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3.9 Birds

BIRDS SYNOPSIS

Stressors to birds that could result from the Proposed Action within the Study Area were considered, and the following conclusions have been reached for the Preferred Alternative (Alternative 1):

- Acoustic: Birds in flight, on the water's surface, or under water while diving for prey items have the potential to be exposed to sound generated by military readiness activities. Unless very close to an intense sound source, responses by birds to acoustic stressors would likely be limited to short-term behavioral responses. Some birds may be temporarily displaced, and there may be temporary increases in stress levels. Although individual birds may be impacted, population-level effects would not occur. As such, acoustic stressors would have no reasonably foreseeable adverse effects on birds.
- Explosive: Birds could be exposed to in-air explosions. Sounds generated by most small underwater explosions are unlikely to disturb birds above the water surface. However, if a detonation is sufficiently large or is near the water surface, birds above the water surface could be injured or killed. Detonations in air could injure or kill birds while either in flight or at the water surface; however, detonations in air during anti-air warfare training and testing would typically occur at much higher altitudes where seabirds and migrating birds are less likely to be present. Detonations can result in fish kills, which may attract birds. If this occurred during training or testing where multiple detonations take place, bird mortalities or injuries are possible. An explosive detonation would likely cause a startle reaction, as the exposure would be brief, and any reactions are expected to be short term. Although a few individuals may experience long-term effects and potential mortality, population-level effects would not occur. As such, explosives would have less than significant effects on birds.
- Energy: The impact of energy stressors on birds is expected to be negligible based on (1) the limited geographic area in which they are used, (2) the rare chance that an individual bird would be exposed to these devices while in use, and (3) the tendency of birds to temporarily avoid areas of activity when and where the devices are in use. The effects of energy stressors would be limited to individual cases where a bird might become temporarily disoriented or be injured. Although a small number of individuals may be impacted, no population-level effects would occur. As such, energy stressors would have no reasonably foreseeable adverse effects on birds.
- Physical Disturbance and Strike: There is a potential for individual birds to be injured or killed by physical disturbance and strikes during training and testing. However, there would not be long-term species or population-level effects due to the vast area over which training and testing activities occur, and the small size of birds and their ability to flee disturbance. As such physical disturbance and strike stressors would have less than significant effects on birds.

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- Ingestion: It is possible that persistent expended materials could be accidentally ingested by birds while foraging for natural prey items, though the probability of this event is low as (1) foraging depths of diving birds is generally restricted to the surface of the water or shallow depths, (2) the material is unlikely to be mistaken for prey, and (3) most of the material remains at or near the sea surface for a short length of time. No population-level effect on any bird species would occur. As such, ingestion stressors would have less than significant effects on birds.

3.9.1 Introduction

The following sections provide an overview of birds in the Study Area and the potential effects of the proposed military readiness activities on these resources. Appendix C provides more detailed descriptions of species within the Study Area.

3.9.2 Affected Environment

The affected environment provides the context for evaluating the effects of the proposed military readiness activities on birds. The Study Area is larger than what was described in the 2018 HSTT and 2022 PMSR EIS/OEISs. Despite this change, the affected environment for birds is not meaningfully different. Refer to Appendix C for detailed information on the affected environment of birds.

3.9.2.1 General Background

As described in the 2018 HSTT and 2022 PMSR EIS/OEISs, most of the bird species that occur within the Study Area are waterbirds—birds that live in marine, estuarine, and freshwater habitats. Waterbirds include seabirds, wading birds, shorebirds, and waterfowl. In this analysis, because of where training and testing activities would occur and the types of activities, the focus of this chapter is on seabirds. The remainder of the species that may be encountered in the Study Area are landbirds that are coastal resident species that live on land but forage in the adjacent coastal waters.

3.9.2.1.1 Group Size

A variety of group sizes and diversity may be encountered throughout the Study Area, ranging from solitary migration of an individual bird to large concentrations of birds in single-species and mixed-species flocks. Depending on season, location, and time of day, the number of birds observed (group size) varies and will likely fluctuate from year to year. During spring and fall periods, diurnal and nocturnal migrants would likely occur in large groups as they migrate over open water. Many waterbirds migrate in very small groups or pairs and can be found in large groups at stopover areas and wintering grounds (Assali et al., 2020; Elphick, 2007).

3.9.2.1.2 Habitat Use

The Hawaiian Islands are important habitat for seabirds in the North Pacific Subtropical Gyre. The shoreline, estuarine, and open ocean environments support a diverse and large population of seabird species by providing important nesting and feeding habitats. The Hawaiian Islands are in the warm North Pacific water mass (U.S. Fish and Wildlife Service, 2005). Recent research estimates that 15 million seabirds inhabit the Hawaiian Islands; 22 species of seabirds regularly nest in the Hawaiian Islands, and many more pass through during migration to and from their breeding grounds elsewhere in the Pacific

(Pratt et al., 2023). In addition to the seabirds that breed in the Study Area, millions of seabirds from more than 100 different species migrate to or through the Study Area. Surveys around the Hawaiian Islands found 40 different species of seabirds; half were local breeders, and the remainder were migrant species (U.S. Fish and Wildlife Service, 2005).

An estimated 5.5–6 million seabirds representing more than 100 species are thought to occur off California based on at-sea surveys within the Study Area (U.S. Fish and Wildlife Service, 2005). More than 300 bird species have been documented in and around San Diego Bay. The majority of these bay birds, representing 30 families, are migratory and may only stop to rest and feed, while others spend the winter or breed. Several are terrestrial birds of special concern or influence that are found about the Bay but may not directly depend upon it. Accordingly, terrestrial bird species are not analyzed in this document because they are not expected to be impacted by military readiness activities described in this EIS/OEIS.

3.9.2.1.3 Movement and Behavior

Many of the seabird species found in the Study Area dive, skim, or grasp prey at the water's surface or within the upper portion (1–2 m) of the water column (Cook et al., 2011; Jiménez et al., 2012; Sibley, 2014). However, numerous seabirds, including various species of diving ducks, cormorants, and alcids (the family that includes murres, murrelets, auks, auklets, shearwaters, and puffins), including the threatened Newell's shearwater, are known to feed at depths greater than 50 m (Raine et al., 2020). Some seabirds are aerial plunge divers, diving from above the surface and making generally shallow dives into the water column after prey (e.g., terns, gannets). Others are considered surface divers, plunging directly from the surface underwater after prey (e.g., puffins, loons). Most diving species tend to catch the majority of their prey near the surface of the water column or on the bottom in shallow water (e.g., clams, mussels, and other invertebrates) (Cook et al., 2011), although some pursue prey to considerable depths, as noted previously. Dive durations are correlated with depth and range from a few seconds in shallow divers to several minutes in alcids (Ponganis, 2015).

3.9.2.1.4 Hearing and Vocalization

Marine birds generally have the greatest hearing sensitivity between 1 and 4 kHz in air and underwater. Additional information on hearing and vocalization for birds is provided in Appendix C. The majority of the published literature on bird hearing focuses on terrestrial birds and their ability to hear in air. A review of 32 terrestrial and marine species indicates that birds generally have greatest hearing sensitivity between 1 and 4 kHz (Beason, 2004; Dooling, 2002). Very few can hear below 20 Hz, most have an upper frequency hearing limit of 10 kHz, and none exhibit hearing at frequencies higher than 15 kHz (Dooling, 2002; Dooling & Popper, 2000). Larsen et al. (2020) determined that the average sound pressure with the most sensitivity was found at 1 kHz, both in air (53 dB re 20 µPa) and underwater (58 dB re 20 µPa), but with higher sensitivities under water. Information on hearing and vocalization for birds is provided in Appendix C.

3.9.2.1.5 General Threats

Seabirds are some of the most threatened marine animals in the world, with 29 percent of species at risk of extinction (Spatz et al., 2014). Threats to bird populations in the Study Area include human-caused stressors (such as incidental mortality) from interactions with commercial and recreational fishing gear; predation and competition by introduced species; disturbance and degradation of nesting areas by humans and domesticated animals; noise pollution from construction and other human activities; nocturnal collisions with power lines and artificial lights; collisions with aircraft; and pollution, such as that from oil spills and plastic debris (Anderson et al., 2007; Burkett et al., 2003; California Department of Fish and Game, 2010; Carter & Kuletz, 1995; Clavero et al., 2009; International Union for Conservation of Nature and Natural Resources, 2010; North American Bird Conservation Initiative, 2022; North American Bird Conservation Initiative & U.S. Committee, 2010; Onley & Scofield, 2007; Phillips et al., 2023; Piatt & Naslund, 1995; Richards et al., 2021; U.S. Fish and Wildlife Service, 2005, 2008, 2010; Waugh et al., 2012; Weimerskirch, 2004). A relatively new threat of wind energy development is of concern in both coastal Hawaii and California (Allison et al., 2019; Ross IV, 2022). Disease, volcanic eruptions, storms, and harmful algal blooms are also natural threats to birds (Anderson et al., 2007; Jeglinski et al., 2024; Jessup et al., 2009; North American Bird Conservation Initiative, 2022; North American Bird Conservation Initiative & U.S. Committee, 2010; U.S. Fish and Wildlife Service, 2005).

Young et al. (2012) and Phillips et al. (2023) summarized the hypothesized effects of climate change on seabirds in the Pacific Climate, which include possible changes in wind patterns (affecting frontal zones and coastal upwelling important for prey items), oceanic warming and increasing thermal stratification, higher sea levels and storm surge events causing inundation of breeding locations, changes in ocean chemistry (creation of low oxygen zones or areas with high acidity), and increased heat stress for breeding birds at terrestrial colony sites.

More detailed species-specific threats are included in Appendix C.

3.9.2.2 Endangered Species Act-Listed Species

Six species of birds listed as Threatened or Endangered under the ESA occur in the Study Area. The status, presence, and nesting occurrence of ESA-listed species are listed in Table 3.9-1. Critical habitat has not been designated for any of these species within the Study Area.

Table 3.9-1: Current Regulatory Status and Presence of Endangered Species Act-Listed Birds in the Study Area

Species Name and Regulatory Status				Species Occurrence in the Study Area		
Common Name	**Scientific Name**	**Distinct Population Segment/Stock**	**Endangered Species Act Status/Critical Habitat**	**Inshore and Coastal Waters Hawaiian Islands**	**Open Ocean**	**Inshore and Coastal Waters of California**
California least tern	*Sternula antillarum browni*	-	Endangered	No	No	**Yes**
Hawaiian petrel	*Pterodroma sandwichensis*	-	Endangered	**Yes**	**Yes**	No
Band-rumped storm-petrel	*Hydrobates castro*	Hawaii distinct population segment	Endangered	**Yes**	**Yes**	No
Short-tailed albatross	*Phoebastria albatrus*	-	Endangered	No	**Yes**	No
Marbled murrelet	*Brachyramphus marmoratus*	-	Threatened	No	No	**Yes**
Newell's shearwater	*Puffinus newelli*	-	Threatened	**Yes**	**Yes**	No

3.9.2.3 Species Not Listed Under the Endangered Species Act

Section 3.9.2.3.1 describes species that are protected and of conservation concern under the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act. Additional information on each taxonomic group is provided in Appendix C. Major bird groups present in the Study Area are shown in Table 3.9-2.

Table 3.9-2: Major Groups of Birds in the Study Area

Major Bird Groups[1]		Species Occurrence in the Study Area [2]		
Common Name (Taxonomic Group)	**Description**	**Inshore and Coastal Waters Hawaiian Islands**	**Open Ocean**	**Inshore and Coastal Waters of California**
Geese, swans, dabbling and diving ducks (Order Anseriformes)	Diverse group of birds that inhabit shallow waters, coastal areas, and deeper waters. Feed at the surface by dabbling or by diving in deeper water. Often occur in large flocks.	Yes	Yes	Yes
Loons (Order Gaviiformes)	Superficially duck-like, fish-eating birds that capture prey by diving and underwater pursuit.	No	Yes	Yes
Grebes (Order Podicipediformes)	Small diving birds, superficially duck like. May occur in small groups.	No	Yes	Yes
Albatrosses, fulmars, petrels, shearwaters, and storm-petrels (Order Procellariiformes)	Group of largely pelagic seabirds. Fly nearly continuously when at sea. Soar low over the water surface to find prey. Some species dive below the surface.	Yes	Yes	Yes
Boobies, gannets, cormorants, anhingas, and frigatebirds (Order Suliformes)	Diverse group of large, fish-eating seabirds with four toes joined by webbing. Often occur in large flocks near high concentrations of bait fish.	Yes	Yes	Yes
Pelicans, herons, egrets, Ibis, and spoonbills (Order Pelecaniformes)	Large wading birds with dagger-like, down-curved, or spoon-shaped bills used to capture prey in water or mud.	Yes	No	Yes
Osprey, bald eagles, peregrine falcons (Orders Accipitriformes, and Falconiformes)	Large raptors that inhabit habitats with open water, including coastal areas. Feed on fish, waterfowl, or other mammals. Migrate and forage over open water.	Yes	No	Yes
Shorebirds, phalaropes, gulls, noddies, terns, skua, jaegers, and alcids (Order Charadriiformes)	Diverse group of small to medium sized shorebirds, seabirds and allies inhabiting coastal, nearshore, and open ocean waters.	Yes	Yes	Yes

[1]American Ornithologists' Union (1998), Sibley (2014), for major bird taxonomic groups.

[2]Presence in the Study Area includes open ocean areas (North Pacific Subtropical Gyre and North Pacific Transition Zone) and coastal waters of two Large Marine Ecosystems (California Current and Insular Pacific-Hawaiian).

3.9.2.3.1 Migratory Birds

Migratory birds are those that undertake periodic seasonal movement from one region to another, typically coinciding with available food supplies or breeding seasons. A variety of bird species would be encountered in the Study Area, including those listed under the MBTA, which protects nearly all migratory species of birds, eggs, and nests and establishes federal responsibilities for protecting these species.

For the analysis of effects, species protected under the MBTA are not analyzed individually but are grouped based on taxonomic or behavioral similarities based on the stressor that is being analyzed. Determinations of potential effects on species protected under the MBTA are presented in Section 3.9.5.

Birds of Conservation Concern are species, subspecies, and populations of migratory birds that the USFWS determined to be the highest priority for conservation actions to prevent the need to list birds under the ESA. The USFWS updated the list of Birds of Conservation Concern in 2021 after the preparation of the 2018 HSTT EIS/OEIS. Table 3.9-3 lists the species with potential to occur in the Study Area.

Table 3.9-3: Birds of Conservation Concern that Occur Within the Study Area

Order/Family	Common Name	Scientific Name
Order Procellariiformes		
Family Diomedeidae		
	Laysan albatross	*Phoebastria immutabilis*
	Black-footed albatross	*Phoebastria nigripes*
Family Procellariidae		
	Pink-footed shearwater	*Puffinus creatopus*
	Christmas shearwater	*Puffinus nativitatis*
	Black-vented shearwater	*Puffinus opisthomelas*
Family Hydrobatidae		
	Ashy storm-petrel	*Oceanodroma homochroa*
	Band-rumped storm-petrel[1]	*Hydrobates castro*
	Tristram's storm-petrel	*Oceanodroma tristrami*
Order Falconiformes		
Family Falconidae		
	Peregrine falcon	*Falco peregrinus*
Order Charadriiformes		
Family Lardiae		
Subfamily Sterninae	Blue noddy	*Procelsterna cerulean*
	Gull-billed tern	*Sterna nilotica*
Subfamily Rynchopinae	Black skimmer	*Rynchops niger*
Family Ardeidae		
	Guadalupe murrelet	*Synthliboramphus hypoleucus*
	Scripps's murrelet	*Synthliboramphus scrippsi*
	Cassin's auklet	*Ptychoramphus aleuticus*

[1] The band-rumped storm petrel are distributed in both the Atlantic and Pacific oceans. The Hawaii DPS is listed under the ESA.

3.9.3 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 birds 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 describes and evaluates how and to what degree the activities described in Chapter 2, Appendix A, and Section 3.0.3.3 could potentially impact birds known to occur 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. 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 and explosives stressors.

The analysis considers standard operating procedures and mitigation measures that would be implemented under Alternative 1 and Alternative 2 of the Proposed Action. The standard operating procedures and mitigation measures that are specific to birds are listed in Table 3.9-4.

Table 3.9-4: Chapter 5 Section Reference to Relevant Mitigation Measures

Applicable Stressor	Requirements Summary and Protection Focus	Section Reference
Personnel Training and Reporting	Designed to aid lookouts and other personnel with observation, environmental compliance, and reporting responsibilities.	Sections 5.3 and 5.4
Explosives	Conduct visual observations for events for all NEW during ship shock trials. Observe during the event and after each individual detonation	Section 5.6
	Conduct visual observations for events involving explosive mine countermeasure and neutralization activities without Navy divers. Use of lookouts, with mitigation zones of 600 yd. for activities using 0.1–5 lb. NEW and 2,100 yd. for >5 lb. NEW.	Section 5.6
	Conduct visual observations for events involving explosive mine countermeasure with Navy divers. Use of lookouts, with mitigation zones of 500 yd. for activities using 1–20 lb. NEW (positive control), 1,000 yd. for 0.1–29 lb. NEW (time-delay), and 1,000 yd. for > 20–60 lb. NEW (positive control).	Section 5.6

Notes: lb. = pound(s), yd. = yard(s), NEW = Net Explosive Weight

The stressors vary in intensity, frequency, duration, and location within the Study Area. General characteristics of all stressors and living resources' general susceptibilities to stressors are discussed in Section 3.0.3.3. The stressors and substressors analyzed for birds include the following:

- **acoustic** (sonar and other transducers, pile driving, vessel noise, aircraft noise, weapons noise, and air guns)
- **explosive** (explosions in-water, explosions in air)

- **energy** (in-air electromagnetic devices, in-water electromagnetic devices, high-energy lasers, high-power microwave devices)
- **physical disturbance and strike** (vessels and in-water devices, aircraft and aerial targets, MEM, seafloor devices, pile driving)
- **ingestion** (MEM)

As noted in Section 3.0.2, a significance determination is made only for activities that may have reasonably foreseeable adverse effects on the human environment based on the significance factors in Table 3.0-2. Explosive, physical disturbance and strike, and ingestion stressors could have a reasonably foreseeable adverse effect, thus requiring 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. In the present instance, the effects of the stressors analyzed would be considered significant if the effects would be short term or long term and well outside the natural range of variability of species' populations, habitats, or the natural processes sustaining them. This could include extensive (i.e., affecting a large proportion of the local population), life-threatening, or debilitating injury and mortality and substantial disruption of time-sensitive behaviors such as breeding. Displacement of birds from preferred breeding or feeding areas, nursery grounds, or migratory routes would occur within project areas, their immediate surroundings, and beyond. Behavioral disruptions and displacement would result in the loss of breeding and egg-bearing adults and chicks due to increased competition or energy expenditure at scales large enough to affect overall bird population numbers or demographic structure. Impacts would also be considered major if they threatened the continued existence of any bird species. Full recovery of bird populations would not be expected to occur in a reasonable time. Habitat would be degraded over the long term or permanently such that it would no longer be able to support dependent populations of birds.

3.9.3.1 Acoustic Stressors

This section summarizes the potential effects of acoustic stressors used during military readiness activities within the Study Area. Table 3.9-5 contains a brief summary of background information that is relevant to the analyses of effects for each acoustic substressor. More detailed information and analysis on acoustic stressors, as well as effects specific to each substressor, is provided in Appendix D.

Table 3.9-5: Acoustic Stressors Information Summary

Substressor	Background Information Summary
Sonar and other transducers	• Pursuit-diving bird species may be exposed to sonar and other transducers while foraging underwater; however, diving occurs only for minutes at a time. • Injury of the lungs from sonar and other transducers is unlikely in birds. • Hearing loss would only occur if a bird were close to a sound source of sufficient intensity and duration. It is unlikely that a diving bird would experience underwater exposure to sonar or other transducers that would impact hearing.
Air guns	• Sound from air guns lack the strong shock wave and rapid pressure increases of explosions that can cause primary blast injury or barotraumas. Generated impulses would have short durations, typically a few hundred milliseconds. • The exposure to these sounds by birds, other than pursuit-diving species, would be negligible because they spend a very short time underwater.

Table 3.9-5: Acoustic Stressors Information Summary (continued)

Substressor	Background Information Summary
Air guns (continued)	• Pursuit divers may experience underwater sound exposure. However, exposure is unlikely because of the short duration of an air gun pulse; relatively low source (exposure would require a bird to be very close to the source at the moment of discharge); and generally, air guns are used at depths greater than where birds forage.
Weapons noise	• Sounds produced by weapons are potential stressors to birds. • Sound generated by a muzzle blast is intense but very brief. A bird very close to a large weapons blast could be injured or experience hearing loss or threshold shift due to acoustic trauma. • Sound generated by a projectile travelling at speeds greater than the speed of sound can produce a low amplitude bow shock wave in a narrow area around its flight path.
Weapons noise (continued)	• Inert objects hitting the water surface would generate a splash, and the noise may disturb nearby birds. • Bird responses to weapons firing and projectile travel noise may include short-term behavioral or physiological responses such as alert responses, startle responses, or temporary increases in heart rate. • Studies of effects of weapons noise on raptors show that these birds show little reaction (e.g., head turn) and do not alter behavior in the presence of noise from weapons testing (Brown et al., 1999; Schueck et al., 2001; Stalmaster & Kaiser, 1997). • Once surface weapons firing activities begin, birds would likely disperse away from the area around the ship and the path of projectiles.
Pile driving	• Impact pile driving produces repetitive, impulsive, broadband sound with most of the energy in lower frequencies. Vibratory pile removal produces nearly continuous sound at a lower source level. Sounds are emitted both in the air and in the water in nearshore areas where some birds forage. • Most individuals would avoid the locations during pile driving and removal activities. • Behavioral responses and displacement from the area are expected to be temporary for the duration of the pile driving and extraction activities.
Vessel noise	• Birds respond to vessels in various ways. Some follow vessels while others avoid vessels. • Vessel noise could elicit short-term behavioral or physiological responses but is not likely to disrupt migrating, breeding, feeding, and sheltering, or result in serious injury to any birds. • Harmful bird/vessel interactions are commonly associated with commercial fishing vessels because birds are attracted to concentrated food sources. Such concentrations are not present around military vessels.
Aircraft noise	• Birds could be exposed to noise associated with subsonic and supersonic fixed-wing aircraft and rotary-wing aircraft overflights. • Exposure to fixed-wing aircraft noise would be brief and infrequent, and repeated exposure of individuals in a short period of time (hours or days) is unlikely. • Common behavioral responses to aircraft noise include no response or stationary alert behavior, startle response, flight, and increased vocalization. • There is also the potential for noise to mask calls. • In some instances of frequent exposure or exposure to intense noise, behavioral responses could affect breeding, foraging, habitat use, and energy budgets.

3.9.3.1.1 Effects from Sonar and Other Transducers

Table 3.9-5 contains a summary of the background information used to analyze the potential effects of sonar and other transducers on birds. For a listing of the types of activities that use sonar and other transducers, refer to Appendix B. For information on the number of activities proposed for each alternative, see Table 3.0-3.

Sonar and other transducers would not be regularly used in nearshore areas that could be used by foraging shorebirds, expect during pierside maintenance activities or navigation in areas around ports. The Pacific current runs through the portion of the HCTT Study Area along the western U.S. coast, and is an area of increased productivity that attracts foraging birds. Therefore, birds that forage in open ocean areas would have a greater chance of underwater sound exposure than birds that forage in coastal areas.

Training and Testing. Pursuit-diving birds could be exposed to low-, mid-, and high-frequency sonar and sound produced by sonar and other transducers during training and testing activities. The greatest potential for measurable effects would be near the sources of low-frequency and high-intensity sonar. For military readiness activities, this would occur mostly in the offshore marine environment. Sonar and other transducers would not be regularly used in nearshore areas that could be used by foraging shorebirds, except during maintenance and for navigation in areas around ports. Therefore, birds that forage in open-ocean areas would have a greater chance of underwater sound exposure than birds that forage in coastal areas. Exposure resulting in adverse effects are unlikely because of the bird would have to be underwater at the time of use of sonar and transducers in very close (within a few meters) proximity to the source.

The possibility of an ESA-listed bird species being exposed to sonar and other transducers depends on whether it submerges during foraging and whether it forages in areas where these sound sources may be used. Hawaiian petrels, band-rumped storm petrels, and short-tailed albatrosses do not submerge while foraging; therefore, it is unlikely they would be exposed to underwater sound from sonar and other active acoustic sources. Least terns, marbled murrelet, and Newell’s shearwater may briefly submerge while foraging, either during plunge-diving (terns) or pursuit diving (murrelet and shearwater), so there is a chance that these species could be exposed to underwater sound from sonar and other transducers. However, their plunge dives are brief, so any chance of exposure would be inconsequential. Most other sonar use occurs farther offshore, however, so the chance for an exposure would be low.

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

Conclusion. Activities that use sonar and other transducers would not have reasonably foreseeable adverse effects on birds for reasons previously stated in the 2018 HSTT and 2022 PMSR EIS/OEISs. These reasons include (1) the close proximity that a diving bird would have to be to an emitting source to have an adverse effect; (2) if a bird was exposed to sound generated by sonar and other transducers, it would likely be sufficiently low (because of the distance from the sound source) to not alter normal feeding activities; and (3) the duration of exposure would likely be sufficiently brief as to have no discernible effect on normal activities.

3.9.3.1.2 Effects from Air Guns

Air guns can introduce brief impulsive, broadband sounds into the marine environment. Section 3.0.3.3.1.1 provides additional details on the use and acoustic characteristics of the small underwater air guns used during training and testing activities.

Training and Testing. The exposure of birds to air gun noise during military readiness activities other than pursuit diving species, would be negligible because they spend only a very short time underwater (plunge-diving or surface-dipping) or forage only at the water surface. Pursuit divers may remain underwater for minutes, increasing the chance of underwater sound exposure. However, the short duration of an air gun pulse and its relatively low source level means that a bird would have to be very close to a small air gun used in training and testing activities at the moment of discharge to be exposed. In addition, air guns may be fired at greater depths than birds conduct their foraging dives. Because of these reasons, the likelihood of a diving bird experiencing an underwater exposure to an air gun that could result in an impact on hearing is negligible.

There is no evidence that diving birds rely on underwater acoustic communication for foraging; rather, they may depend more on vision/visual cues (see Section 3.9.2.1.4). Because the signal from an air gun is very brief, the masking of important acoustic signals underwater by an air gun is unlikely.

The possibility of an ESA-listed seabird species being exposed to sounds from an air gun depends on whether it submerges during foraging and whether it forages in areas where this sound source may be used. Hawaiian petrels and short-tailed albatrosses do not submerge while foraging; therefore, it is unlikely they would be exposed to underwater sound from air guns. Least terns, marbled murrelets, and Newell's shearwater may briefly submerge while foraging, either during plunge-diving (terns) or pursuit diving (murrelet and shearwater). The remote possibility of exposure to a brief air gun signal exists, but only for pursuit divers that may be underwater long enough to be exposed. As discussed previously, effects on individual birds, if any, are expected to be minor and limited. No long-term consequences to individuals are expected. Accordingly, there would be no consequences to any bird populations, and air guns would not have a significant adverse effect on populations of migratory bird species.

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

Conclusion. Air gun activities would not have reasonably foreseeable adverse effects on birds for reasons previously stated in the 2018 HSTT and 2022 PMSR EIS/OEISs. These reasons include (1) the close proximity that a diving bird would have to be to air guns to have a measurable behavioral change, (2) the very close proximity (within a few meters) a diving bird would have to be air guns for injury, (3) the short duration and infrequent scheduling of an air gun event, and (4) the likely resumption of normal activities after air gun use ends.

3.9.3.1.3 Effects from Pile Driving

Refer to Table 3.9-5 for a summary of the background information used to analyze the potential effects of pile driving on birds. Detailed background information is provided in Appendix D.

Training and Testing. Pile driving would occur in Port Hueneme harbor in the Southern California portion of the Study Area. Although some individual birds could be exposed to noise from pile driving, the activities would occur intermittently (one event occurring intermittently over approximately 30 days per year) in very limited areas and would be of short duration (maximum of 90 minutes per 24-hour period). The activity would occur in highly disturbed estuarine habitats that are generally similar to that which was analyzed in the 2018 HSTT and 2022 PMSR EIS/OEISs.

Of the bird species under the ESA, Hawaiian petrels, short-tailed albatrosses, band-rumped storm petrels (Hawaii Distinct Population Segment), and Newell's shearwater do not occur in Port Hueneme Harbor. Marbled murrelet and least terns would be expected to occur within the areas subject to pile driving. There are limited available data on non-auditory injury to birds from intense non-explosive sound sources. The 2022 PMSR EIS/OEIS cited a study for recommended auditory thresholds for murrelets. The study recommended the auditory injury threshold (point at which injury to the ear hair cells would occur) for underwater noise levels at 202 decibels referenced to 1 micropascal squared per second (dB re 1 μPa^2-sec) cumulative SEL and the non-auditory injury threshold (from barotrauma) at 208 dB re 1 μPa^2-sec SEL for marbled murrelets (Science Applications International Corporation, 2011). Birds in the vicinity of pile driving activities are expected to avoid the area, and exposures would result in less than significant effects.

Modernization and Sustainment of Ranges. Pile driving would not occur during modernization and sustainment of ranges activities.

Conclusion. Pile driving activities would not have a reasonably foreseeable adverse effects on birds for reasons previously stated in the 2018 HSTT and 2022 PMSR EIS/OEISs. These reasons include (1) the close proximity that a diving bird would have to be to active pile driving to have a measurable behavioral change, (2) the very close proximity (within a few meters) a diving bird would have to be pile driving for injury, (3) the short duration and infrequent scheduling of an impact, and (4) the likely resumption of normal activities after the cessation of pile driving.

3.9.3.1.4 Effects from Vessel Noise

Military readiness activities proposed in the Study Area involve maneuvers by various types of surface ships, boats, submarines, and unmanned vehicles (collectively referred to as vessels) (see Section 3.0.3.3.1.4). Birds could be exposed to both in-air and underwater noise from vessels throughout the Study Area, but few exposures would occur based on the infrequency of operations and the low density of vessels within the Study Area at any given time. Potential for exposure to vessel noise due to military readiness activities would be greatest near Navy ports.

Birds respond to vessels in various ways. Some birds are commonly attracted to and follow vessels, including certain species of gulls, storm-petrels, and albatrosses (Hamilton, 1958; Hyrenbach, 2001, 2006), while other species such as frigatebirds, sooty terns, and a variety of diving birds seem to avoid vessels (Borberg et al., 2005; Hyrenbach, 2006; Schwemmer et al., 2011). Vessel noise could elicit short-term behavioral or physiological responses but is not likely to disrupt major behavior patterns, such as migrating, breeding, feeding, and sheltering, or to result in serious injury to any birds. Harmful bird/vessel interactions are commonly associated with commercial fishing vessels because birds are attracted to concentrated food sources around these vessels (Dietrich & Melvin, 2004; Melvin & Parrish, 2001). The concentrated food sources (catch and bycatch) that attract birds to commercial fishing vessels are not present around Navy vessels.

Although loud sudden noises can startle and flush birds, vessels are not expected to result in major acoustic disturbance of birds in the Study Area. The continuous noise from Navy vessels has the potential to cause masking for birds, both in air and underwater. Due to the transient nature of Navy vessels, this masking is expected to be temporary. Birds near ports may experience increased masking and become habituated to this noise or attempt to compensate for the masking. Noises from Navy vessels are similar to or less than those of the general maritime environment. Birds may respond to the physical presence of a vessel, regardless of the associated noise (see Section 3.9.3.4.1).

Training and Testing. Table 3.0-14 lists each vessel type and their characteristics for different activity types proposed under Alternative 1. Table 3.0-17 lists the number of annual events using vessels and seven-year event numbers for training and testing activities. The location and hours of Navy vessel usage for training and testing activities are dependent upon the locations of Navy ports, piers, and established at-sea training and testing areas. These areas (including the previously analyzed HSTT Study Area and new areas added to the HCTT Study Area) have not appreciably changed in decades and are not expected to change in the foreseeable future.

Modernization and Sustainment of Ranges. The Navy proposes to deploy undersea fiber optic cables and connected instrumentation to existing undersea infrastructure along the seafloor in the California Study area (south and west of SCI), and in the Hawaii Study Area (northeast of Oahu and west of Kauai). Vessels supporting modernization and sustainment activities would move very slowly during installation activities (0 to 3 knots) but otherwise would have similar noise effects as described for training and testing activities.

Conclusion. Vessel noise generated by military readiness activities would not have reasonably foreseeable adverse effects on birds for reasons previously stated in the 2018 HSTT and 2022 PMSR EIS/OEISs. Vessel noise produced during military readiness activities may briefly impact some individuals, but exposures would be brief, localized, and intermittent and would not be expected to impact populations or to impact survival, growth, or reproduction. Birds in the open ocean, foraging or migrating, could be exposed to vessel noise as the vessel passes and may respond by avoiding areas of temporarily concentrated vessel noise. If a bird responds to vessel noise, only short-term behavioral responses such as startle, head turning, or avoidance would be expected. There is little likelihood of repeated exposures because of the transient nature of vessels and regular movement of birds. Because effects on individual birds are expected to be minor and limited, no long-term consequences to individuals or populations are expected.

3.9.3.1.5 Effects from Aircraft Noise

Military readiness activities proposed in the Study Area involve various types of aircraft, including fixed-wing, and rotary-wing aircraft (see Section 3.0.3.3.1.4). Aircraft noise would be generated throughout the Study Area, contributing both airborne and underwater sound to the ocean environment. Most of the aircraft noise would be generated at air stations, which are outside the Study Area. Takeoffs and landings occur at established airfields as well as on vessels across the Study Area. Takeoffs and landings from Navy vessels produce in-water noise at a given location for a brief period as the aircraft climbs to cruising altitude. Some bird species, particularly waders and shorebirds, could have greater exposure to aircraft noise because of the proximity of habitats (e.g., wetlands, estuaries) to airfields. Seabirds in pelagic habitats would likely experience fewer exposures because of the brief overflight time and the high altitude of the aircraft relative to the lower altitudes maintained by foraging seabirds.

A bird offshore could be exposed to transient noise from aircraft passing overhead and may respond by avoiding areas where aircraft operations are temporarily concentrated. Aircraft activity would be dispersed, and exposures would be infrequent and brief. This is true of fixed- or rotary-winged aircraft, though helicopters could hover for longer periods and helicopter activities would also occur closer to the coast and inshore, and at times at lower altitudes than fixed wing aircraft, increasing the potential to expose birds to aircraft noise.

Training and Testing. Table 3.0-7 provides source levels for some typical aircraft used during training and testing activities under Alternative 1. Exposures to aircraft noise, particularly those of longer duration, could result in behavioral responses and physiological stress. However, it is likely that birds present when aircraft noise exposure begins would leave the area to avoid further exposure to aircraft noise, human presence, and other training and testing-associated stressors. Any reactions are expected to be short term and minor. Repeated exposures of individuals would be unlikely, and no long-term consequences to individuals or populations are expected.

Sonic booms would also be generated during training and testing activities. Supersonic aircraft flights are not intentionally generated below 30,000 ft. unless over water and more than 30 nautical miles from inhabited coastal areas or islands. Deviation from these guidelines may be approved for tactical missions that require supersonic flight, phases of formal training requiring supersonic speeds, research and test flights that require supersonic speeds, and for flight demonstration purposes when authorized by the Chief of Naval Operations (U.S. Department of the Navy, 2016). Outside of these authorized tactical missions, sonic booms would not likely disturb seabirds in these pelagic environments.

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

Conclusion. Activities that use aircraft would not have a reasonably foreseeable adverse effect on birds for reasons previously stated in the 2018 HSTT and 2022 PMSR EIS/OEISs. These reasons include: (1) birds in nearshore environments (where the most aircraft noise exposures would occur) would likely be disturbed, but, any observable behavioral change would be temporary with normal activities quickly resuming after the aircraft has left the area; (2) the brief overflight time and the high altitude of the aircraft relative to the lower altitudes maintained by foraging seabirds; and (3) sonic booms would be generated at elevations sufficiently high enough where the noise generated by the sonic boom would be short in duration (a few seconds) and not likely discernible from ambient sounds in the pelagic environment.

3.9.3.1.6 Effects from Weapons Noise

Proposed military readiness activities involve various weapons platforms, as described in Appendix A (see Section 3.0.3.3.1.5). Other devices intentionally produce noise to serve as a non-lethal deterrent. Not all weapons utilize explosives, either by design or because they are non-explosive practice munitions. Noise produced by explosives, both in air and water, are discussed in Section 3.0.3.3.2, with potential effects on birds discussed in Section 3.9.3.2.

Training and Testing. Table 3.0-9 provides examples of in-water and airborne weapons platforms proposed for use under Alternative 1, listing the noise source and the anticipated sound level. Most sounds would be brief, lasting from less than a second for a blast or inert impact to a few seconds for other launch and object travel sounds. Most incidents of impulsive sounds produced by weapons firing, launch, or inert object effects would be single events, with the exception of gunfire activities.

Use of weapons during training would typically occur in the range complexes, with fewer activities in the transit corridor. Most activities involving large-caliber naval gunfire or the launching of targets, missiles, bombs, or other munitions are conducted more than 3 NM from shore.

Birds that migrate or forage in open-ocean areas could be exposed to large-caliber weapons noise. All species could be exposed to small- and medium-caliber weapons noise that may occur closer to shore. Because weapons firing occurs at varying locations over a short time period and bird presence changes seasonally and on a short-term basis, individual birds would not be expected to be repeatedly exposed to weapons firing, launch, or projectile noise. Any effects on migratory or breeding birds related to startle reactions, displacement from a preferred area, or reduced foraging success in offshore waters would likely be short in duration and infrequent.

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

Conclusion. Activities that include weapons noise would not have reasonably foreseeable adverse effects on birds for reasons previously analyzed in the 2018 HSTT and 2022 PMSR EIS/OEISs. Because effects on individual birds, if any, are expected to be minor and limited, no long-term consequences to individuals are expected.

3.9.3.2 Explosive Stressors

Table 3.9-6 contains brief summaries of background information that is relevant to the analyses of effects for each explosive substressor. Detailed information on acoustic impact categories in general, as well as effects specific to each substressor, is provided in Appendix D.

While each of these substressors could affect birds, the following analysis focuses on those substressors that would occur in areas covered under previous NEPA analyses (2018 HSTT and 2022 PMSR EIS/OEISs), as well as new areas proposed in the HCTT Study Area.

Table 3.9-6: Explosives Stressors Background Information Summary

Substressor	Background Information Summary
Explosions in Air	• Detonations in air during anti-air warfare training would typically occur at much higher altitudes (greater than 3,000 feet [914 meters] above sea level) where seabirds and migrating birds are not likely to be present. • Explosives detonated at or just above the water surface, such as those used in anti-surface warfare, would create blast waves that would propagate through both the water and air. • Detonations in air could also result in mortality or injury to birds. • If prey species (e.g., fishes) are killed or injured as a result of detonations, some birds may be attracted to forage in the area and be exposed to subsequent detonations. • A fleeing response to an initial explosion may reduce bird exposure to any additional explosions that occur within a short time. • Detonations either in air or underwater have the potential to cause a permanent or temporary hearing loss or auditory threshold shift, which could affect the ability of a bird to communicate or detect biologically relevant sounds. • An explosive detonation would likely cause a startle reaction, as the exposure would be brief, and any reactions are expected to be short term. Startle effects range from altering behavior (e.g., stop feeding or preening), minor behavioral changes (e.g., head turning), or a flight response. The range of effects could depend on the charge size, distance from the charge, and the animal’s behavior at the time of the exposure. Any effects related to startle reactions, displacement from a preferred area, or reduced foraging success in offshore waters would likely be short term and infrequent. • Because most events would consist of a limited number of detonations, exposures would not occur over long durations; and since events occur at varying locations, it is expected there would be an opportunity to recover from an incurred energetic cost, and individual birds would not be repeatedly exposed to explosive detonations.

Table 3.9-6: Explosives Stressors Background Information Summary (continued)

Substressor	Background Information Summary
Explosions in Water	• The majority of underwater explosions typically in offshore locations and in depths greater than 100 feet (30 meters). • Sound and energy generated by most small underwater explosions are unlikely to disturb birds above the water surface. If a detonation is sufficiently large or is near the water surface, however, pressure would be released at the air-water interface. Birds above this pressure release could be injured or killed. • If prey species, such as fish, are killed or injured as a result of detonations, some birds may be attracted to forage in the area and be exposed to subsequent detonations. The Navy maintains mitigation measures to stop activities when large numbers of birds aggregate in area where multiple successive explosions would occur.

3.9.3.2.1 Effects from Explosions in Air

3.9.3.2.1.1 Effects from Explosions in Air Under Alternative 1

Training and Testing. Because most events involving in-air explosions would consist of a limited number of detonations, exposures would not occur over long durations; and since events occur at varying locations, it is expected there would be an opportunity to recover from an incurred energetic cost, and individual birds would not be repeatedly exposed to explosive detonations.

The Navy will implement mitigation for seabirds during applicable explosive mine warfare activities throughout the Study Area (see Table 3.9-4). The mitigation will help avoid or reduce potential effects on concentrations of seabirds and birds that have the ability to forage underwater.

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

Conclusion. Activities that include the use of in-air explosives under Alternative 1 would result in less than significant effects because although a few individuals may experience long-term effects and potential mortality, population-level effects are not expected.

3.9.3.2.1.2 Effects from Explosions in Air Under Alternative 1 and Alternative 2

Even though the number of explosives used in Alternative 2 would be greater than Alternative 1, potential effects on birds are not expected to be meaningfully different. Therefore, activities that include in-air explosions under Alternative 2 would be similar to Alternative 1 and would result in less than significant effects.

3.9.3.2.2 Effects from Explosions in Water

Detonations underwater have the potential to cause a permanent threshold shift or temporary threshold shift, which could affect the ability of a bird to communicate with conspecifics or detect biologically relevant sounds. An explosive detonation would likely cause a startle reaction, as the exposure would be brief and any reactions are expected to be short term. Startle effects range from altering behavior (e.g., stop feeding or preening), minor behavioral changes (e.g., head turning), or a flight response. The range of effects could depend on the charge size, distance from the charge, and the animal's behavior at the time of the exposure. Explosives detonated in water are binned by NEW. The bins of explosives that are proposed for use in the Study Area are shown in Table 3.0-10. Any effects related to startle reactions, displacement from a preferred area, or reduced foraging success in offshore waters would likely be short-term and infrequent.

Nearshore waters are the primary foraging habitat for many seabird species. Any small detonations close to shore could have a short-term adverse impact on nesting and nearshore foraging species. Larger detonations would typically occur near areas with the potential for relatively high concentrations of seabirds (e.g., upwelling areas associated with the Pacific Current, productive live/hard bottom habitats, and large algal mats); therefore, any effects on seabirds are likely to be greater in these areas.

3.9.3.2.2.1 Effects from Explosions in Water Under Alternative 1

Training and 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.

Sound and energy generated by most small underwater explosions are unlikely to disturb birds above the water surface. If a detonation is sufficiently large or is near the water surface, however, pressure would be released at the air-water interface. Birds above this pressure release could be injured or killed.

If prey species, such as fish, are killed or injured as a result of detonations, some birds may continue to forage close to the area, or may be attracted to the area, and be exposed to subsequent detonations in the same area within a single event, such as gunnery exercises, which involves firing multiple high-explosive 5-in. rounds at a target area; bombing exercises, which could involve multiple bomb drops separated by several minutes; or underwater detonations, such as multiple explosive munitions neutralization charges. However, a fleeing response to an initial explosion may reduce seabird exposure to any additional explosions that occur within a short timeframe. Along the coast of SCI and throughout the SSTC, however, groups of pelicans and grebes are noted around under water detonations and are monitored to avoid effects from subsequent underwater detonations.

Because most events involving underwater explosions would consist of a limited number of detonations, exposures would not occur over long durations; and since most at-sea events occur at varying locations, it is expected there would be an opportunity to recover from an incurred energetic cost, and individual birds would not be repeatedly exposed to explosive detonations. Some areas are used more regularly for mine warfare activities and other activities that use lower yield explosives under water. Although a few individuals may experience long-term effects and potential mortality, population-level effects are not expected, and explosives would not have a significant adverse effect on populations of migratory bird species. The Action Proponents conduct extensive activity-based mitigation that includes visual observations for ship shock trials in accordance with event-specific mitigation and monitoring plans (refer to Chapter 5). Adherence to these plans increases the likelihood that Lookouts would sight groups of birds on the surface within the ship shock trial mitigation zone. For other explosive activities, the Action Proponents would also implement mitigation to relocate, delay, or cease detonations when marine animals are sighted within or entering a mitigation zone to avoid or reduce potential explosive effects. The mitigation measures will help avoid or reduce potential effects on concentrations of seabirds and birds that have the ability to forage underwater.

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

Conclusion. Activities that include explosions in water under Alternative 1 would result in less than significant effects since the effects on birds would not have a measurable effect on breeding, feeding, and sheltering of birds.

3.9.3.2.2.2 Effects from Explosions in Water Under Alternative 2

Even though the number of explosives used in Alternative 2 would be greater than Alternative 1, potential effects on birds are not expected to be meaningfully different. Therefore, activities that include in-air explosions under Alternative 2 would be similar to Alternative 1 and would result in less than significant effects.

3.9.3.3 Energy Stressors

Table 3.9-7 contains brief summaries of background information that is relevant to the analyses of effects for each energy substressor. Detailed information on energy stressors in general, as well as effects specific to each substressor, is provided in Appendix F.

Table 3.9-7: Energy Stressors Background Information Summary

Substressor	Background Information Summary
In-air electromagnetic devices	• Several different types of in-air electromagnetic devices are used during military readiness activities, including an array of communications transmitters, radars, and electronic countermeasures transmitters. In-air electromagnetic effects can be categorized as thermal (i.e., capable of causing damage by heating tissue) or non-thermal. • Thermal effects are most likely to occur when near high-power systems. Should such effects occur, they would likely cause birds to temporarily avoid the area receiving the electromagnetic radiation until the stressor ceases (Manville, 2016). • Currently, questions exist about far-field, non-thermal effects from low power, in-air electromagnetic devices. Manville (2016) performed a literature review of this topic. Although findings are not always consistent, several peer-reviewed studies have shown non-thermal effects can include (1) affecting behavior by preventing birds from using their magnetic compass, which may in turn affect migration; (2) fragmenting the DNA of reproductive cells, decreasing the reproductive capacity of living organisms; (3) increasing the permeability of the blood-brain barrier; (4) causing other behavioral effects; (5) causing other molecular, cellular, and metabolic changes; and (6) increasing cancer risk. • Cucurachi et al. (2013) also performed a literature review of 113 studies and reported that (1) few field studies were performed (the majority were conducted in a laboratory setting); (2) 65% of the studies reported ecological effects both at high as well as low dosages (i.e., those that are compatible with real field situations, at least on land); (3) no clear dose-effect relationship could be discerned, but studies finding an effect applied higher durations of exposure and focused more on mobile phone frequency ranges; and (4) a lack of standardization and a limited number of observations reduced the possibility of generalizing results from an organism to an ecosystem level.

Table 3.9-7: Energy Stressors Background Information Summary (continued)

Substressor	Background Information Summary
In-air electromagnetic devices (continued)	• Any temporary disorientation experienced by birds from electromagnetic changes caused by in-air electromagnetic devices may be considered a short-term impact and would not hinder bird navigation abilities due to their use of other orientation cues such as the sun and moon, visual cues, wind direction, infrasound, and scent. • Given the wide area where military readiness activities at sea could occur and the relatively low-level and dispersed use of these systems at sea, it is unlikely that birds would be affected by these activities, and population-level effects are not expected. • Similarly, the potential to affect ESA-listed birds is low based on the low numbers of individuals and the transient and brief nature of the use of these devices. No effects are anticipated.
In-water electromagnetic devices	• Towed in-water electromagnetic devices effects could impact diving bird species or species on the surface in the immediate area where the device is deployed. There is no information available on how birds react to electromagnetic fields underwater.
High-energy lasers	• Effects would occur if individuals were struck directly with a laser beam, which could result in injury or mortality due to the thermal effects of radiation exposure. • Birds could be exposed to a laser only if they fly through the beam, a very unlikely occurrence because of the limited use of high-energy lasers and small area and time that the beam would be present. • The laser is designed not to miss the intended target and automatically shuts down if the target-lock is lost, preventing the laser from striking anything but the target.
High-power microwave weapons	• High-power microwave devices are used in a similar manner and with a similar purpose as high-energy lasers, and some for the same reasoning explaining why adverse effects are unlikely applies to the analysis of effects from high-power microwave devices. High-power microwave devices lack the automated shutdown capability if target-lock is lost and would be turned off by the operator; however, a bird exposure is unlikely. For an exposure to occur, the beam would have to miss the target and hit a bird in the beam's path before the operator could turn off the device.

Notes: DNA = deoxyribonucleic acid; ESA = Endangered Species Act

3.9.3.3.1 Effects from In-Air Electromagnetic Devices

Given (1) the information provided in Table 3.9-7; (2) the dispersed nature of Navy military readiness activities at sea; and (3) the relatively low-level and dispersed use of these systems at sea, the following conclusions are reached:

- The chance that in-air electromagnetic devices would cause thermal damage to an individual bird is extremely low;
- It is possible, although unlikely, that some individual birds would be exposed to levels of electromagnetic radiation that would cause discomfort, in which case they would likely avoid the immediate vicinity of training and testing;
- The strength of any avoidance response would decrease with increasing distance from the in-air electromagnetic device; and
- No long-term or population-level effects would occur.

Training and Testing. Training and testing activities involving in-air electromagnetic devices would occur throughout the Study Area. For the reasons described previously, however, no long-term or population-level effects on birds would occur.

The effects of in-air electromagnetic device use on birds are not expected to result in detectable changes to bird habitat, reproduction, growth, or survival, and are not expected to result in population-level effects or affect the distribution or abundance of birds.

Modernization and Sustainment of Ranges. In-air electromagnetic devices would not be used during modernization and sustainment of ranges activities.

Conclusion. In-air electromagnetic devices would not have reasonably foreseeable adverse effects on birds for reasons previously stated in the 2018 HSTT and 2022 PMSR EIS/OEISs. These reasons include (1) the close proximity that a diving bird would have to be to a device to have a measurable behavioral change, (2) the very close proximity (within a few meters) a flying bird would have to be for in-air electromagnetic devices to induce injury, (3) the likely startle response from stressors not associated with electromagnetic fields (i.e., visual disturbance of aircraft or aircraft noise), and (4) the likely resumption of normal activities after the cessation of device use.

3.9.3.3.2 Effects from In-Water Electromagnetic Devices

Table 3.9-7 contains a summary of background information used to analyze the potential effects of in-water electromagnetic devices on birds. Detailed information is provided in Appendix F.

Training and Testing. For a discussion of the types of activities that create an electromagnetic field under water, refer to Appendix B, and for information on locations and the number of activities proposed for Alternative 1, see Table 3.0-11. The in-water devices producing an electromagnetic field are towed or unmanned mine countermeasure systems. 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.

The distribution of birds in these portions of the Study Area is patchy (Fauchald et al., 2002; Haney, 1986b; Nevitt & Veit, 1999; Savoca et al., 2016; Schneider & Duffy, 1985). Exposure of birds would be limited to those foraging at or below the surface (e.g., cormorants, loons, petrels, grebes) because that is where the devices are used. Birds that forage inshore could be exposed to these in-water electromagnetic stressors because their habitat overlaps with some of the activities that occur in the nearshore portions of the California Study Area. However, the in-water electromagnetic fields generated would be distributed over time and location near mine warfare ranges and harbors, and any influence on the surrounding environment would be temporary and localized. More importantly, the in-water electromagnetic devices used are typically towed by a helicopter, surface ship, or unmanned vehicle. It is likely that any birds in the vicinity of an approaching vehicle towing an in-water electromagnetic device would be dispersed by the noise and disturbance generated by the vehicles (Section 3.9.3.1) and therefore move away from the vehicle and device before any exposure could occur.

Modernization and Sustainment of Ranges. The Navy proposes to deploy undersea cables and connected instrumentation to existing undersea infrastructure along the seafloor in the California Study area (south and west of SCI), and the Hawaii Study Area (northeast of Oahu and west of Kauai). These cables all generate an EMF. The EMF produced by the cable is less than that of the natural background magnetic force of the earth at distances beyond 0.6 cm (0.25 in) from the cable. As electromagnetic energy dissipates exponentially by distance from the energy source, the magnetic field from the cable would be equal to 0.1 percent of the earth's at a distance of 6 m (20 ft.). The cables and nodes would be installed at the bottom of the ocean floor, in most cases at a minimum depth of 37 m (120 ft.). Given this depth, birds are unlikely to come into extended contact with cables or nodes and it is extremely unlikely that they would be affected by the magnetic field.

Conclusion. In-water electromagnetic devices would not have reasonably foreseeable adverse effects on birds for reasons previously stated in the 2018 HSTT and 2022 PMSR EIS/OEISs. These reasons include (1) relatively low intensity of the magnetic fields generated (0.2 microtesla at 600 ft. from the source), (2) very localized potential impact area, (3) temporary duration of the activities (hours), (4) occurrence only underwater, and (5) the likelihood that any birds in the vicinity of the approaching vehicles towing an in-water electromagnetic device would move away from the vehicle and device before any exposure could occur. No long-term or population-level effects are expected.

3.9.3.3.3 Effects from High-Energy Lasers and High-Power Microwaves

Refer to Table 3.9-7 for a summary of background information used to analyze the potential effects of high-energy lasers and high-power microwaves on birds. Detailed information is provided in Appendix F.

Training and Testing. High-energy laser and microwave weapons use is described in Section 3.0.3.3.3.3, with locations in the Hawaii and California Study Areas identified in Chapter 2.

These types of weapons use precision targeting with high-fidelity optics and other sensors to ensure that a beam targets a specific object. The weapon is only engaged at that target, and if the tracking loses the target the weapon cycles off. These aspects of precision-targeted energy weapons provide for a negligible impact on birds in flight or on the water's surface. Further, high-energy laser use and microwave weapons testing would occur far from shore and away from islands where higher concentrations of birds would be expected. Accordingly, exposure to high-energy lasers or microwave weapons use would be exceedingly rare because of the targeting procedures in place for these types of weapons and the location where these weapons would be used. High-energy lasers have automatic shut off capability when a target is lost, so there is very little opportunity for a bird in flight or on the surface to be targeted by a laser. High-power microwave devices do not have automatic shutoff capability; however, they are closely monitored to ensure the beam remains on target and turned off when not targeting an object.

No long-term or population-level effects are expected.

Modernization and Sustainment of Ranges. High-energy lasers and microwaves would not be used during modernization and sustainment of ranges activities.

Conclusion. Birds are not likely to be exposed to high energy lasers and adverse effects are not reasonably foreseeable based on the (1) relatively low number of activities, (2) very localized potential impact area of the laser beam, and (3) temporary duration of potential effects (seconds).

3.9.3.4 Physical Disturbance and Strike Stressors

The evaluation of the effects from physical disturbance and strike stressors on birds focuses on proposed activities that may cause birds to be injured or killed by an object that is moving through the water (e.g., vessels and in-water devices), moving through the air (e.g., aircraft and aerial targets), dropped into the water (e.g., MEM), deployed on the seafloor (e.g., mine shapes and anchors), or propelled through the water column (e.g., explosive fragments).

Table 3.9-8 contains brief summaries of background information that is relevant to the analyses of effects for each physical disturbance and strike substressor. Detailed information on physical disturbance and strike stressors in general, as well as effects specific to each substressor, is provided in Appendix F.

Table 3.9-8: Physical Disturbance and Strike Stressors Background Information Summary

Substressor	Background Information Summary
Vessels and in-water devices	• Vessel strike and collision with in-water devices has the potential to impact all taxonomic groups found within the Study Area and could cause injury, mortality, or behavioral responses. • There would be a higher likelihood of vessel and in-water device disturbance or strike in the coastal areas than in the open ocean because of the concentration of activities and higher numbers of birds closer to shore. • Direct collisions of birds with vessels and in-water devices are unlikely but may occur, especially at night when birds can become disoriented by or attracted to artificial light (Favero et al., 2011; Hamilton, 1958; Hyrenbach, 2001, 2006; Merkel & Johansen, 2011). • Vessel and in-water device activity could cause birds to temporarily move from an area.
Aircraft and aerial targets	• Bird strikes could occur during military readiness activities that use aircraft, particularly in nearshore areas, where birds are more concentrated in the Study Area. • Bird-aircraft strikes are a serious concern for the Navy because these incidents can result in injury to aircrews and damage equipment as well as injure or kill birds (Bies et al., 2006). • Bird strike potential is greatest in foraging or resting areas, in migration corridors at night, and at low altitudes during the periods around dawn and dusk. • While wildlife strikes can occur anywhere aircraft are operated, Navy data indicate that they occur most often within the airfield environment. • Unmanned drones could also strike birds; however, evidence from returned drones indicates the probability is low (Jha et al., 2019).
Military expended materials	• Exposure of birds to military expended materials during Navy military readiness activities could result in physical injury or behavioral disturbances to birds in air, at the surface, or underwater during foraging dives. • The widely dispersed area where materials would be coupled with the patchy distribution of seabirds suggests that the probability of these types of ordnance striking a seabird would be low. • Human activity associated with training could cause birds to flee a target area before the onset of firing, thus avoiding harm. • The potential likelihood of individual birds being struck by munitions is very low; thus, effects on bird populations would not be expected.

For birds, it is not expected seafloor devices are at all likely to cause physical disturbance or strike. Therefore, this analysis focuses on vessels, in-water devices, aircraft and aerial targets, and MEM (including non-explosive practice munitions). Additionally, the following analysis focuses on those substressors that would occur in new areas and those that would occur more often than what was analyzed in the 2018 HSTT and 2022 PMSR EIS/OEISs.

3.9.3.4.1 Effects from Vessels and In-Water Devices

Table 3.9-8 contains a summary of background information used to analyze the potential effects of vessels and in-water devices on birds. Detailed information is provided in Appendix F.

In general, there would be a higher likelihood of vessel and in-water device disturbance or strike in the coastal areas than in the open ocean portions of the Study Area because of the concentration of activities and higher numbers of birds closer to shore.

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

Training and Testing. Section 3.0.3.3.4.1 discusses the types of activities and number of events that present a potential strike hazard for birds. For a discussion on the types of activities that use in-water devices see Appendix B. Table 3.0-14 provides a list of representative vessels used in training and testing activities, along with vessel lengths and speeds used in training and testing activities that present a strike risk to birds flying over the water or resting on the surface. The potential for vessel strikes to birds is not associated with any specific training and testing activity but rather a limited, sporadic, and accidental result of Navy ship movement within the Study Area. Vessel movement can be widely dispersed throughout the HCTT Study Area but is more concentrated near naval ports, piers, and range areas. Navy training vessel traffic would be especially concentrated near Pearl Harbor and San Diego Bay. Smaller support craft usage would also be more concentrated in the coastal areas near naval installations, ports, and ranges.

Modernization and Sustainment of Ranges. The Navy proposes to deploy undersea fiber optic cables and connected instrumentation to existing undersea infrastructure along the seafloor in the California Study area (south and west of SCI), and the Hawaii Study Area (northeast of Oahu and west of Kauai). Vessels supporting modernization and sustainment of ranges activities would move very slowly during installation activities (0–3 knots) and would not pose a collision threat to birds.

Conclusion. Activities that include the use of vessels and in-water devices under Alternative 1 would result in less than significant effects due to (1) the ability of birds to maneuver and avoid vessels on the surface, (2) the low likelihood that a diving bird would be in the vicinity of in-water devices, and (3) the low speed of most in-water devices.

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

As shown 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 effects from the use of vessels and in-water devices under Alternative 2 is measurably greater than under Alternative 1, but would still result in less than significant effects.

3.9.3.4.2 Effects from Aircraft and Aerial Targets

Refer to Table 3.9-8 for a summary of background information used to analyze the potential effects of aircraft and aerial targets on birds. Detailed information is provided in Appendix F.

Bird strikes could occur during military readiness activities that use aircraft, particularly in nearshore areas, where birds are more concentrated in the Study Area. Bird strike potential is greatest in foraging or resting areas, in migration corridors at night, and at low altitudes during the periods around dawn and dusk. While wildlife strikes can occur anywhere aircraft are operated, Navy data indicate that they occur most often within the airfield environment (Pfeiffer et al., 2018). Unmanned drones could also strike birds; however, evidence from returned drones indicates the probability is low (Jha et al., 2019). Detailed background information is provided in Appendix F.

Bird-aircraft strikes are a serious concern for the Navy because these incidents can result in injury to aircrews and damage equipment as well as injure or kill birds (Bies et al., 2006). Standard operating procedures applied during proposed activities would reduce manned aircraft strike hazards from large flocks of birds.

3.9.3.4.2.1 Effects from Aircraft and Aerial Targets Under Alternative 1

Training and Testing. As a result of standard operating procedures for aircraft safety, strikes of large flocks of birds by manned aircraft would be expected to occur infrequently. Strikes to individual birds could occur as a result of aircraft and aerial target use in the Study Area under Alternative 1, which would result in injury or mortality. No population-level effects are expected. ESA-listed species could be impacted due to disturbance by aircraft activities or by strike while in flight. However, this is considered unlikely given the scarcity of individuals, and the dispersed and temporary nature of these activities.

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

Conclusion. Activities that include the use of aircraft and aerial targets under Alternative 1 would result in less than significant effects due to (1) bird exposure to strike potential would be relatively brief as an aircraft or aerial target quickly passes; and (2) although individual bird mortalities could occur, population-level impacts on birds would not likely result.

3.9.3.4.2.2 Effects from Aircraft and Aerial Targets Under Alternative 2

The only difference between Alternatives 1 and 2 in aircraft and aerial target activities is that the number of activities would be slightly greater under Alternative 2. Even though the number of activities in Alternative 2 would be greater than Alternative 1, potential effects on birds are not expected to be meaningfully different. Therefore, activities that include aircraft and aerial targets under Alternative 2 would be similar to Alternative 1 and would result in less than significant effects.

3.9.3.4.3 Effects from Military Expended Materials

Exposure of birds to MEM during Navy training and testing activities could result in physical injury or behavioral disturbances to birds in air, at the surface, or underwater during foraging dives. Although a quantitative analysis is not possible due to the absence of bird density information in the Study Area and the dispersed nature of training and testing activities, an assessment of the likelihood of exposure to MEM was conducted based on general bird distributions in the Study Area and their abilities to avoid expended materials.

The potential impact of MEM on birds in the Study Area is dependent on the probability that birds are present in areas where such materials are used as well as the ability of birds to detect and avoid foreign objects. The amount of materials expended over the vast area over which military readiness activities occur (see Chapter 2, combined with the ability of birds to flee disturbance, coupled with the often patchy distribution of seabirds (Fauchald et al., 2002; Haney, 1986a; Schneider & Duffy, 1985), would make direct strikes unlikely. Individual birds may be impacted, but strikes would have no impact on populations.

3.9.3.4.3.1 Effects from Military Expended Materials Under Alternative 1

Training and Testing. Tables 3.0-18 to 3.0-21 in Section 3.0.3.3.4.2 provide a breakdown of the number and general location of different activities that generate these materials under Alternative 1 and Alternative 2. MEM would occur throughout the Study Area, although relatively few items would be expended in transit between the Hawaii and California portions of the Study Area. Appendix I provides details on the types, numbers, and footprints of expended materials by location.

Based on the updated background and analysis for training and testing, MEM effects on birds would be limited to temporary (lasting up to several hours) behavioral and stress-startle responses to individual birds found within localized areas. Human activity such as vessel movement, aircraft overflights, and target placement could cause birds to flee a target area before the onset of firing, thus avoiding harm. If birds were in the target area, they would likely flee the area prior to the release of MEM or just after the initial rounds strike the target area (assuming seabirds were not struck by the initial rounds). Additionally, the force of MEM fragments dissipates quickly once the pieces hit the water, so direct strikes on seabirds foraging below the surface would not be likely. Generally, munitions would not be used in shallow/nearshore areas (some anti-mine warfare activities could occur in some shallow water areas). The potential likelihood of individual seabirds being struck or disturbed by munitions is very low; thus, effects on seabird populations would not be expected.

Modernization and Sustainment of Ranges. No MEM are expected during modernization and sustainment of ranges activities. Some anchors used to deploy training mines or instrumentation may not be recovered and become MEM, but those are covered in the analysis of seafloor devices.

Conclusion. Activities that include the use of MEM under Alternative 1 would result in less than significant effects due to (1) the vast area over which training and testing activities occur; (2) the ability of birds to flee disturbance; and (3) although individual bird mortalities could occur, population-level impacts on birds would not likely result.

3.9.3.4.3.2 Effects from Military Expended Materials Under Alternative 2

MEM use would increase from Alternative 1 to Alternative 2, but not to an extent that would result in increased effects on birds. 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.

3.9.3.4.4 Effects from Seafloor Devices

As discussed in Section 3.0.3.3.4.3, seafloor devices are used during military readiness activities that are typically deployed onto the seafloor in shallow water and later recovered. Some seafloor devices may be deployed in deeper waters and some devices (e.g., anchors) are not always recovered. Because these devices are stationary or very slow moving, they do not pose a risk of physical disturbance or strike to birds, including ESA-listed species. Because of this, seafloor devices pose no threat of impact on birds and is not discussed further.

3.9.3.4.5 Effects from Pile Driving

Human activity such as vessel or boat movement, and equipment setting and movement, is expected to cause birds to flee the activity area before the onset of pile driving. If birds were in the activity area, they would likely flee the area prior to, or just after, the initial strike of the pile at the beginning of the ramp-up procedure. Pile driving is, therefore, not considered a physical disturbance or strike stressor for birds.

3.9.3.5 Ingestion Stressors

Table 3.9-9 contains brief summaries of background information that is relevant to the analyses of effects for each ingestion substressor. Detailed information on ingestion stressors in general, as well as effects specific to each substressor, is provided in Appendix F.

Table 3.9-9: Ingestion Stressors Background Information Summary

Substressor	Background Information Summary
Military expended materials	• Ingestion of military expended materials by birds could occur in any training or testing area at the surface or just below the surface portion of the water column. • Floating material of ingestible size could be eaten by birds that feed at or near the water surface, while materials that sink pose a potential risk to diving birds that feed just below the water's surface (Titmus & Hyrenbach, 2011). • Physiological effects on birds from ingestion include blocked digestive tracts; blockage of digestive enzymes; lowered hormone levels; delayed ovulation; reproductive failure; nutrient dilution; exposure to indirect effects from harmful chemicals found in and on the plastic material; and altered appetite satiation, which can lead to starvation (Azzarello & Van Vleet, 1987; Provencher et al., 2014). • While ingestion of marine debris has been linked to bird mortalities, sublethal effects are more common (Roman et al., 2016; Thiel et al., 2018; Wilcox et al., 2016).

3.9.3.5.1 Effects from Military Expended Materials

Table 3.9-9 contains a summary of background information used to analyze the potential effects of MEM on birds. Detailed information is provided in Appendix F. The types of activities that would produce potentially ingestible MEM are listed in Appendix B. The quantity of MEM associated with each training location is provided in Appendix I.

3.9.3.5.1.1 Effects from Military Expended Materials Under Alternative 1

Training and Testing. As indicated in Section 3.0.3.3.6.3, the use of chaff, flares, and targets would occur and could generate MEM constituting ingestion stressors throughout the Study Area under Alternative 1. Although chaff fibers are too small for birds to confuse with prey, there is some potential for chaff to be incidentally ingested along with other prey items. If ingested, chaff is not expected to impact birds due to the low concentration that would be ingested and the small size of the fibers.

The plastic materials associated with flare compression pads or pistons sink in saltwater (U.S. Department of the Navy, 1999), which reduces the likelihood of ingestion by seabirds. Although the overall concentration of MEM would be low, and Navy standard practice is to collect and remove as much debris as possible when retrieving a degraded target, MEM would not be evenly distributed. Similarly, seabirds are not evenly distributed in the Study Area (Fauchald et al., 2002; Haney, 1986b; Schneider & Duffy, 1985). As noted previously, there is some potential for expended materials that float (e.g., some types of target fragments or chaff end caps or flare compression pads and pistons) to become concentrated along frontal zones, along with food resources that tend to attract foraging seabirds, resulting in the incidental ingestion of such materials, most likely as very small fragments.

MEM would constitute a minute portion of the floating debris that seabirds would be exposed to and may accidentally consume in such situations but could nevertheless contribute to harmful effects of manmade debris on some seabirds. The overall likelihood that individual birds would be negatively impacted by ingestion of MEM in the Study Area under Alternative 1 for training is considered low, but not discountable. Population-level effects would be very unlikely given the relatively small quantities expended over large areas that overlap with potential foraging locations. This conclusion applies to ESA-listed bird species as well.

Modernization and Sustainment of Ranges. No MEM of ingestible size would be expended during modernization and sustainment of ranges activities.

Conclusion. Activities that include the use of MEM under Alternative 1 would result in less than significant effects due to (1) the small size and low concentration of items like chaff fibers, (2) the sink rate of most MEM would minimize the time a bird would be near these items, and (3) most birds would not confuse MEM with prey items.

3.9.3.5.1.2 Effects from Military Expended Materials Under Alternative 2

MEM use would increase from Alternative 1 to Alternative 2, but not to an extent that would result in increased effects on birds. 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.

3.9.3.6 Secondary Stressors

This section analyzes the potential effects on birds exposed to stressors indirectly through effects on habitat and prey availability. Detailed information on each secondary substressor is provided in Appendix F. Table 3.9-10 contains brief summaries of background information that is relevant to the analyses of effects for each substressor (e.g., explosives via habitat). Detailed background information supporting the secondary stressors analysis is provided in Appendix F.

Table 3.9-10: Secondary Stressors Background Information Summary

Indirect Links	Substressors	Background Information Summary
Habitat	Explosives	• The effects of stressors on physical habitat are described in Section 3.5. The impact of the Proposed Action alternatives on physical habitats, sediment, and water quality were considered negligible and therefore would not indirectly impact birds. • Any physical effects on habitats would be temporary and localized because military readiness activities would occur infrequently, be distributed across a vast area, and not routinely repeated in the same location.
Prey availability	All stressors	• The effects of stressors to prey availability for birds are described in Section 3.4 and Section 3.6. • The impact of the Proposed Action alternatives on fishes (prey items for seabirds) were considered negligible and therefore would not indirectly impact birds. • Any effects on bird prey resources would be temporary and localized. Furthermore, as discussed previously, these activities are expected to have minimal effects on prey habitats.

3.9.3.6.1 Impact of Secondary Stressors

3.9.3.6.1.1 Effects on Habitat

The effects of stressors on aquatic habitats and potential water and sediment quality degradation on aquatic life are described in Section 3.2. The impact of the Proposed Action alternatives on physical habitats, sediment, and water quality were considered negligible and therefore would not indirectly impact birds. Furthermore, any physical effects on habitats would be temporary and localized because military readiness activities would occur infrequently, be distributed across a vast area, and not routinely repeated in the same location. Military readiness activities would not be expected to indirectly impact birds through degradation of habitats used by birds and prey species.

3.9.3.6.1.2 Effects on Prey Availability

As noted in Section 3.4 and Section 3.5, implementation of the No Action Alternative, Alternative 1, or Alternative 2 would not adversely impact populations of invertebrate or fish prey resources (e.g., crustaceans, bivalves, worms, sand lance, herring) of birds and therefore would not indirectly impact birds. Any effects on bird prey resources would be temporary and localized. Furthermore, as discussed previously, these activities are expected to have minimal effects on prey for military readiness activities under both alternatives.

3.9.3.7 Combined Stressors

There are generally two ways that a bird could be exposed to multiple additive stressors. The first would be if a bird were exposed to multiple sources of stress from a single event or activity within a single training or testing 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 effects from a single activity would depend on the range of effects of each of the stressors and the response or lack of response to that stressor. Secondly, a bird could be exposed to multiple military readiness activities over the course of its life. Military readiness activities, however, are generally separated in space and time in such a way that it would be unlikely that any individual bird would be exposed to stressors from multiple activities within a short timeframe. The exception to this would be animals with a home range intersecting an area of concentrated activity, as they 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, birds that experience temporary hearing loss or injury from acoustic stressors could be more susceptible to physical disturbance and strike stressors due to a decreased ability to detect and avoid threats. Birds that experience behavioral and physiological consequences of ingestion stressors could be more susceptible to entanglement and physical strike stressors due to malnourishment and disorientation. These interactions are speculative, and without data on the combination of multiple stressors, the synergistic effects from the combination of stressors are difficult to predict in any meaningful way.

The following analysis makes the reasonable assumption that the majority of exposures to individual stressors are non-lethal, and instead focuses on consequences potentially impacting bird fitness (e.g., physiology, behavior, reproductive potential).

3.9.3.7.1 Combined Effects of All Stressors Under Alternative 1

Most of the activities proposed under Alternative 1 generally involve the use of moving platforms (e.g., ships, torpedoes) that may produce one or more stressors; therefore, if birds were within the effects range of those activities, they may be introduced to multiple stressors at different times. The minimal effects of far-reaching stressors (e.g., sound pressures, particle motion) may also trigger some animals to leave the area ahead of a more damaging impact (e.g., physical disturbance or strike). Individual stressors that would otherwise have minimal to no impact may combine to have a measurable effect. Due to the wide dispersion of stressor sources, speed of the platforms, and general dynamic movement of many training and testing activities, it is unlikely that a highly mobile bird would occur in the potential effects range of multiple sources or sequential exercises. Effects would be more likely to occur on sessile and slow-moving species in areas where training and testing activities are concentrated and consistently located.

Although potential effects on birds from training and testing activities under Alternative 1 may include injury and mortality, in addition to other effects such as physiological stress, masking, and behavioral effects, the combined effects are not expected to lead to long-term consequences for bird populations. Based on the general description of effects, the number of birds impacted is expected to be small relative to overall population sizes and would not be expected to yield any lasting effects on the survival, growth, recruitment, or reproduction of any bird species. Therefore, the combined effects of stressors from Alternative 1 on birds would be less than significant.

3.9.3.7.2 Combined Effects of All Stressors Under Alternative 2

Training and testing activities proposed under Alternative 2 would represent an increase over what is proposed for Alternative 1. However, the notable differences are not expected to substantially increase the potential for combined effects over what is analyzed for Alternative 1. The analysis presented in Section 3.9.3.7.1 would similarly apply to Alternative 2.

3.9.4 Endangered Species Act Determinations

In accordance with Section 7(a)(2) of the ESA, the Navy has consulted with the USFWS for stressors that may affect the band-rumped storm petrel, short-tailed albatross, Hawaiian petrel, Newell's shearwater, California least tern, and marbled murrelet.

3.9.5 Migratory Bird Treaty Act Determinations

The U.S. DoD, like other federal agencies, has regulatory, management, and stewardship responsibilities related to migratory birds. These requirements are driven by the MBTA, the "Military Readiness Rule" (50 CFR section 21.42, Authorization of take incidental to military readiness activities), and EO 13186. Under the military readiness rule, the Navy may take migratory birds incidental to military readiness activities described in this EIS/OEIS provided that the Navy's actions do not result in a significant adverse effect on a population of birds protected under the MBTA. The Navy has determined that the Proposed Action would not result in a significant adverse effect on a population of a migratory bird species. If over the course of training and testing activities, the Navy determines that a population of migratory birds would be significantly impacted, the Navy would be required to confer and cooperate with the USFWS to develop and implement appropriate conservation measures to minimize or mitigate such significant adverse effects. Based on the analysis contained in this section, the Navy's proposed military readiness activities would not adversely impact any population of migratory bird species. This conclusion is supported by mitigation measures that limit potential effects, precision targeting, and locations where military readiness activities would occur.

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