in the continental shelf portions of the Study Area. Refer to

Appendix C for species seasonal distribution patterns and migratory behavior. As previously indicated, any physical disturbance from vessel movements and use of in-water devices is not expected to result in more than a brief behavioral response (e.g., avoidance).

Pinniped occurrence within the California Study Area varies seasonally for most species (U.S. Department of the Navy, 2024d). The distribution of Hawaiian monk seals is consistent year-round but varies with distance from shore. While it is possible that vessels could encounter pinnipeds in offshore waters of the Study Area, in particular migrating northern elephant seals and Guadalupe fur seals that distribute widely offshore following breeding and molting, pinnipeds are highly mobile in the water and would likely be able to avoid an oncoming large vessel moving in nearshore channels. Movements of large vessel in nearshore waters would be at relatively slow speeds and would have limited overlap with pinniped occurrence. High-speed small craft movements in nearshore waters, including San Diego Bay and Pearl Harbor, would occur frequently; however, pinnipeds occurring in nearshore waters spend large amounts of time hauled out and display high maneuverability in the water, suggesting they could avoid interactions with small crafts as well. The only pinniped known to occur regularly in San Diego Bay is the California sea lion, and while frequently observed outside of Pearl Harbor, monk seals are far less common inside the harbor. Compared to cetaceans, pinnipeds are not as susceptible to vessel strikes; therefore, a pinniped strike is not anticipated during military readiness activities using vessels.

Encountering a sea otter during the use of in-water devices is not anticipated. Sea otters occur in a very limited portion of the Study Area, primarily close to shore off Central California and SNI in water depths less than 50 m, and there are few military readiness activities that may involve the use of vessels and in-water devices in these locations. The three amphibious landing areas used during selected training activities extend to shore in potential sea otter habitat and could pose a risk to sea otters, particularly if the lanes disturb kelp beds, a preferred habitat for sea otters.

Several characteristics of both the boats and devices and how these activities are conducted would reduce probability of effects on sea otters. Larger amphibious vessels would remain farther offshore during activities that use the landing areas; and only smaller boats, landing craft, and in-water devices (e.g., landing craft-utility boats, amphibious combat vehicles, and small combat rubber raider craft—similar to civilian zodiacs) would be used in the nearshore landing areas that overlap with sea otter habitat. Landing craft-utility boats and amphibious combat vehicles move very slowly (less than 8 knots), and the utility boats have a shroud around the propeller to prevent hitting the bottom, which also eliminates the potential for a propeller striking an otter. The amphibious combat vehicles do not have propellers, move the slowest of all boats and devices used during this activity, and have a front wave deflector when amphibious that would help to avoid direct contact with an otter. The small combat rubber raider craft are not any different than a civilian zodiac with an outboard motor. They would be the fastest of the boats operated in the landing areas, but they should be easily detected and avoided by a sea otter; and their hulls are made of rubber, which reduces the potential for injury from a direct strike. Any kelp beds located in the landing lanes would be avoided for the safety of equipment and personnel during these activities, further reducing the potential for an effect.

With the implementation of mitigation measures, including surveying the amphibious landing lanes prior to an activity and avoiding kelp beds, a sea otter strike is not anticipated. Disturbance due to the physical presence of vessels and in-water devices is not expected to result in more than a temporary behavioral response, which could include diving or leaving the area. Based on these considerations, there is a remote possibility that sea otters in the landing areas could be disturbed during amphibious landing events, including during preparations prior to the activity; however, sea otter strikes are not anticipated.

Modernization and Sustainment of Ranges. Vessels would be used to deploy seafloor cables and connected instrumentation for SOAR modernization activities and the SWTR installation off SCI as well as undersea fiber optic cables and connected instrumentation south and west of SCI, northeast of Oahu, and west of Kauai. The vessels would move very slowly during cable installation activities (1 to 5 knots) and would not pose a collision threat to marine mammals potentially occurring in the vicinity of the vessel.

Conclusion. Overall, the use of vessels and in-water devices during military readiness activities would have less than significant adverse effects on marine mammals. A vessel strike on an individual marine mammal would be considered a significant adverse effect on the individual even if the strike does not result in mortality. Nevertheless, the probability of a vessel strike remains low and even if a strike were to occur the effects on the population would be less than significant.

3.7.3.5.1.2 Effects from Vessels and In-Water Devices Under Alternative 2

As show in Table 3.0-17, the number of vessels and in-water devices used in the Study Area increases under Alternative 2. Training accounts for nearly 9 times the number of events with vessel and in-water device movements than testing, and, under Alternative 2 training events would increase by 11 percent in the California Study Area and 9 percent in the Hawaii Study Area. Therefore, the potential for adverse effects from the use of vessels and in-water devices under Alternative 2 is measurably greater than under alternative 1; however, more vessel movements do not necessarily equate to greater adverse effects. Therefore, the probability of vessel strikes on large whales would only be marginally higher than under Alternative 1, and the conclusions for significance are the same under both alternatives.

3.7.3.5.2 Effects from Military Expended Materials

This section analyzes the strike potential to marine mammals from the following categories of MEM: (1) all sizes of non-explosive practice munitions, (2) fragments from high-explosive munitions, (3) expendable targets and target fragments, and (4) expended materials other than munitions, such as sonobuoys, expended bathythermographs, and torpedo accessories. For a discussion of the types of activities that use MEM, refer to Appendix B and for a discussion on where items would be used or expended under each alternative, see Table 3.0-18 through Table 3.0-21. For physical disturbance and strike stressors as they relate to marine mammals, adverse effects from fragments from high-explosive munitions are included in the analysis presented in Section 3.7.3.3 and are not considered further in this section. Potential adverse effects from MEM as ingestion stressors to marine mammals are discussed in Section 3.7.3.7.

The primary concern is the potential for a marine mammal to be hit with a military expended material at or near the water's surface. While disturbance or strike from an item falling through the water column is possible, it is not very likely given the objects generally sink slowly through the water and can be avoided by marine mammals. Therefore, the discussion of MEM strikes focuses on the potential of a strike at the surface of the water.

While no strike from MEM has ever been reported or recorded, the possibility of a strike still exists. Therefore, the potential for marine mammals to be struck by MEM was evaluated using statistical probability modeling to estimate potential direct strike exposures. The analysis is described in detail in Appendix I and briefly summarized below.

To estimate potential direct strike exposures, four scenarios were developed using marine mammal densities, including the species with the highest average monthly density in the California and Hawaii study areas, and the dimensions of an array of MEM types (e.g., bombs, targets). Estimates of impact probability and number of exposures for a given species of interest were made for areas with the highest annual number of MEM used. The number of predicted exposures in a single year for ESA-listed marine mammals and the species with the highest average monthly density in the Hawaii and California Study Areas are shown in Appendix I.

3.7.3.5.2.1 Impacts from Military Expended Materials Under Alternative 1

Training and Testing. Military readiness activities that involve MEM would occur in nearshore and offshore waters of the Hawaii Study Area and California Study Area. MEM are not expected to be used during activities in San Diego Bay, Pearl Harbor, or Port Hueneme.

In the Hawaii Study Area, the species with the highest average monthly density is rough toothed dolphin, and the number of predicted exposures was calculated to be 0.0053 per year based on the probability of strike. Predicted exposures for all other species would be lower, in many cases several orders of magnitude lower, because species densities are lower. For ESA-listed species, Hawaiian monk seal had the highest number of predicted exposures at 0.00048 per year. In the California Study Area, the species with the highest average monthly density is short-beaked common dolphin, and the number of predicted exposures was 1.958 per year. Predicted exposures for all other species would be lower, in most cases several orders of magnitude lower, because species' densities are substantially lower. For ESA-listed species, fin whale had the highest number of predicted exposures at 0.08367 per year.

The analysis is likely an overestimation of the probability of a strike for the following reasons: (1) it calculates the probability of a single military item (of all the items expended over the course of the year) hitting a single animal at its species' highest seasonal density; (2) it does not take into account the possibility that an animal may avoid military activities; (3) it does not take into account the possibility that an animal may not be at the water surface; (4) it does not take into account that most projectiles fired during training and testing activities are fired at targets, and so only a very small portion of those projectiles that miss the target would hit the water with their maximum velocity and force; and (5) it does not quantitatively take into account the Navy avoiding animals that are sighted through the implementation of mitigation measures.

Modernization and Sustainment of Ranges. No MEM are expected to be used during modernization and sustainment of ranges activities. Some anchors may not be recovered and become MEM, but those are analyzed as seafloor devices.

Conclusion. Activities that include the use of MEM under Alternative 1 would result in less than significant effects. The analysis of physical disturbance and strike due to the use of MEM during military readiness activities under Alternative 1 resulted in a low but measurable number of predicted exposures to marine mammals, and the probability of a direct strike is low.

3.7.3.5.2.2 Impacts from the Use of Military Expended Materials Under Alternative 2

Based on the probability analysis, effects from the use MEM under Alternative 2 would be higher, but effects are not meaningfully different from Alternative 1. For example, the number of predicted exposures for rough-toothed dolphin in the Hawaii Study Area was calculated to be 0.0058 per year under Alternative 2 (compared with 0.0053 per year under Alternative 1), and the number of predicted exposures to short-beaked common dolphin was 2.036 per year (compared with 1.958 per year under

Alternative 1) (Appendix I). Therefore, activities that include the use of MEM under Alternative 2 would be similar to Alternative 1 and would result in less than significant effects.

3.7.3.5.3 Effects from Seafloor Devices

Training and Testing. Seafloor devices include items placed on, dropped on, or moved along the seafloor such as mine shapes, anchor blocks, anchors, bottom-placed devices, and bottom-crawling unmanned underwater vehicles. To identify the types of activities that use seafloor devices see Appendix B, and for a discussion on where they are used and how many activities would occur under each alternative, see Table 3.0-22. The likelihood of any marine mammal species encountering seafloor devices is considered low even for species that interact with benthic habitat, including humpback whales, gray whales, Hawaiian monk seals, and sea otters, because these devices are either stationary or move very slowly along the bottom. In the unlikely event that a marine mammal is in the vicinity of a seafloor device, the stationary or very slowly moving devices would not be expected to physically disturb or alter natural behaviors of marine mammals.

Modernization and Sustainment of Ranges. New range modernization and sustainment activities include installation of undersea cables integrated with hydrophones and underwater telephones to sustain the capabilities of the SOAR. Deployment of fiber optic cables along the seafloor would occur in three locations: south and west of SCI in the California Study Area, and to the northeast of Oahu and west of Kauai in the Hawaii Study Area. In all three locations the installations would occur completely within the water; no land interface would be involved.

The cables are deployed from a slow moving (1–5 knots) cable laying vessel, which operates continuously (day and night) until all cables are deployed and installed on the seafloor. While the duration the vessel is on site is dependent on the number and length of cables to be installed, the process is expected to be completed within a week for the installation of fiber option cables and over several weeks (less than 40 days) for undersea range cables, limiting the timeframe for a marine mammal to encounter the vessel or a cable in the water column. Mitigation to reduce the probability of physical disturbance or strike during cable laying activities would be implemented as part of the activity.

Fiber optic cables would be deployed and installed on the seafloor in the California Study Area off SCI, and in the Hawaii Study Area to the northeast of Oahu and west of Kauai. Fiber optic cables are narrower and lighter than the armored cables installed on underwater ranges and are less likely to affect a marine mammal through physically disturbance or strike while in the water column. Deployment would also occur continuously (night and day) from a slow-moving vessel over a relatively short time period, limiting any potential for a marine mammal to encounter and potentially be disturbed by either the vessel or the cable as it is lowered through the water column prior to installation on the seafloor. Cable installation activities are not annual activities and would only occur once over days to weeks between 2025 and 2032.

Conclusion. There are no reasonably foreseeable adverse effects from seafloor devices on marine mammals (Table 3.7-18), therefore further analysis is not warranted. Background information on physical disturbance and strike stressors is provided in Appendix F.

3.7.3.5.4 Effects from Pile Driving

Training and Testing. Only California sea lions and harbor seals occur regularly in Port Hueneme. Port Hueneme is an active port with both commercial and military vessels transiting through the port exposing California sea lions and harbor seals to anthropogenic stressors similar to physical disturbance stressors associated with pile driving activities. While in the port, both the sea lions and harbor seals spend much of their time hauled out on floating docks and other structures, limiting the potential for disturbance or strike by pile driving activities occurring in the water. When in the water, it is likely that both pinniped species would avoid sites where pile driving is actively occurring due to the potentially disturbing acoustic stressors and pile driving equipment operating at and above the surface. Avoidance of pile driving sites minimizes the potential for direct strike by vessels, which are generally stationary or moving slowing within the harbor. Based on these factors, it is not likely that any marine mammal would be struck by a piling or pile driving equipment during installation. Mitigation measures discussed in Chapter 5 would be conducted to further reduce any potential for adverse effects.

Modernization and Sustainment of Ranges. Pile driving would not be used during modernization and sustainment of ranges.

Conclusion. Therefore, there are no reasonably foreseeable adverse effects on marine mammals, specifically California sea lions and harbor seals, from pile driving as a physical disturbance and strike stressor. Background information on physical disturbance and strike stressors is provided in Appendix F. Adverse effects to marine mammals from pile driving activities as an acoustic stressor are addressed in Section 3.7.3.2.3.

3.7.3.6 Entanglement Stressors

Table 3.7-20 summarizes the potential adverse effects from entanglement stressors on marine mammals as the result of proposed military readiness activities within the Study Area. This analysis includes the potential adverse effects from three types of MEM: wires and cables, decelerators/parachutes, and subsurface objects (e.g., nets). The analysis is also applicable to cables installed as part of range sustainment and modernization activities. The number and location of wires and cable and decelerators/parachutes used during military readiness activities are provided in Table 3.0-24 (wires and cables) and Table 3.0-26 (decelerators/parachutes).

A small number of in-water training and testing activities would deploy subsurface obstacles, including nets, as part of an avoidance activity. The activities would avoid sensitive habitats and high vessel traffic areas, and all avoidance “targets” used in the activity would be recovered at the end of the exercise. Entanglement is extremely unlikely to occur for the reasons described in Table 3.7-20. Therefore, the effects of entanglement in submerged wires and cables, decelerators/parachutes, and nets or other obstacles on marine mammals are not reasonably foreseeable, and further analysis is not warranted. Background information on entanglement stressors is provided in Appendix F.

Table 3.7-20: Entanglement Stressors Summary Information

Sub-Stressor	Summary
Wires and cables	Wires and cables are unlikely to adversely affect marine mammals for the following reasons: • The chance that an individual animal would encounter expended cables or wires is low based on (1) the fact that the wires and cables will sink to the seafloor upon release, (2) relatively few marine mammal species forage on the seafloor, particularly in the deeper waters where wires and cables would be likely to reside, and (3) expended wires and cables would be sparsely distributed throughout the Study Area. • It is very unlikely that an animal would become entangled even if it encountered a cable or wire while it was sinking or upon settling to the seafloor. • A marine mammal would have to swim through loops, become twisted within the cable or wire, or in the case of mysticetes, get the cable or wire stuck in their baleen to become entangled, and given the properties of the expended wires (low breaking strength, sinking rates, and resistance to coiling or looping) this seems unlikely. Wires and cables resting on unconsolidated soft sediments (e.g., sand or silt) are likely to become partially or completely buried over time by shifting sediments, further reducing the likelihood that a marine mammal would encounter an expended wire or cable.
Decelerators/ parachutes	Entanglement of a marine mammal in a decelerator/parachute assembly at the surface, within the water column, or at the seafloor would be unlikely for the following reasons: • Most decelerators/parachutes are small and their distribution in the Study Area would be sparse. • A decelerator/parachute would have to land directly on an animal, or an animal would have to swim into a floating decelerator/parachute to become entangled within the cords or fabric while the decelerator/parachute is floating at the surface or sinking through the water column. • Most small and medium decelerators/parachutes would be expended in deep ocean areas and sink to the bottom relatively quickly, reducing the likelihood of encounter by marine mammals that occur predominantly in nearshore waters. • The main potential for entanglement is with large and extra-large decelerators/parachutes. While these larger parachutes would eventually sink and flatten on the seafloor, there is the potential that these decelerators/parachutes could remain suspended in the water column before sinking or billow at the seafloor for a longer period of time before flattening. The longer parachute lines pose an entanglement risk as well. Nevertheless, larger decelerators/parachutes would ultimately sink and become inaccessible in deeper waters to marine mammals, and the likelihood of encounter at the surface and in the water column is low. • Once on the seafloor, decelerators/parachutes on unconsolidated soft sediments (e.g., sand or silt) are likely to become partially or completely buried over time by shifting sediments, further reducing the likelihood that a marine mammal would encounter an expended decelerator/parachute.

Table 3.7-20: Entanglement Stressors Summary Information (continued)

Sub-Stressor	Summary
Cables Installed during Range Sustainment and Modernization Activities	Cables installed on the seafloor as part of this activity are highly unlikely to result in entanglement of a marine mammal for the following reasons: • The cables installed at underwater ranges are thick (approximately 3 inches in diameter), armored for durability and abrasion resistance, and inflexible, highly unlikely to loop or coil during installation. • Most marine mammals do not forage on the seafloor and would not encounter the cables after installation. • The cable laying process occurs once, not annually, and typically lasts for approximately 40 days for range installation, and about 1 week for the installation of fiber optic cables. • The fiber optic cables installed at Kaneohe Bay, west of Kauai, and off San Clemente Island are narrower (about 1 inch in diameter) but also relatively inflexible and resistant to looping in the water column. • The cables would be installed from a slowly moving (1 – 5 knots) cable laying vessel.
Nets used during obstacle avoidance activities	Although the use of submerged nets during military readiness activities represents a potential risk of entanglement to marine mammals, entanglement is extremely unlikely to occur for the following reasons: • Proposed mitigation and monitoring measures would reduce the potential that a marine mammal would encounter a net. • Nets are deployed in the water for a relatively brief period of time (hours), further reducing the likelihood of encounter. • Nets would always be tethered to one for more vessels and quickly retrievable if a marine mammal were to be sighted. • The area would be observed prior to and during net deployment. • There are relatively low densities of marine mammals, particularly ESA-listed species, in the vicinity of Navy obstacle avoidance exercises.

3.7.3.7 Ingestion Stressors

Table 3.7-21 summarizes the potential adverse effects of ingestion stressors due to the release of MEM used during military readiness activities within the Study Area. This analysis includes the potential adverse effects from the following types of MEM: non-explosive practice munitions (small- and medium-caliber), post detonation fragments from explosive munitions, fragments from targets hit by munitions, chaff, and flare casings and end caps. Refer to Tables 3.0-18 through 3.0-21 for numbers of MEM used in the Study Area. There are no reasonably foreseeable adverse effects from ingestion stressors on marine mammals (Table 3.7-21), therefore further analysis is not warranted. Background information on ingestion stressors is provided in Appendix F.

Table 3.7-21: Ingestion Stressors Summary Information

Sub-Stressor	Summary
Military expended materials – munitions	Ingestion of smaller expended munitions is not expected for any species of marine mammal. However, species that forage on the seafloor where expended munitions will reside are at greater risk of encountering and possibly ingesting smaller munitions. Ingestion of munitions is not expected for the following reasons: • General types of non-explosive practice munitions include projectiles, missiles, and bombs. Of these, only small- or medium-caliber projectiles (up to 2.25 inches in diameter) would be small enough for a marine mammal to ingest, reducing the quantity of expended munitions with the potential to be ingestions stressors. • Munitions are mainly composed of solid metal materials and would quickly and directly sink through the water column and settle on the seafloor, becoming inaccessible to most if not all marine mammals, depending on water depth. • Upon detonation explosive munitions (e.g., demolition charges, projectiles, missiles, and bombs) would release fragments of metal and other materials into the marine environment. Fragments would result from fractures in the munitions casing and would vary in size and quantity depending on the type and size of the munition. Typical sizes of fragments are unknown; however, some fragments would likely be too large for a marine mammal to ingest, and others would be so small as to be undetectable. • Solid metal fragments from explosive munitions would sink quickly to the seafloor, making them unavailable to marine mammals as ingestions stressors. • Munitions and munitions fragments residing on the seafloor in unconsolidated soft sediments (e.g., sand or silt) would likely become partially or complete buried over time as sediments shift. • Most explosive munitions and many non-explosive munitions are expended more than 12 NM from shore where waters throughout the Study Area are deeper than the foraging depths of marine mammals that forage on the seafloor, and under these circumstances there would be no potential for ingestion.
Military expended materials other than munitions	Most MEM other than munitions (e.g., chaff, plastic flare caps) that remain floating on the surface or in the water column are too small to pose a risk of intestinal blockage to any marine mammal that happened to encounter it and then ingested it. The adverse effects of ingesting MEM other than munitions would be limited to cases where an individual marine mammal might consume an indigestible item too large to be passed through the gut (e.g., a small decelerator/parachute). This is unlikely to occur for the following reasons: • With the possible exception of decelerators/parachutes that may appear similar to the prey of some species such as sperm whales and beaked whales, marine mammals would not be preferentially attracted to floating MEM as potential prey. • Most small and medium decelerators/parachutes would be expended in deep ocean areas and sink to the bottom relatively quickly, reducing the likelihood of encounter by marine mammals. • MEM would most likely only be incidentally ingested by individuals foraging on the bottom where these items were released, and most MEM are expended in deep offshore waters (i.e., more than 3 and often more than 12 NM from shore) where the seafloor is inaccessible to most marine mammals, and in particular benthic foraging species.

3.7.3.8 Secondary Stressors

The terms “indirect” and “secondary” do not imply reduced severity of environmental consequences but instead describe how a marine mammal may be exposed to the stressor. Potential indirect adverse effects on marine mammals would be through effects on their habitat or prey. Stressors from military readiness activities that could pose indirect effects on marine mammals via habitat or prey include (1) explosives, (2) explosives byproducts and unexploded munitions, (3) metals, (4) chemicals, and (5) transmission of disease and parasites (see Table 3.7-22).

Adverse effects on abiotic habitat, specifically sediments and water, are analyzed in Section 3.2. Indirect effects from explosive materials, byproducts, and unexploded munitions on marine mammals from chemical constituents in sediments are possible only if a marine mammal were to ingest the substantial amount of sediment. Section 3.7.3.7 explains why ingestion of MEM, which would include chemicals, in sediments is unlikely. Marine mammals as a group feed on a wide variety of prey ranging from small crustaceans, the primary prey for baleen whales, to other marine mammals (e.g., some killer whales prey on seals and even large whales). Appendix C describes foraging habitats and behaviors for marine mammals in the Study Area. For an adverse effect on prey to result in an indirect adverse effect on a marine mammal species, the population or a regional subpopulation of the prey (e.g., a fishery) would need to be significantly adversely affected. The analysis presented in Section 3.4 on invertebrates and Section 3.5 on fishes concluded that there would be less than significant to no direct adverse effects on those species. Therefore, there would be no potential for indirect adverse effects on marine mammals.

There are no reasonably foreseeable adverse effects from secondary stressors on marine mammals (Table 3.7-22), therefore further analysis is not warranted. Background information on secondary stressors is provided in Appendix F.

Table 3.7-22: Secondary Stressors Summary Information

Sub-Stressor	Summary
Explosives	Underwater explosions could adversely affect other species in the food web, including prey species that marine mammals feed upon. • The adverse effects of explosions would differ depending on the type of prey species and proximity to the detonation site. • In addition to physical effects of an underwater blast, prey might have behavioral reactions to underwater sound. For instance, prey species might exhibit a strong startle reaction to explosions that might include swimming to the surface or scattering away from the source. • Any of these scenarios would be temporary, only occurring as a result of the explosion and would only affect a small number of prey species, not a regional population. No lasting effects on the abundance or availability prey or the pelagic food web would be expected.
Explosives byproducts and unexploded munitions	Explosives byproducts are the materials remaining after the explosives in a munition combust. With a high-order detonation, all explosives materials are consumed leaving mostly non-toxic gasses including nitrogen, carbon dioxide, hydrogen, and water vapor with small amounts of other gases. No secondary effects on marine mammals from high-order detonations of explosives would occur. • Low-order detonations and unexploded munitions have the potential to indirectly affect marine mammals by introducing unconsumed explosives into marine sediments that degraded into chemical constituents over time and remain in benthic habitat. • Previous studies have shown that concentrations of explosives degradation products remain in close proximity to the degrading munition. • Only those species that commonly forage at the seafloor have the potential to encounter degrading munitions that could be leaching chemical constituents from exposed explosives materials. • Most munitions are expended in deep, offshore waters below the photic zone and far from benthic foraging habitat, limiting potential exposure to marine mammal prey.

Table 3.7-22: Secondary Stressors Summary Information (continued)

Sub-Stressor	Summary
Metals	Several military readiness activities expend items composed of metals into the marine environment that are potentially harmful in higher concentrations. • Metals on the seafloor would degrade slowly over years to decades, limiting any potential for concentrations to reach toxic levels in sediments. • Most metals used in MEM occur naturally in sediments.
Chemicals	Several military readiness activities introduce chemicals into the marine environment that are potentially harmful in higher concentrations; however, rapid dilution would occur, and toxic concentrations are unlikely to be encountered. • Chemicals introduced are principally from flares and propellants for missiles and torpedoes. Properly functioning flares, missiles, and torpedoes combust nearly all of their propellants, leaving benign or readily diluted soluble combustion byproducts (e.g., hydrogen cyanide). • Operational failures may allow propellants and their degradation products to be released into the marine environment. Flares and missiles that operationally fail may release perchlorate, which is highly soluble in water, persistent, and affects metabolic processes in many plants and animals if in sufficient concentration. • Such concentrations are not likely to persist in the ocean. • Torpedoes are typically recovered along with any remaining fuel.
Transmission of Marine Mammal Diseases and Parasites	Selected Navy training activities may include trained marine mammals as part of the activity, and these marine mammals have the potential to interact with wild animals and potentially transmit diseases or parasites. As summarized below, the Navy takes extensive precautions to ensure this would not happen.

3.7.4 Summary of Potential Effects on Marine Mammals

3.7.4.1 Combined Effects of All Stressors Under Alternative 1

This section evaluates the potential for combined adverse effects of all the stressors from the Proposed Action. The analysis and conclusions for the potential adverse effects from each of the individual stressors are discussed in Sections 3.7.3.2 through 3.7.3.7 and, for ESA-listed species, summarized in Section 3.7.5. Stressors associated with military readiness activities do not typically occur in isolation but rather occur in some combination. For example, mine neutralization activities include elements of acoustic, physical disturbance and strike, entanglement, ingestion, and secondary stressors that are all coincident in space and time. An analysis of the combined adverse effects of all stressors considers the potential consequences of additive stressors as described below. This analysis makes the reasonable assumption that most exposures to stressors are non-lethal, and instead focuses on consequences potentially affecting marine mammal fitness (e.g., physiology, behavior, reproductive potential).

There are generally two ways that a marine mammal could be exposed to multiple additive stressors. The first would be if a marine mammal were exposed to multiple sources of stress from a single event or activity within a single military readiness event (e.g., a mine warfare event may include the use of a sound source and a vessel). The potential for a combination of these adverse effects from a single activity would depend on the range to effects of each of the stressors and the response or lack of response to that stressor. Most of the proposed activities generally involve the use of moving platforms (e.g., ships, torpedoes, aircraft) that may produce one or more stressors; therefore, it is likely that if a marine mammal were within the potential range of those activities, it may be adversely affected by multiple stressors simultaneously. Individual stressors that would otherwise have minimal to no effect may combine to have a measurable response. However, due to the wide dispersion of stressors, speed of the platforms, general dynamic movement of many military readiness activities, and behavioral avoidance exhibited by many marine mammal species, it is very unlikely that a marine mammal would remain in the potential range of multiple sources or sequential events. Exposure to multiple stressors is more likely to occur at an instrumented range where military readiness activities using multiple platforms may be concentrated during a particular event. In such cases involving a relatively small area on an instrumented range, a behavioral reaction resulting in avoidance of the immediate vicinity of the activity would reduce the likelihood of exposure to additional stressors. Nevertheless, the majority of the proposed activities are unit-level training and small testing activities which are conducted in the open ocean. Unit-level exercises occur over a small spatial scale (one to a few square miles) and with few participants (usually one or two) or short duration (the order of a few hours or less). The majority of testing activities are similarly small in scale with one or two platforms and acoustic sources and short in duration.

Secondly, a marine mammal could be exposed to multiple military readiness activities over the course of its life, however, military readiness activities are generally separated in space and time in such a way that it would be unlikely that any individual marine mammal would be exposed to stressors from multiple activities within a short timeframe. However, animals with a home range intersecting an area of concentrated activity have elevated exposure risks relative to animals that simply transit the area through a migratory corridor.

Multiple stressors may also have synergistic effects. For example, marine mammals that experience temporary hearing loss or injury from acoustic stressors could be more susceptible to physical disturbance and strike stressors via a decreased ability to detect and avoid threats, such as an approaching vessel. Marine mammals that experience behavioral and physiological consequences of ingestion stressors could be more susceptible to entanglement and physical strike stressors via malnourishment and disorientation. These interactions are speculative, and without data on the combination of multiple stressors, the synergistic adverse effects from the combination of stressors are difficult to predict in any meaningful way.

Research and monitoring efforts have included: before-, during-, and after-event observations and surveys; data collection through conducting long-term studies in areas of military readiness activity; occurrence surveys over large geographic areas; biopsy of animals occurring in areas of military readiness activity; and tagging studies where animals are exposed to stressors from training and testing activities. These efforts are intended to contribute to the overall understanding of what effects may be occurring overall to animals in these areas. To date, the findings from the research and monitoring (Palacios et al., 2021; U.S. Department of the Navy, 2020a, 2021a, 2022a, 2022b) and the regulatory conclusions from previous analyses by NMFS (National Marine Fisheries Service, 2020a, 2020b, 2020c, 2022, 2023) are that majority of from military readiness activities are not expected to have adverse effects on the fitness of any individuals or long-term consequences to populations of marine mammals.

Although potential adverse effects on certain marine mammal species from military readiness activities may include behavioral responses, or injury to individuals, those injuries are not expected to lead to long-term consequences for populations.

The analysis conclusions for combined effects of all stressors on marine mammals resulting from military readiness activities are consistent with a determination of less than significant adverse effects on marine mammals.

3.7.4.2 Combined Effects of All Stressors Under Alternative 2

Under Alternative 2, there would be no meaningful difference in the combined effects of all stressors compared to Alternative 1. However, since the level of activities in Alternative 1 are expected to fluctuate from year to year, and the level in Alternative 2 is proposed to be a maximum level every year, the adverse effects from all stressors would be expected to be greater under Alternative 2 compared to Alternative 1 over a seven-year period. Nevertheless, the combined effects from all stressors under Alternative 2 are not meaningfully different from Alternative 1, and therefore the conclusions for significance, ESA-listed species, and critical habitat are the same under Alternative 2.

3.7.5 Endangered Species Act Determinations

Based on the potential co-occurrence of marine mammals and military readiness activities under Alternative 1, the activities may affect the blue whale, fin whale, western North Pacific gray whale, sei whale, humpback whale (Mexico and Central America DPSs), sperm whale, Southern Resident killer whale, Guadalupe fur seal, MHI insular false killer whale, Hawaiian monk seal, and southern sea otter as defined by the ESA. Military readiness activities may affect MHI insular false killer whale, humpback whale (Mexico and Central America DPSs), and Hawaiian monk seal critical habitats, because some activities are likely to occur in critical habitats and have the potential to temporarily affect one or more of the essential features defining those habitats. Military readiness activities would not result in the destruction or adverse modification of Southern Resident killer whale critical habitat, because the activities are not expected to occur in the critical habitat or affect the essential features of the critical habitat.

The summary of effects determinations for each ESA-listed species is provided in Table 3.7-23.

3.7.6 Marine Mammal Protection Act Determinations

Letters of Authorization are being sought in accordance with the MMPA from NMFS for certain military readiness activities (the use of sonar and other transducers, pile driving, vessels, and explosives), as described under the Alternative 1. The use of sonar and other transducers may result in Level A and Level B harassment of certain marine mammals. Pile driving may result in Level B harassment of California sea lions and harbor seals. The use of explosives may result in Level A harassment, Level B harassment, and mortality of certain marine mammals. The use of vessels may result in Level A harassment or mortality of certain large whales due to physical strike. Noise from the launch of missiles and aerial vehicles at SNI (PMSR) and PMRF and artillery firing at PMRF may results in Level B harassment of certain hauled-out pinnipeds.

Vessel noise, aircraft noise, the use of in-water electromagnetic devices, high-energy lasers, high-power microwave devices, in-water devices, seafloor devices, wires and cables, decelerators/parachutes, and MEM are not expected to result in Level A or Level B harassment of any marine mammals.

Table 3.7-23: Marine Mammal ESA Effect Determinations for Military Readiness Activities Under Alternative 1 (Preferred Alternative)

Species	*Designation Unit*	Overall Determination	Acoustic and Explosive Stressors: Sonar & Other Transducers	Acoustic and Explosive Stressors: Air Guns	Acoustic and Explosive Stressors: Pile Driving	Acoustic and Explosive Stressors: Vessel Noise	Acoustic and Explosive Stressors: Aircraft Noise	Acoustic and Explosive Stressors: Weapons Noise	Acoustic and Explosive Stressors: Explosives	Energy Stressors: In-Water Electromagnetic Devices	Energy Stressors: High Energy Lasers	Energy Stressors: High-Power Microwave	Physical Disturbance and Strike Stressors: Vessels & In-Water Devices	Physical Disturbance and Strike Stressors: Military Expended Material	Physical Disturbance and Strike Stressors: Seafloor Devices	Physical Disturbance and Strike Stressors: Pile Driving	Entanglement Stressors: Wires & Cables	Entanglement Stressors: Decelerators/Parachutes	Ingestion Stressors: Military Expended Materials	Indirect Effects
Blue whale	Eastern North Pacific	MA	MA	MA	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
	Central North Pacific	MA	MA	MA	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
Fin whale	California, Oregon, and Washington	MA	MA	MA	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
	Hawaiian	MA	MA	MA	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
Gray whale	Western North Pacific	MA	MA	NE	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
Sei whale	Eastern North Pacific	MA	MA	NE	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
	Hawaii	MA	MA	NE	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
Humpback whale	Mexico and Central America DPSs	MA	MA	MA	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
	Critical habitat	MA	NE	NE	n/a	NE	NE	NE	MA	NE	NE	NE	NE	MA	MA	n/a	MA	MA	MA	MA
Sperm whale	California, Oregon, and Washington	MA	MA	MA	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
	Hawaii	MA	MA	MA	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
False killer whale	Main Hawaiian Islands Insular DPS	MA	MA	NE	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
	Critical habitat	MA	NE	MA	n/a	NE	NE	NE	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
Killer whale	Eastern North Pacific Southern Resident	MA	MA	MA	n/a	MA	MA	MA	MA	NE	NE	NE	NE	NE	NE	n/a	NE	NE	NE	MA
	Critical habitat	MA	NE	MA	n/a	NE	NE	NE	MA	NE	NE	NE	NE	NE	NE	n/a	NE	NE	NE	NE
Hawaiian monk seal	Throughout its range	MA	MA	MA	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
	Critical habitat	MA	NE	NE	n/a	NE	NE	NE	MA	NE	NE	NE	NE	MA	MA	n/a	MA	MA	MA	MA
Guadalupe fur seal	Throughout its range	MA	MA	MA	n/a	MA	MA	MA	MA	NE	NE	NE	MA	MA	MA	n/a	MA	MA	MA	MA
Southern sea otter	California	MA	NE	NE	n/a	NE	NE	NE	NE	NE	NE	NE	MA	NE	NE	n/a	NE	NE	NE	NE

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