Point Mugu Sea Range Annual Monitoring and Activity Report, July 2023 – July 2024

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ACRONYMS AND ABBREVIATIONS

3-D	3-dimensional
ASL	above sea level
ATAR	Autonomous Terrestrial Acoustic Recorder
B807	Building 807
B809	Building 809
CFR	Code of Federal Regulations
cm	centimeter
dB	decibel
dBA	decibel, A-weighted, to emphasize mid-frequencies and to de-emphasize low and high frequencies to which human (and pinniped) ears are less sensitive
F	Fahrenheit
FOV	field of view
ft	feet
FLIR	Forward Looking Infrared
hr	hour
Hz	Hertz
IHA	Incidental Harassment Authorization
in	inches
kg	kilogram
kHz	kilohertz
km	kilometer (1 km = 3281 ft, 0.62 mi, or 0.54 n.mi)
kts	knots or nautical miles per hour
lb	pounds
LOA	Letter of Authorization
m	meter
mi	mile
min	minute
mm	millimeter
MMPA	Marine Mammal Protection Act
M_{pa}	Frequency weighting appropriate for pinnipeds in air (see Gentry et al. 2004; Southall et al. 2007)
NAWCWD	Naval Air Warfare Center Weapons Division
nm	nautical miles
NMFS	National Marine Fisheries Service
PMSR	Point Mugu Sea Range
PTS	Permanent Threshold Shift
rms	root mean square (a type of average)
s	second
SEL	sound exposure level
SEL-A	A-weighted sound exposure level
SEL-M	M_{pa}-weighted sound exposure level
SNI	San Nicolas Island
SPL	sound pressure level
SPL-f	flat-weighted sound pressure level
TTS	Temporary Threshold Shift
µPa	micropascal

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EXECUTIVE SUMMARY

The U.S. Navy's Point Mugu Sea Range (PMSR) holds a Letter of Authorization (LOA) issued by the National Marine Fisheries Service (NMFS) for the period of July 7, 2022 through July 6, 2029 (Appendix A, 87 FR 408888). The LOA allows for the 'take by harassment' of California sea lions (*Zalophus californianus*), Pacific harbor seals (*Phoca vitulina*) and northern elephant seals (*Mirounga angustirostris*) resulting from missile launches on San Nicolas Island (SNI), California, an island owned and managed by the Navy. Past Incidental Harassment Authorizations (IHA) and LOA allowed for disturbance of seals and sea lions (pinnipeds) for missile launches from SNI beginning 2001 through 2022 (66 FR 41834, 67 FR 56271, 68 FR 52132, 74 FR 26580, 79 FR 32678, 84 FR 28462, 85 FR 38863, 86 FR 32372). In addition to authorizing the missile launches from SNI, the 2022 LOA also authorizes testing and training activities identified as air warfare; electronic warfare; and surface warfare for explosives and vessel use within the special-use air and sea surface space of the PMSR. This report summarizes activities and observations for the monitoring period from July 2023 through July 2024 under the 2022 LOA (87 FR 40888), which is valid from July 2022 through July 2029.

SNI Missiles Launched

From July 2023 through July 2024, eleven (11) missiles and aerial targets were launched from SNI representing seven (7) launch events[1]. All eleven (11) of these missiles/targets crossed over SNI's shoreline on the western end of the island. One launch event on 24 July 2023 was meant to be a "quad launch" meaning four targets are launched 3-5 seconds apart from one-another. There was a 13 second gap between two of the targets launched, resulting in what was meant to be a "quad launch" into two "dual launch" events.

Explosive Sources Used

From July 2023 through July 2024, 46 explosives were expended from 9 permitted explosive bins within the 36,000 square nautical miles of special-use air and sea surface space of the PMSR. The explosive bin quantities used during this period were well below the allowable limits for each bin and affects from expended explosives did not exceed allowable take levels above Level A Harassment (permanent threshold shift) or Level B Harassment (behavioral or temporary threshold shift).

Monitoring Equipment deployed during Land-based Launches

For land-based launch events that had not been monitored with acoustic recorders or videos cameras during more than three events, up to three unattended video cameras were set up to monitor pinnipeds at different sites near the missile launch trajectory. Autonomous Terrestrial Acoustic Recorders (ATARs) were deployed next to the video cameras. An additional ATAR was deployed near the launch site for each event. Beaches monitored during each launch varied based on presence of hauled-out pinnipeds and proximity to the launch site.

For launch events that had been monitored with acoustic recorders and videos cameras during more than three events, up to three unattended time-lapse cameras were set up to monitor pinnipeds at different sites near the launch trajectory.

[1] Multiple missiles/targets fired in rapid succession (e.g. 3-5 seconds apart) are considered one launch event.

Estimated Numbers of Pinnipeds Affected

For each launch, the species and number of pinnipeds affected was estimated using video recordings or time-lapse camera photos. When appropriate, extrapolations of the number of pinnipeds affected were made when the field of view of the camera did not include the entire beach being monitored.

Only pinnipeds that moved more than 10 meters or entered the water were counted as being behaviorally "taken" for the purposes of this permit. Take number were assumed based on comparing the number of pinnipeds observed in images taken prior to the launch event to images taken immediately after the launch event. There was no evidence of pinniped injuries, fatalities or pup abandonment related to the monitored launches during this or any other monitoring period since 2001.

Approximately 458 California sea lions, 1 Pacific harbor seal and 17 northern elephant seals were estimated to be "taken" at monitoring sites during the July 2023 through July 2024 monitoring period. These figures are approximate and may include instances where the same individuals were counted more than once at different times and/or different days. These estimates correspond to an average rate of 76.3 sea lions, 0.17 harbor seals and 2.83 elephant seals affected per launch event at all monitored reference sites.

The data collected during this monitoring period and pinniped monitoring data collected at SNI since 2001 suggest that any effects of the launch operations were minor, short-term, and localized. It is not likely that any of the pinnipeds on SNI were adversely affected by behavioral reactions to missile launches from the island.

A detailed analysis of sound data from the ATARs is included in Appendix B of this report. The types of missiles launched during this monitoring period were similar to those launched in previous years. All launch sites used during this reporting period had been used in all previous reporting periods since 2001. Additionally, the missile launch sounds recorded during this monitoring period were similar to recordings from previous SNI launches (U.S. Navy 2020, Burke 2017, Ugoretz 2015, Ugoretz 2014, Ugoretz 2013, Holst et al. 2011). During this 2023-2024 monitoring period, temporary threshold shift (TTS) for Phocids in air was exceeded during two launch events. The ATAR device for all monitoring locations is placed on a bluff or cliff high above the haul-out location. The bluff or cliff likely masked the missile sound, making it unlikely for either TTS or PTS to occur (U.S. Navy 2020, Burke 2017, Ugoretz 2015, Ugoretz 2014, Ugoretz 2013, Holst et al. 2011). Based on these data and past data analyses, it is unlikely that any pinnipeds incurred any TTS or PTS during launches at SNI. If TTS were to occur, hearing loss would have presumably been mild and recoverable and thus not have caused permanent damage.

1. MONITORING PROGRAM AND MISSILE LAUNCHES

1.1 Monitoring Program

San Nicolas Island (SNI) is located approximately 65 miles (m) (~100 kilometers (km)) from the mainland coast of southern California (Fig. 1.1). Missiles/targets were launched from one of two land-based launch complexes on the western part of SNI. Building 807 (B807) Launch Complex is located on the west end of SNI, approximately 35 feet (ft) (11 meters [m]) Above Sea Level (ASL), and the Alpha Launch Complex is located approximately 625 ft (190.5 m) ASL on the west-central part of SNI (Fig. 1.2). The missiles/targets pass over or near pinniped haul-out sites located around the northwestern periphery of SNI. The pinniped species that commonly occur on SNI include California sea lions (*Zalophus californianus*), Pacific harbor seals (*Phoca vitulina*) and northern elephant seals (*Mirounga angustirostris*).

The U.S. Navy holds a Letter of Authorization (LOA) issued by the National Marine Fisheries Service (NMFS) for the period of July 7, 2022 through July 6, 2029 (Appendix A, 87 FR 40888). The LOA allows for the 'take by harassment' of California sea lions, Pacific harbor seals and northern elephant seals, resulting from missile/target launches on San Nicolas Island (SNI), California, an island owned and managed by the Navy. Past IHAs and LOAs allowed for disturbance of seals and sea lions (pinnipeds) for launches from SNI from 2001 through 2022 (66 FR 41834, 67 FR 56271, 68 FR 52132, 74 FR 26580, 79 FR 32678, 84 FR 28462, 85 FR 38863, 86 FR 32372).

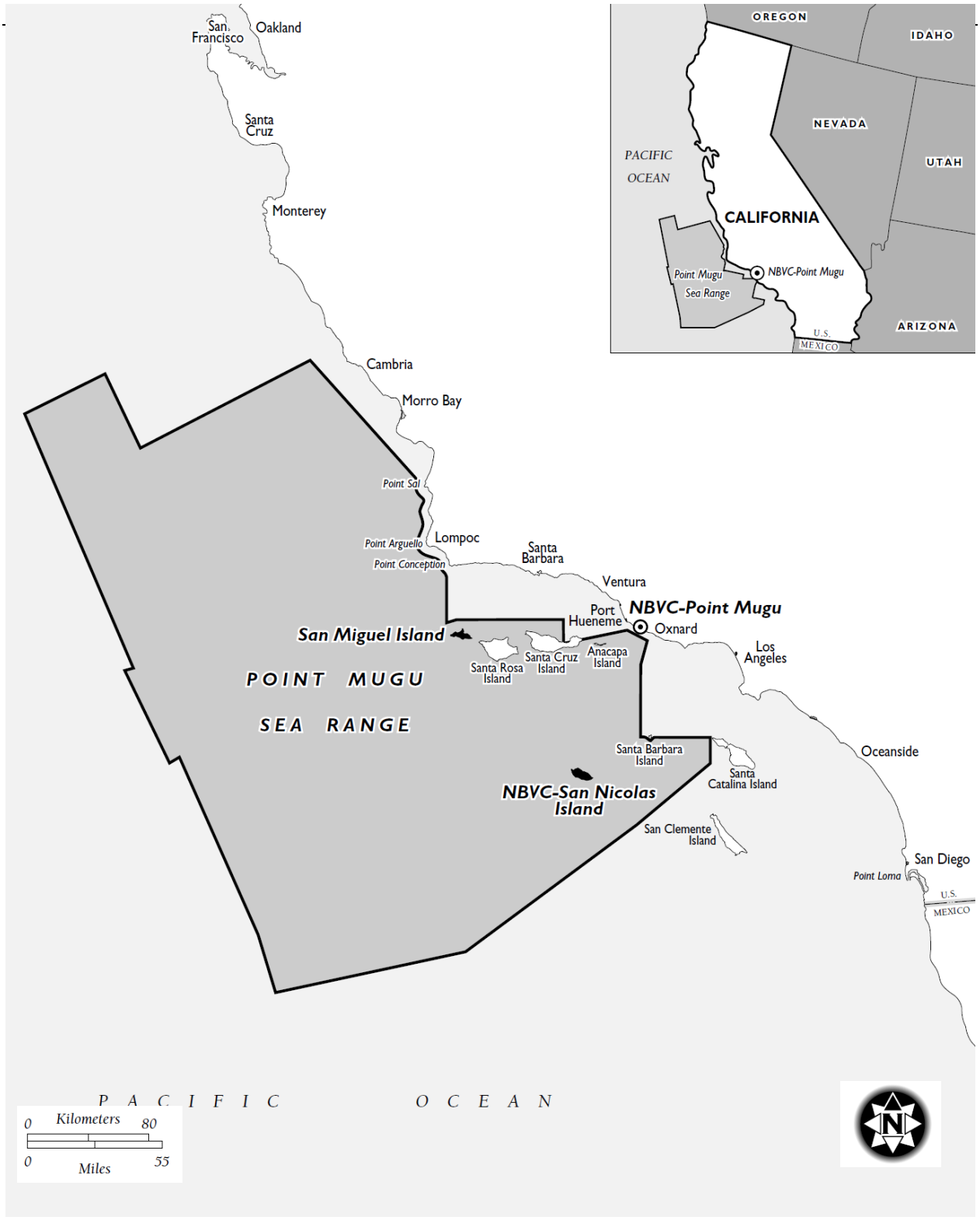


FIGURE 1.1. Regional site map of the Point Mugu Sea Range and San Nicolas Island, California

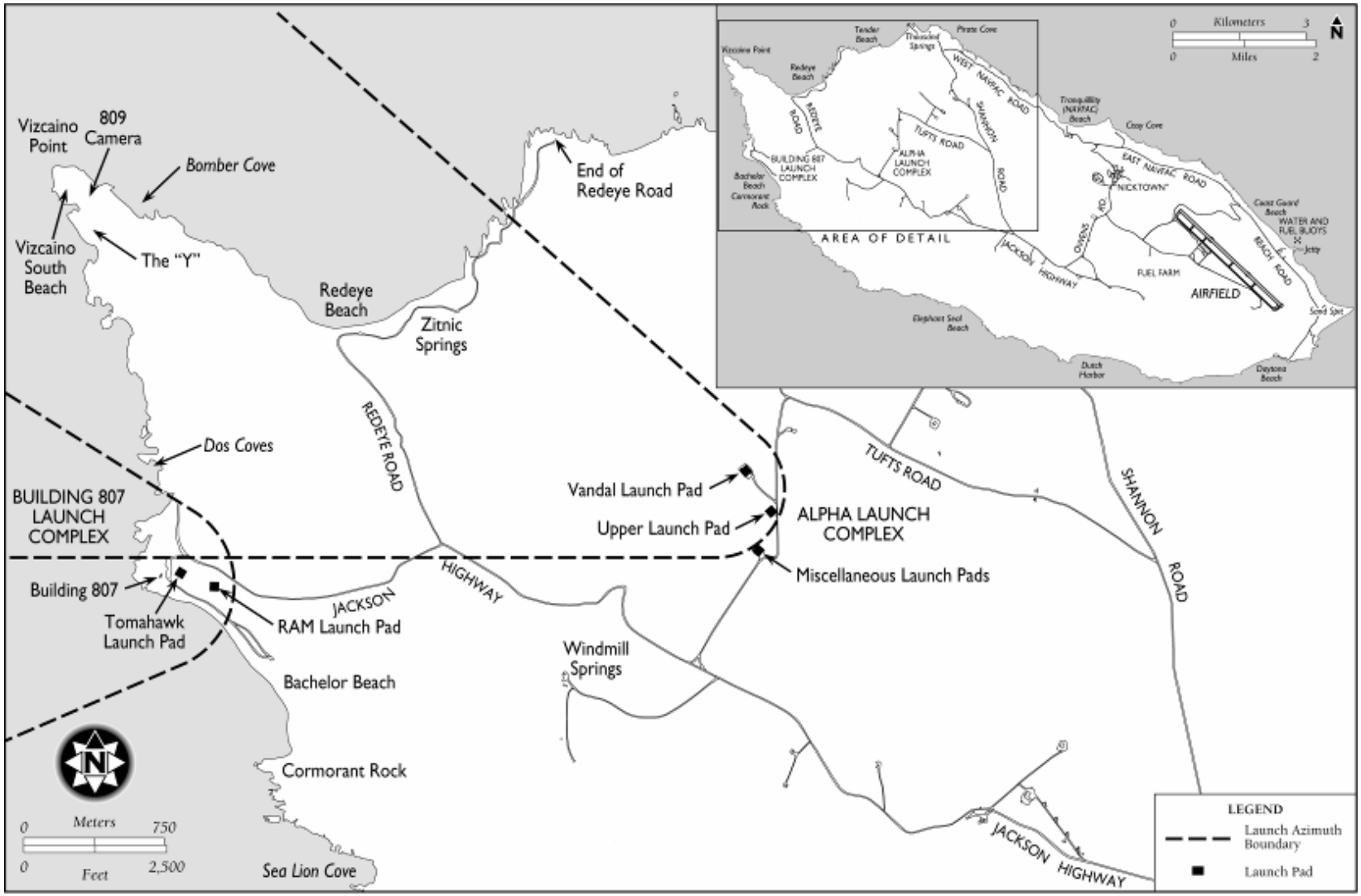


FIGURE 1.2. Map of San Nicolas Island, California, and the general launch azimuths (dashed lines) for each launch complex. These launch azimuths are typical, although occasionally launch paths could pass outside these boundaries.

As a result of the Navy's 2022 7-year LOA, the provisions to monitor launches and their affects to pinnipeds hauled-out on SNI no longer require the Navy to monitor every launch event with acoustic and video equipment. The pinniped species monitored on SNI remained the same as those monitored in past reports.

Past monitoring plans required that, for all launch events at SNI, simultaneous autonomous audio recording of launch sounds and video recording of pinniped behaviors occur. The acoustic monitoring, using Autonomous Terrestrial Acoustic Recorders (ATARs), recorded the sound levels observed from the haul-out locations and measured for Temporary Thresholds Shift (TTS) and Permanent Threshold Shift (PTS) in pinnipeds exposed to the launch sound. The visual monitoring was observed with video camera recorders capturing video of pinniped behaviors before, during and after the launch event at the same haul-out sites as the ATAR devices.

In consultation with NMFS, the PMSR developed a monitoring plan using time-lapse cameras to analyze for potential long-term affects to pinniped abundance resulting from launch events. The new monitoring plan requires the Navy to continue monitoring pinniped disturbance during launch events from SNI by either using the time-lapse cameras for recurring launch events[2] or video and acoustic equipment for new launch events[3]. The new monitoring plan presented to NMFS was approved in April 2023 and continues to be updated and improved through the adaptive management process as it continues to be implemented. This report presents the results on the start of the long-term pinniped abundance analysis and will summarize the launch events, including take numbers and sources used during the 2023-2024 monitoring period.

During the 2023-2024 monitoring period, seven launch events occurred from San Nicolas Island. Four (4) new launch events analyzed the pinniped take numbers using acoustic recorders and video cameras and two recurring launch events analyzed pinniped take numbers using time-lapse cameras.

1.1.1 Acoustic Monitoring

During 4 launch events conducted during this monitoring period, Autonomous Terrestrial Acoustic Recorders (ATARs) were placed in the same location as video cameras documenting pinniped reactions, allowing for paired acoustic and pinniped-response data to be collected. In addition to recording launch sound, these audio recordings recorded ambient noise levels prior to and following the launches.

Objectives of the audio monitoring program included:

1. Document levels and characteristics of launch sound at several distances from the missile paths;
2. Document levels and characteristics of ambient sound to measure background noise against which the pinnipeds will (or will not) detect the launch sound; and
3. Determine if the sound levels from missile launches were high enough to have the potential to induce Temporary Threshold Shift (TTS) or Permanent Threshold Shift (PTS) in pinnipeds exposed to launch sound.

[2] Recurring launch events are launches from San Nicolas Island that have been video and acoustically monitored for at least three times.

[3] New launch events are launches from San Nicolas Island that have not been video and acoustically monitored for at least three times.

1.1.2 Video Camera Monitoring

During the 4 launch events, video monitoring provided data on behavioral changes of pinnipeds hauled-out on SNI. This information was used to document the nature, frequency, occurrence, and duration of any changes in pinniped behavior resulting from the launch events, including the occurrence of stampedes from haul-out sites if they occur.

Objectives of video monitoring included:

1. Identify and document any change in behavior or movements that occurred at the time of the launch event;
2. Quantify the interval required for pinniped numbers and behavior to return to normal if there was a change as a result of a launch event;
3. Ascertain periods or launch conditions when pinnipeds are most and least responsive to launch activities; and
4. Document numbers of pinnipeds disturbed by launch events and any evidence of injury or mortality associated with an event.

1.1.3 Time-Lapse Camera Monitoring

Time-lapse cameras were used during 2 launch events and to collect long-term pinniped abundance data. Three time-lapse cameras were located at three different haul-out sites around SNI. The time-lapse camera locations do not rotate to different haul-out sites as they are constantly collecting images for long-term pinniped abundance analysis. The three stationary haul-out sites were carefully selected, among other pinniped haul-out sites around the island, as representative sites for sensitive pupping and molting seasons for all three pinniped species: California sea lion, Pacific harbor seal, and northern elephant seal.

Objectives of the time-lapse camera monitoring included:

1. Identify and document any change in behavior or movements that occurred at the time of the launch event;
2. Quantify the number of pinnipeds and pinniped behavior minutes after to an hour after the launch event;
3. Ascertain periods or launch conditions when pinnipeds are most and least responsive to launch activities; and
4. Document number of pinnipeds disturbed by launch events and any evidence of injury or mortality associated with an even.

1.2 "Take" Estimates

The monitoring program for the missile launches on SNI was designed, in part, to provide data necessary to estimate the number of pinnipeds "taken" by launches and the manner in which they were affected. For military readiness activities, the MMPA defines harassment as:

"1) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild; or, (2) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to,

migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered." [10 USC Ch. 631§7235]

In this report, consistent with previous monitoring reports, the Navy and NMFS agreed that only those animals that met the following criteria count as "taken" by launches:

1. Pinnipeds injured or killed during launch events, if any[4] (e.g., by stampedes);
2. Pinnipeds exposed to launch sounds strong enough to cause TTS or PTS; or
3. Pinnipeds that left the haul-out site or exhibited prolonged movement[5] or behavioral changes (such as pups separated from mothers) relative to their behavior immediately prior to the launch.

No pinnipeds are known to have been injured or killed since the launch monitoring began in 2001, and few, if any, are believed to have received sounds strong enough to elicit TTS or PTS (Holst, et al. 2011). Thus, the number of pinnipeds counted as potentially "taken" during the 2023-2024 monitoring period was based on criterion 3 above: The number that left the haul-out site or exhibited prolonged movement or other behavioral changes relative to their behavior immediately prior to the launch. Following NMFS guidance [2002], subtle behavioral reactions persisting for only a few minutes are considered unlikely to have biologically significant consequences for the pinnipeds. Pinnipeds that move into the water or greater than 10 m (33 ft) along the beach are considered to have been behaviorally "taken" (by Level B Harassment).

1.3 Launch Dates and Information

From July 2023 through July 2024, eleven (11) missiles and aerial targets, one of which was technically a "quad launch" and two of which were "dual launches", were launched from SNI representing six (6) launch events[6] (Table 1.1). Six launch events were analyzed in this report for pinniped take numbers as the launch event on 24 July 2023 was analyzed as one "quad" event instead of two dual launches. All eleven (11) of these missiles/targets crossed over SNI's shoreline on the western end of the island.

[4] Note that the LOA issued to the Navy did not allow for injury or mortality. Any evidence of injury or mortality of pinnipeds associated with a launch event was to be reported to NMFS and conditions of the permit would be reevaluated.

[5] Prolonged movement, for the purpose of the monitoring and this report, "prolonged movement" is defined as one or more animals moving in a directed manner either more than 10 m (33 ft) onshore or moving any distance from the shore and entering the ocean.

[6] Multiple missiles fired in rapid succession (e.g. 3-5 seconds apart) are considered one launch event.

Table 1.1. Launch data for July 2023 through July 2024.

Launch Date	Launch Time (local)	Number of Missiles	Launch Complex	Pinniped Monitoring Locations		
07/24/2023	1030	Quad Launch (4)	Alpha	Dos Coves	Red Eye West	Phoca Reef
09/14/2023	0900	Single Launch (1)	B807a	Dos Coves	Red Eye West	Phoca Reef
12/12/2023	1032	Dual Launch (2)	Alpha	Dos Coves	Red Eye West	Phoca Reef
12/13/2023	1220	Dual Launch (2)	Alpha	Dos Coves	Red Eye West	Phoca Reef
03/22/2024	1303	Single Launch (1)	B807	Dos Coves	Red Eye West	Phoca Reef
04/06/2024	1040	Single Launch (1)	B807	Dos Coves	Red Eye West	Phoca Reef

2. PINNIPED BEHAVIOR DURING SNI LAND-BASED LAUNCH EVENTS

2.1 Introduction

Three species of pinnipeds are common on SNI beaches – California sea lion, Pacific harbor seal, and northern elephant seal. No other pinniped species were observed at monitoring sites during this or previous monitoring periods since 2001 (Ugoretz 2016, Ugoretz 2015, Holst et al. 2011).

California sea lions often show startle responses to SNI launches and movement along the beach. In most cases, sea lion behavior returns to pre-launch levels within seconds or minutes following the launches (Holst et al. 2011). Behavior as well as numbers of sea lions hauled-out several hours after a launch appears similar to the behavior and numbers observed before a launch.

In contrast, Pacific harbor seals often react strongly to launch sound. They commonly leave their haul-out sites to enter the water. Early monitoring reports suggested that harbor seals did not return to a haul-out site for several hours or the next tide cycle (Holst et al. 2011). Holst and Lawson (2002) noted that the behavior and numbers of Pacific harbor seals hauled-out on the day following a launch were similar to those on the day of the launch. Focused monitoring of Pacific harbor seals during the 2020-2021 monitoring period indicated that harbor seals can return to their haul-out site within minutes of a launch (U.S. Navy 2021). Distribution and abundance of harbor seals at the sites monitored were strongly influenced by the height of the tide.

Northern elephant seals are often startled by missile launch sounds but have otherwise shown little or no reaction to missile launches. During this monitoring period, elephant seals were present on many of the monitored haul-outs along with other species and were included in the camera's field of view. Elephant seal reactions were similar to those in the past (generally no movement or very minor movement down the beach) reconfirming their relative lack of reaction to missile launches.

2.2 Visual Field Methods

Navy personnel placed up to three Sony high-definition digital video cameras (HDR-CX160) on tripods overlooking haul-out sites. Launch and other sounds detected by the microphones built into these cameras were also recorded. The audio data collected by the video cameras were used during behavioral analyses (e.g., to confirm the exact time when the missile was launched) but were not calibrated and not of sufficient quality to provide detailed launch sound information.

Video cameras were placed at locations overlooking haul-out sites prior to new launch events in a manner that minimized disturbance to pinnipeds. When the entire haul-out aggregation at a given site could not be captured in the camera's field of view, a representative focal subgroup within the haul-out aggregation was selected. The number of animals "taken" at a given location was estimated based on the percentage of beach observed and percentage of the focal group affected with the assumption that animals were equally distributed along the beach. Video was recorded before, during, and after each new launch event.

Time-lapse cameras were added to the monitoring effort during the 2020-2021 monitoring period and remained in use for the 2021-2022 monitoring period and were fully incorporated into the monitoring plan for the 2022-2023 and 2023-2024 monitoring periods. Previously, the time-lapse cameras were used as an alternative method to measure pinniped disturbance when the video cameras either failed, due to

technical difficulties, or lens fouling obstructed accurate take counts. The time-lapse camera systems included a Canon Rebel single lens reflex camera housed in a Pelican case and mounted onto a tripod. A solar panel and light sensor allowed for the cameras to be continuously deployed capturing photos during all daylight hours. Photos were captured in intervals of one to five minutes. The time-lapse cameras were deployed at locations overlooking haul-out sites. Prior to each launch event, the time-lapse camera lens was cleaned, and the capture interval was changed from five minutes (the normal capture interval for long-term monitoring) to one minute to capture the launch event.

2.2.1 Video Analysis

Digital video recordings were reviewed by an experienced biologist on a high-resolution color monitor. The recordings from before, during, and up to 60 min after each launch were reviewed to document the types and numbers of pinnipeds present and the nature and number of any overt responses to the launch. The number, proportion and age class (adult or pup - where determinable) of the individuals that responded in various ways were estimated using the video recordings and supplemented with time-lapse imagery, when available. Following NMFS guidance [2002], subtle behavioral reactions persisting for only a few minutes are considered unlikely to have biologically significant consequences for the pinnipeds. Pinnipeds that move into the water or greater than 10 m (33 ft) along the beach are considered to have been behaviorally "taken."

2.2.2 Time-Lapse Analysis

Images taken from the time-lapse cameras were analyzed and classified for age class (where determinable) and pinniped species using the off-the-self DotDotGoose[7] platform created by the American Museum of Natural History. The images were reviewed by an experienced biologist on a high-resolution color monitor. The images of one minute before, immediately after/during and minutes to an hour after each launch event were analyzed for pinniped take numbers, general behavioral observations, and age class (adult or pup - where determinable). Because the images were taken at intervals of every one minute, there was limited confidence in determining if specific individuals in one image were the same individuals in the following image. In result, assumptions were made to estimate the pinniped take numbers.

Assumptions:

1. Take numbers were calculated by taking the difference between the number of individuals observed in the image captured 1 minute before the launch event to the number of individuals observed immediately after/during the launch event.
2. If the number of individuals observed in the image immediately after/during the launch event was less than the number of individuals observed in the image 1 minute prior to the launch event, than it is assumed that those individuals entered the water and are considered taken.
3. If the number of individuals observed in the image immediately after/during the launch event was more than the number of individuals observed in the image 1 minute prior to the launch event than it is assumed that those individuals moved more than 10 meters from a location not in the field of view to a location in the field of view and were considered taken.

[77] DotDotGoose platform: https://biodiversityinformatics.amnh.org/open_source/dotdotgoose/

2.2.3 Image Perimeters

For all three haul-out locations, the time-lapse camera's field of view stayed stationary year-round with the entire beach within the field of view. Two of the three haul-out locations had additional surrounding haul-outs in the background of the image. Accurate classification could only be performed for the pinnipeds hauled-out on the beach as opposed to pinnipeds in the distant surrounding areas. To ensure the same area was counted for each analysis, perimeters were outlined for two (Figure 2.1 and Figure 2.2) of the three haul-out sites. The third haul-out site had no surrounding distant haul-out areas in the field of view. Only pinnipeds within these perimeters were classified and counted for take numbers.

Figure 2.1. Dos Coves Perimeter. Pinnipeds were counted and classified by age class and sex for take numbers within the red perimeter outline.

Figure 2.2. Red Eye West Perimeter. Pinnipeds were counted and classified by age class and sex for take numbers within the red perimeter outline.

2.3 Summary of Pinniped Behavior during Specific Launches

The following are brief summaries of the observations made from viewing either the video cameras or the time-lapse camera data collected at monitoring sites during the 2023-2024 monitoring period.

2.3.1 Quad Launch from Alpha complex: July 24, 2023 (1030hrs)

- **Dos Coves**
    - Technical issues prevented the video camera from recording the launch event; however, visual observations were captured using the time-lapse camera. Before the launch, the beach was occupied primarily by resting sea lions, with a few moving around. Following the launch, there was a noticeable startled reaction, as all the animals raised their heads from their previously lying-down positions. The count of animals before the launch compared to immediately after showed a difference of 21 sea lions and 1 elephant seal. After 10 minutes, the sea lions began to return to the beach and resumed their pre-launch behavior. In total, 21 sea lions and 1 elephant seal were taken.
- **Red Eye West**
    - The video camera data was corrupted, so the data was analyzed using the time-lapse camera. The beach was occupied solely by sea lions. Prior to the launch event, most of the animals were resting or lying down, with many on the rocks lining the water's edge. Immediately after the launch, all the animals appeared startled, and those resting on the sand moved down to the rocks. There was a difference of 288 sea lions between the images taken right before and immediately after the launch. Fifteen minutes later, the sea lions

began to return to shore and resumed their pre-launch behavior. In total, 288 sea lions were recorded as taken.

- **Phoca Reef**
    - Technical issues prevented the video camera from recording the launch event; however, visual observations were captured using the time-lapse camera. This reef is used exclusively by harbor seals. At the time of the launch, the entire reef was exposed and no harbor seals were hauled-out on the reef during the launch event.

2.3.2 Launch from Building 807: September 14, 2023 (0900hrs)

- **Dos Coves**
    - The video camera lens was heavily fouled, so the time-lapse camera was used to analyze the pinniped count while the video camera was still used for general reactions. Immediately before the launch, birds were seen flying away, followed by a startled response from the pinnipeds. Prior to the launch, the pinnipeds were resting on the beach. Once the launch occurred, they appeared confused, looking around to locate the source of the noise, which caused many to move away from the water instead of toward it. They stopped moving shortly after the launch noise ceased. Within five minutes of the event, the pinnipeds returned to their resting positions. In total, 14 sea lions and 1 elephant seal were taken.
- **Red Eye West**
    - Used the video camera to analyze the launch event. Prior to the launch there were pinnipeds resting on the sand dune and some resting on the rocks by the water's edge. The launch noise was barely audible on the video camera. There was no startle response and no reaction to the launch noise. There were approximately 150 sea lions and 1 elephant seal on the beach prior to the launch event. None were taken.
- **Phoca Reef**
    - This reef is exclusively used by harbor seals. During the launch event, the reef was partly exposed and no harbor seals were hauled-out.

2.3.3 Dual Launch from Alpha: December 12, 2023 (1032hrs)

- **Dos Coves**
    - This event was only recorded using time-lapse cameras as it has been previously recorded three or more times in the past. The time-lapse camera was experiencing technical difficulties during the time of this launch, so no data was collected for this launch event at this monitoring location.
- **Red Eye West**
    - This event was only recorded using time-lapse cameras as it has been previously recorded three or more times in the past. Before the launch event, there were more sea lions than elephant seals hauled out on the beach, with most of the pinnipeds resting on the sand dune. Immediately after the launch, the images showed that most of the pinnipeds moved from

the sand dune and entered the water. In total, 70 sea lions and 1 elephant seal were recorded as taken.

- **Phoca Reef**
    - This event was only recorded using time-lapse cameras as it has been previously recorded three or more times in the past. This reef is used exclusively by harbor seals. This reef was not exposed during the time of the launch and no harbor seals were hauled-out.

2.3.4 Dual Launch from Alpha: December 13, 2023 (1220hrs)

- **Dos Coves**
    - This event was only recorded using time-lapse cameras as it has been previously recorded three or more times in the past. The time-lapse camera was experiencing technical difficulties during the time of this launch, so no data were collected for this launch event at this monitoring location.
- **Red Eye West**
    - This event was only recorded using time-lapse cameras as it has been previously recorded three or more times in the past. Prior to the launch event, there were 25 sea lions and 3 elephant seals with most resting on the sand dune. Immediately after the launch event, the image indicated that some of the sea lions made their way from the sand dune and entered the water. A total of 9 sea lions were taken.
- **Phoca Reef**
    - This event was only recorded using time-lapse cameras as it has been previously recorded three or more times in the past. This reef is used exclusively by harbor seals. This reef was entirely exposed during the time of the launch and no harbor seals were hauled-out.

2.3.5 Launch from Building 807: March 22, 2024 (1303hrs)

- **Dos Coves**
    - The time-lapse camera and the video camera were experiencing technical difficulties during the time of this launch, so no data were collected for this launch event at this monitoring location.
- **Red Eye West**
    - Before the launch event, many elephant seals were resting in the foreground, along with some pinnipeds and brown pelicans on the sand dune. The launch sound was audible on the video camera, causing the brown pelicans to fly away and startling all the animals. The pinnipeds returned to their pre-launch activities within minutes. In total, 5 elephant seals and 34 sea lions were recorded to be taken.
- **Phoca Reef**
    - This reef is used exclusively by harbor seals. This reef was exposed during the time of the launch and no harbor seals were hauled-out.

2.3.6 Launch from Building 807: April 06, 2024 (1040hrs)

- **Dos Coves**
    - It was a very windy day, which caused fouling on the video camera, so the analysis was completed using the time-lapse cameras. Although the time-lapse footage also had significant fouling, the behavioral takes were still collected. The pinnipeds returned to their pre-launch behavior within minutes of the launch. In total, 6 elephant seals and 18 sea lions were recorded as taken.
- **Red Eye West**
    - It was a very windy day, which caused fouling on the video camera, so the analysis was completed using the time-lapse cameras. Although the time-lapse footage also had significant fouling, the behavioral takes were still collected. There were 3 elephant seals and 4 sea lions taken.
- **Phoca Reef**
    - This reef is used exclusively by harbor seals. This reef entire was exposed during the time of the launch. There was one harbor seal resting on the reef prior to the launch and zero harbor seals after. One harbor seal was taken.

3. ACOUSTIC MEASUREMENTS OF SNI LAUNCH EVENTS

3.1 Introduction

The acoustic measurement techniques for the 2023-2024 monitoring period were consistent in approach and methodology with those used in the preceding years (Ugoretz 2016, Ugoretz 2015, Holst et al. 2011). Recordings of launch sound and ambient sound were measured at up to three pinniped haul-out sites as well as near the launch pad for each launch event. ATARs were developed for this purpose by the Navy's acoustical contractor, Greeneridge Sciences Inc. of Santa Barbara, California. The specific design of the ATARs is described in earlier reports (Ugoretz 2016, Ugoretz 2015, Holst et al. 2011).

3.2 Acoustic Analysis

Various federal, state, and other organizations recommend specific acoustic thresholds for the onset of TTS and PTS in marine mammals. The thresholds used in this report are for impulsive noise (noise with high peak sound pressure, short duration, fast rise-time, and broad frequency content) from the U.S. Navy technical report by J. Finneran, E. Henderson, D. Houser, K. Jenkins, S. Kotecki, and J. Mulsow, Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III), published by the Space and Naval Warfare Systems Center Pacific, San Diego, CA in June 2017.

As with Navy Phase II criteria (Finneran & Jenkins, 2012), auditory weighting functions were applied to acoustic data, prior to the calculation of acoustic metrics such as sound exposure level (SEL) and sound pressure level (SPL), to account for various species' frequency-dependent hearing sensitivity. However, unlike Navy auditory weighting functions for Phase II which were based on "M-weighting" curves for "functional hearing groups", Navy Phase III (Finneran et al., 2017) weighting functions are defined by a

generic band-pass filter whose shape is determined by parameters specific to a slightly different classification of nine "marine species hearing groups".

In addition to differences in auditory weighting functions, TTS and PTS thresholds differ between Navy Phase II and Phase III. In Navy Phases II and III, pinnipeds were classified into two hearing groups based upon pinnipeds' two scientific families: Otariidae (eared seals: sea lions and fur seals) and Phocidae (earless seals, or true seals). However, in Navy Phase II, TTS thresholds were the same for both Otariids and Phocids in air, as were PTS thresholds. In Navy Phase III, different TTS and PTS thresholds are defined for Otariids in air (OA) and Phocids in air (PA). The Navy Phase III thresholds for pinnipeds in air are summarized in Table 3.1 below:

Table 3.1. Navy Phase III TTS and PTS thresholds for pinnipeds in air.

Group	Non-impulsive		Impulsive			
			TTS Threshold		PTS threshold	
	TTS threshold SEL[a] (weighted)	PTS threshold SEL[a] (weighted)	SEL[a] (weighted)	Peak SPL[b] (unweighted)	SEL[b] (weighted)	Peak SPL[b] (unweighted)
OA[c]	157	177	146	170	161	176
PA[d]	134	154	123	155	138	161

[a] SEL thresholds are in dB re (20 µPa)^2·s in air
[b] SPL thresholds in dB re 20 µPa in air
[c] OA-Otariid in air (includes California sea lion)
[d] PA-Phocid in air (includes Pacific harbor seal)

The TTS and PTS thresholds relevant to San Nicolas Island launches and used in this report are those listed under "Impulsive" in Table 3.1.

3.3 Results Acoustic Analysis

Acoustic data collected during the July 2023 through July 2024 monitoring period were analyzed by Greeneridge Sciences Inc. The acoustic monitoring results for seven (7) launches are presented in Table 3.2. Four parameters are reported for the launch flight sounds: peak pressure level, SPL, SEL, and duration. These values are similar to sound levels reported for previous launches from SNI (U.S. Navy 2020, Burke 2017, Ugoretz 2015, Ugoretz 2014, Ugoretz 2013, Holst et al. 2011).

Table 3.2. Pulse parameters for unweighted, OA-weighted, and PA-weighted sound from SNI missile launches, July 2023 – July 2024.

Values highlighted in green exceeded the level at which TTS onset might occur.

Launch Date & Monitoring Site	CPA (km)	Unweighted sound				OA-weighted sound			PA-weighted sound		
		Pk	SPL	SEL	Dur	SPL	SEL	Dur	SPL	SEL	Dur
24 July 2023 (1 of 4)											
Phoca Reef		99.5	83.1	86.3	2.1	55.0	52.5	0.6	53.7	57.6	2.5
Dos Coves		144.7	136.5	120.5	0.0	104.8	98.7	0.2	108.5	102.8	0.3

Launch Date & Monitoring Site	CPA (km)	Unweighted sound				OA-weighted sound			PA-weighted sound		
		Pk	SPL	SEL	Dur	SPL	SEL	Dur	SPL	SEL	Dur
Redeye West		152.6	130.3	129.1	0.7	110.3	109.6	0.8	114.5	113.7	0.8
Alpha Complex		133.2	118.6	124.4	3.7	93.3	98.6	3.4	99.2	104.2	3.2
24 July 2023 (2 of 4)											
Phoca Reef		97.7	83.0	86.5	2.3	52.8	54.5	1.5	55.2	58.9	2.3
Dos Coves		142.6	132.7	119.1	0.0	107.6	97.0	0.1	109.7	101.0	0.1
Redeye West		146.9	128.8	125.0	0.4	98.5	98.7	1.03	102.9	103.0	1.0
Alpha Complex		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24 July 2023 (3 of 4)											
Phoca Reef		100.4	83.7	87.1	2.2	51.8	54.9	2.1	55.3	59.0	2.3
Dos Coves		143.8	136.4	120.4	0.0	102.3	96.4	0.3	106.6	100.9	0.3
Redeye West		148.7	127.8	126.9	0.8	104.8	105.0	1.0	109.2	109.2	1.0
Alpha Complex		133.4	118.7	124.4	3.7	94.6	99.1	2.8	100.3	104.7	2.7
24 July 2023 (4 of 4)											
Phoca Reef		98.8	83.3	86.7	2.1	51.5	53.5	1.6	55.0	58.8	2.4
Dos Coves		143.2	133.5	119.1	0.0	105.5	96.5	0.1	108.4	100.8	0.2
Redeye West		149.5	133.5	126.8	0.2	104.3	103.3	0.8	108.5	107.5	0.8
Alpha Complex		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14 September 2023											
Dos Coves		121.5	107.0	116.1	8.2	94.6	103.2	7.3	99.1	107.7	7.2
Redeye West		92.0	78.7	87.9	8.3	52.2	61.7	8.9	57.6	67.0	8.8
Phoca Reef		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
B807/Rock Crusher		149.3	123.8	129.2	3.4	113.1	117.5	2.7	116.0	120.9	3.1
22 March 2024											
Dos Coves		140.1	122.2	130.8	7.3	113.1	119.7	4.5	118.0	124.8	4.8
Redeye West		112.8	96.5	105.3	7.5	79.1	85.8	4.7	84.8	91.7	4.9
Phoca Reef		100.9	84.6	93.2	7.2	55.9	64.6	7.4	61.9	70.2	6.8
B807/Rock Crusher		150.4	131.9	134.4	1.8	121.3	120.1	0.8	124.3	124.6	1.1
6 April 2024											
Phoca Reef		118.0	103.1	112.0	7.7	72.2	81.1	7.8	77.1	86.0	7.8
Redeye West		115.1	97.8	106.0	6.6	79.5	86.0	4.5	85.2	91.8	4.6
Dos Coves		135.4	119.3	126.3	4.9	106.2	112.8	4.5	109.9	116.9	5.0
B807/Rock Crusher		151.8	134.8	136.4	1.4	122.5	121.6	0.8	126.8	126.1	0.9

Note: Peak levels (Pk) and SPLs are in dB relative to 20 µPa. SELs or energy levels are in dB re 20 $\mu Pa^2 \cdot s$. Durations (Dur) are in seconds. N/A = data not available. "B807" is an abbreviation for "Building 807". Durations shown as "0.0" are a result of roundoff error for values < 0.05 s. Pulse parameters shown as "N/A" for the second and fourth missile flights on 24 July 2023 may, in fact, be associated with the first and third flights that day; see text for details.

3.4 Discussion and Summary

During the July 2023-July 2024 monitoring period, the sound levels received from the seven launches were comparable to those recorded from previous launches at SNI.

- Two launches exceeded TTS for weighted SEL for Phocids in air:
    - On 22 March 2024, the TTS threshold for Phocids in air was exceeded at Dos Coves and Building 807/Rock Crusher for weighted SEL. The sound was measured at 124.8 dB re 20 μPa^2-s for weighted SEL at Dos Coves and measured at 124.6 dB re 20 μPa^2-s for weighted SEL at Building 807/Rock Crusher. Unfortunately, the video camera and time-lapse

camera were experiencing technical difficulties causing no behavioral take data to be collected. It is unlikely that the launch sound caused TTS as the recording device was placed on the cliff above the haul-out site at Dos Coves. It is likely the cliff masked the launch sound. Building 807/Rock Crusher is the launch site and there are no pinnipeds hauled-out at this location.

- On 6 April 2024, the TTS threshold for Phocids in air was exceeded at Building 807/Rock Crusher for weighted SEL. The weighted SEL was recorded at 126.1 dB re 20 μPa^2-s. Building 807/Rock Crusher is the launch site and there are no pinnipeds hauled-out at this location.

The highest measured, unweighted (flat weighting), peak SPL was measured at 152.6 dB re 20 µPa recorded on 24 July 2023 at Red Eye West. The highest measured, weighted SEL was measured at Building 807/Rock Crusher on 6 April 2024. The measured sound levels were 121.6 dB re 20 μPa^2-s for Otariids in air and 126.1 dB re 20 μPa^2-s for Phocids in air. Building 807/Rock Crusher is a launch site and is not a haul-out location for pinnipeds.

Overall, the results to date indicate that there is little potential for appreciable TTS in pinnipeds hauled-out on SNI near the launch paths during launch operations. This conclusion is necessarily speculative given the limited TTS data for pinnipeds in air exposed to strong sounds for brief periods. In the event that levels are occasionally sufficiently high to cause TTS, these levels probably would be only slightly above the presumed thresholds for mild TTS. Thus, if TTS did occur, it would typically be mild and reversible and thus PTS would not occur. Given the relatively infrequent launches from SNI, the low probability of TTS during any one launch, and the fact that a given pinniped is not always present on land, there appears to be no likelihood of PTS from the cumulative effects of multiple launches. It is unlikely that the launch events observed during this monitoring period caused TTS as the launch sounds recorded were similar to those recorded in the past (U.S. Navy 2020, Burke 2017, Ugoretz 2015, Ugoretz 2014, Ugoretz 2013, Holst et al. 2011) and the pinnipeds that flushed the haul-out locations due to the launch sounds returned to the haul-out location within minutes.

4. BASELINE TIME-LAPSE MONITORING

4.1 Introduction

In April 2023 a baseline time-lapse camera monitoring plan was accepted by NMFS. July 2023-July 2024 is the first year analyzed using the new baseline time-lapse monitoring plan. Three time-lapse cameras were located on three different beaches on SNI; Dos Coves, Redeye West Beach and Phoca Reef (Figure 4.1). The time-lapse camera systems included a Canon Rebel single lens reflex camera housed in a Pelican case and mounted onto a tripod. A solar panel and light sensor allowed for the cameras to be continuously deployed capturing photos during all daylight hours. Photos were captured in intervals of one to five minutes. Throughout the year, photos were taken every 5 minutes during daylight hours. The timing mechanism was adjusted during launch events to take a photo every minute to estimate behavior take numbers.

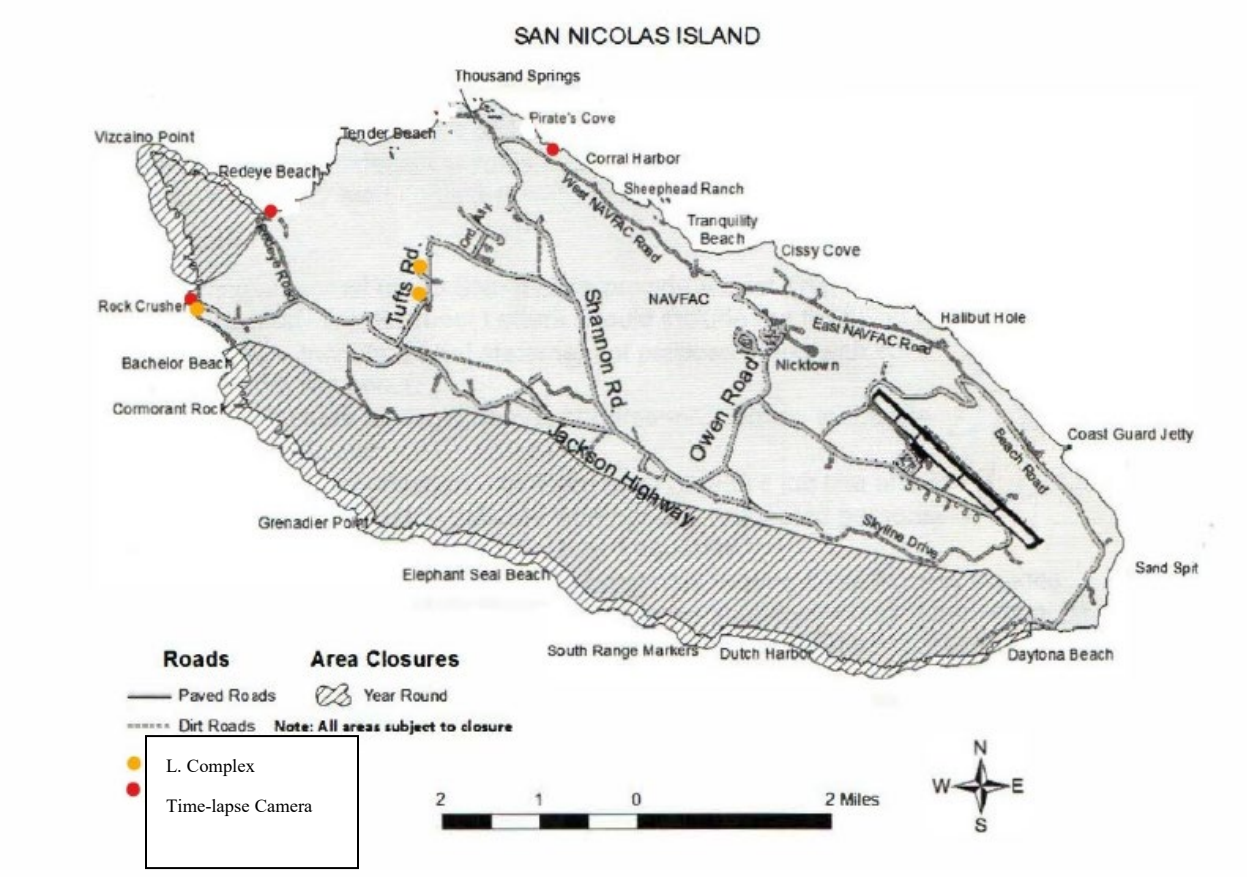


Figure 4.1. Map of SNI indicating the long-term time-lapse camera monitoring locations in reference to the launch sites.

4.2 Methods

Throughout the monitoring period, each beach was divided into two-week sections. Within each section, two days were randomly selected, and for each day, two photos were analyzed in the morning (0900-1259) and two in the afternoon (1300-1800). In two-week sections where a launch event occurred, two random images were analyzed before the launch and two after. In some cases, all four images analyzed on the launch day were taken during either the morning or afternoon, depending on the timing of the event. These images differed from those used to analyze the behavioral take numbers. No photos were analyzed before 0900 or after 1800 as this monitoring plan was designed to assess baseline pinniped abundance during the hours when launch events most commonly occur; such events rarely happen before 0900 or after 1800.

Given that this was the first year implementing the monitoring plan, the original proposal included analyzing species type, number of individuals, age class, and sex. However, analyzing age class and sex in every photo proved challenging due how time-intensive it was and due to lens fouling, which made it difficult to distinguish these features in many images. Additionally, analyzing every photo from each beach for anything beyond species type and individual counts proved to be too time intensive. Each location was analyzed only for number of individuals and species type.

4.3. Results for the Baseline Time-lapse Monitoring

For each beach, the abundance of hauled-out individuals was graphed based on the species type. For each graph (Chart 4.1- Chart 4.5), the species abundance was grouped into morning hours (0900-1259) and afternoon hours (1300-1800) throughout the year. Temperature (c) was also overlayed over the abundance to see if there was a correlation. The date, time of analysis, beach, species type, abundance, temperature/weather and tides are included in Table 4.1.

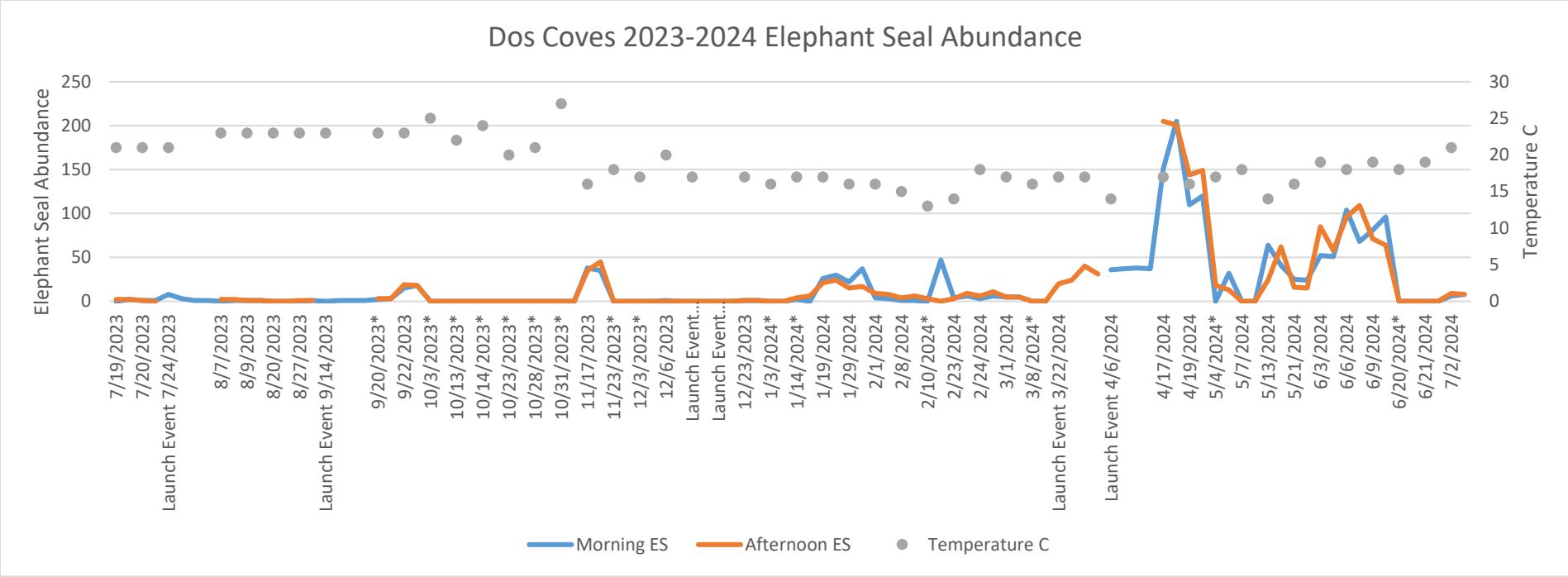


Chart 4.1. Dos Coves 2023-2024 Sea Lion Abundance. 9/20/2023* All pictures too blurry to count; 10/3/2023*- 10/31/2023* Camera Knocked over; 11/23/2023* Some pictures too blurry to count; 12/3/2023* Some pictures too blurry to count; Launch Event 12/12/2023* Tech Issues; Launch Event 12/13/2023* Tech Issues; 1/3/2024* Some pictures too blurry to count; 1/14/2024* Some pictures too blurry to count; 2/10/2024 Some pictures too blurry to count; 3/8/2024* Camera Knocked over; 5/4/2024* Some pictures too blurry to count; 6/20/2024* Some pictures too blurry to count.

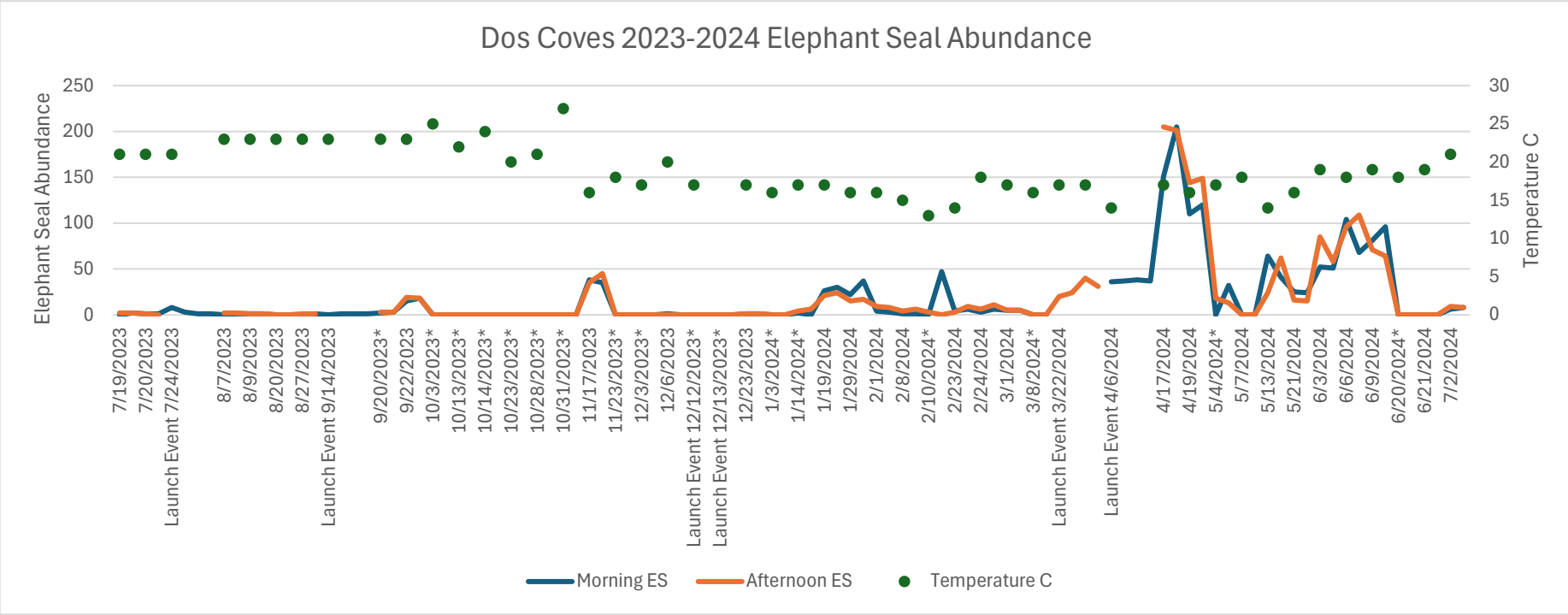
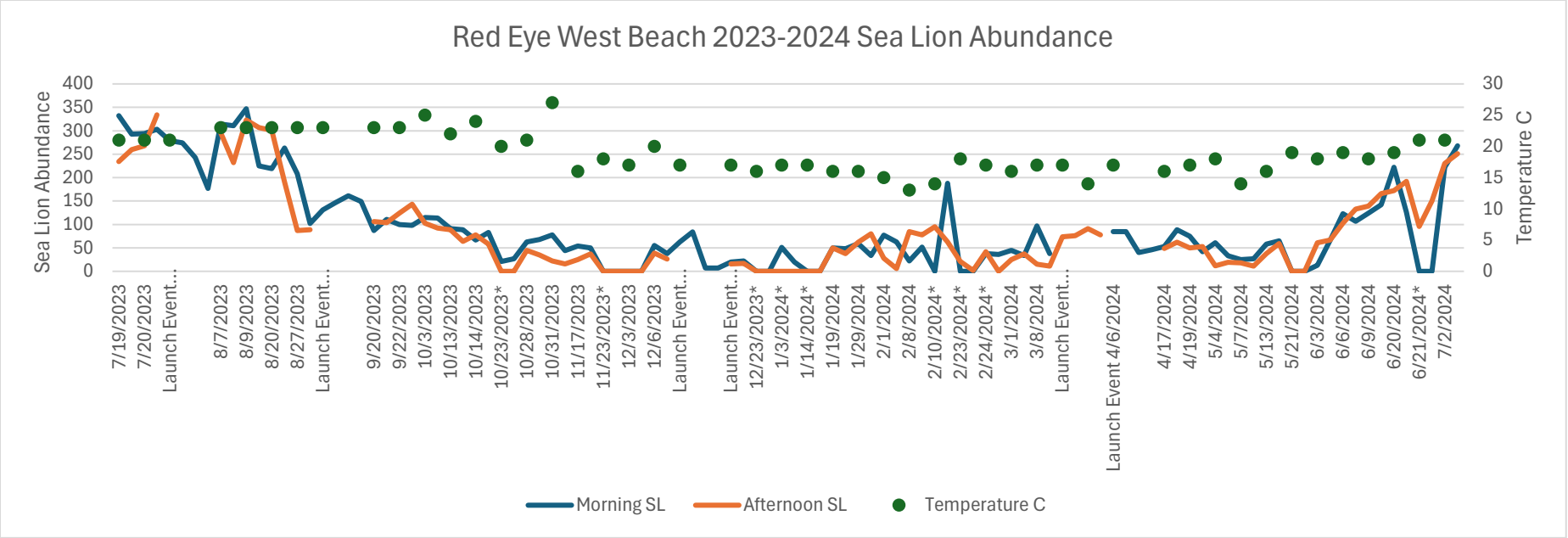


Chart 4.2. Dos Coves 2023-2024 Elephant Seal Abundance. 9/20/2023* All pictures too blurry to count; 10/3/2023*- 10/31/2023* Camera Knocked over; 11/23/2023* Some pictures too blurry to count; 12/3/2023* Some pictures too blurry to count; Launch Event 12/12/2023* Tech Issues; Launch Event 12/13/2023* Tech Issues; 1/3/2024* Some pictures too blurry to count; 1/14/2024* Some pictures too blurry to count; 2/10/2024 Some pictures too blurry to count; 3/8/2024* Camera Knocked over; 5/4/2024* Some pictures too blurry to count; 6/20/2024* Some pictures too blurry to count.



Graph 4.3. Red Eye West Beach 2023-2024 Sea Lion Abundance. 10/23/2023* Some pictures too blurry to count; 11/23/2023* Some pictures too blurry to count; 12/23/2023* Some pictures too blurry to count; 1/3/2024* Some pictures too blurry to count; 1/14/2024* Some pictures too blurry to count; 2/10/2024* Some pictures too blurry to count; 2/23/2024* Some pictures too blurry to count; 2/24/2024* Some pictures too blurry to count; 6/21/2024* Some pictures too blurry to count.

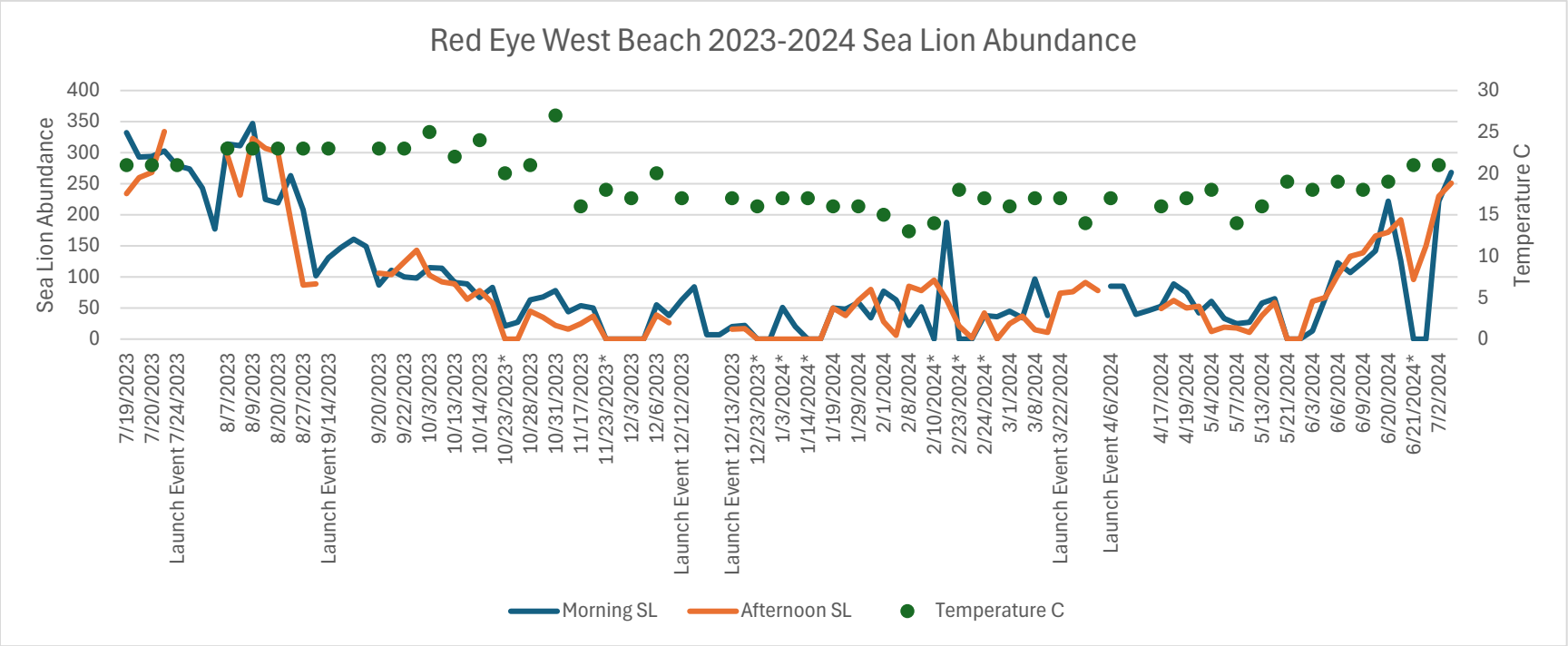


Chart 4.3. Red Eye West Beach 2023-2024 Sea Lion Abundance. 10/23/2023* Some pictures too blurry to count; 11/23/2023* Some pictures too blurry to count; 12/23/2023* Some pictures too blurry to count; 1/3/2024* Some pictures too blurry to count; 1/14/2024* Some pictures too blurry to count; 2/10/2024* Some pictures too blurry to count; 2/23/2024* Some pictures too blurry to count; 2/24/2024* Some pictures too blurry to count; 6/21/2024* Some pictures too blurry to count.

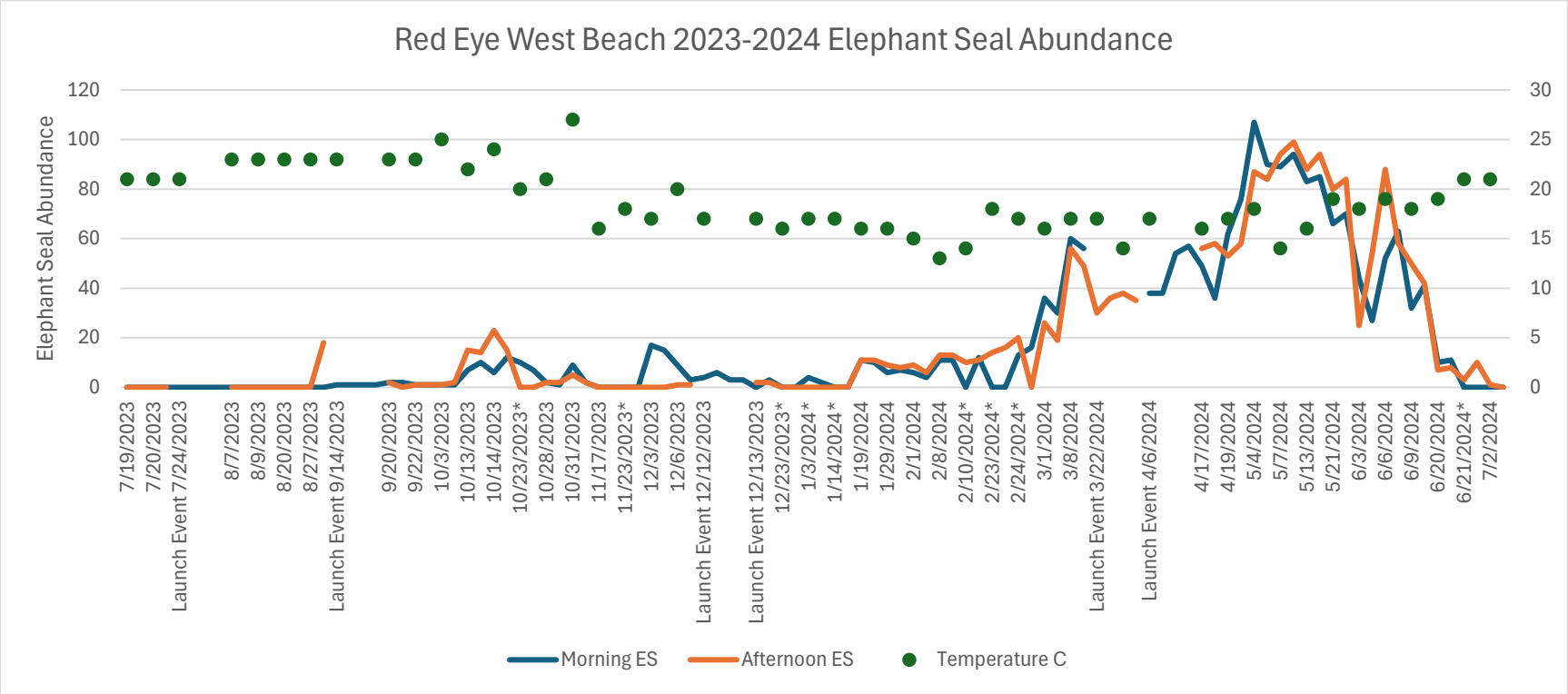


Chart 4.4. Red Eye West Beach 2023-2024 Elephant Seal Abundance. 10/23/2023* Some pictures too blurry to count; 11/23/2023* Some pictures too blurry to count; 12/23/2023* Some pictures too blurry to count; 1/3/2024* Some pictures too blurry to count; 1/14/2024* Some pictures too blurry to count; 2/10/2024* Some pictures too blurry to count; 2/23/2024* Some pictures too blurry to count; 2/24/2024* Some pictures too blurry to count; 6/21/2024* Some pictures too blurry to count.

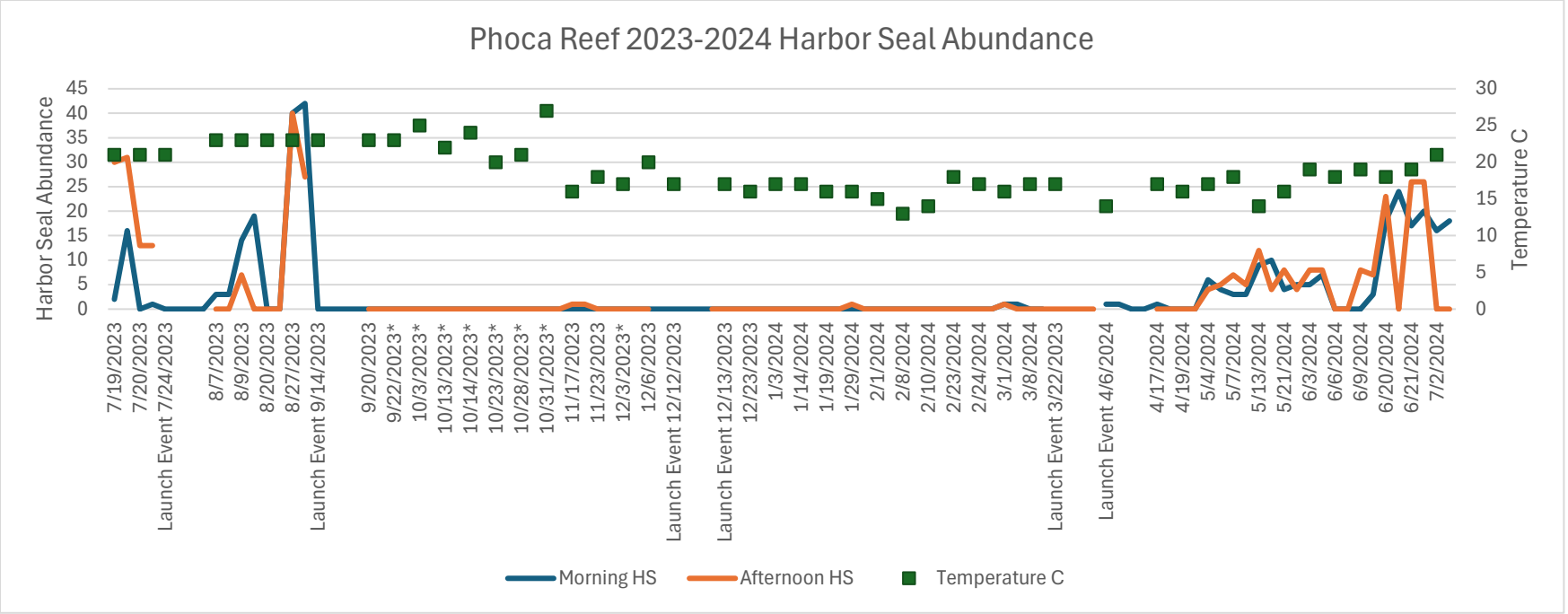


Chart 4.5. Phoca Reef 2023-2024 Harbor Seal Abundance. 9/22/2023*-10/31/2023* Tech issues; 12/3/2023* Pictures were too blurry to count.

Table 4.1. Baseline time-lapse camera data during the 2023-2024 monitoring period.

Date	Time	Phoca Reef HS	Dos Coves SL	Dos Coves ES	Red Eye SL	Red Eye ES	Temperature C/Weather	Tide
7/19/2023	1011	2	138	0	332	0	~21	05:48 AM -0.4FT 12:14 PM 3.4FT 04:57 PM 2.2FT 10:52 PM 5.1FT
	1119	16	135	2	293	0		
	1311	30	163	2	234	0		
	1655	31	160	2	260	0		
7/20/2023	1040	0	155	1	294	0	~21	006:17 AM -0.2FT 12:44 PM 3.4FT 05:35 PM 2.2FT 11:25 PM 4.8FT
	933	1	144	1	303	0		
	1413	13	91	1	268	0		
	1731	13	47	0	334	0		
Launch Event 7/24/2023	Before 1030	0	114	8	279	0	~21	01:25 AM 3.4FT 08:08 AM 1.1FT 03:00 PM 3.9FT 09:45 PM 2.0FT
	Before 1030	0	117	3	274	0		
	After 1030	0	74	1	243	0		
	After 1030	0	62	1	177	0		
8/7/2023	956	3	21	0	314	0	~23	02:18 AM 3.5FT 08:22 AM 1.2FT 02:58 PM 4.7FT 10:16 PM 1.1FT
	1033	3	47	1	311	0		
	1340	0	75	2	296	0		
	1551	0	109	2	232	0		
8/9/2023	922	14	35	1	347	0	~23	06:19 AM 2.7FT 10:18 AM 2.3FT 05:03 PM 4.7FT
	1021	19	56	1	225	0		
	1336	7	77	1	323	0		
	1720	0	19	1	307	0		
8/20/2023	954	0	35	0	219	0	~23	06:16 AM 0.8FT 12:31 PM 4.1FT 06:43 PM 1.6FT
	1236	0	75	0	263	0		
	1309	0	50	0	301	0		
	1544	0	17	0	191	0		
8/27/2023	1034	40	74	0	208	0	~23	02:00 AM -0.3FT 08:39 AM 3.4FT 01:00 PM 2.5FT 07:07 PM 5.5FT
	1201	42	63	1	102	0		
	1324	40	31	1	87	0		
	1515	27	36	1	89	18		
Launch Event 9/14/2023	Before 0900	0	18	0	131	1	~23	04:04 AM 0.2FT 10:08 AM 4.2FT 03:57 PM 1.2FT 09:47 PM 4.9FT
	Before 0900	0	26	1	147	1		
	After 0900	0	36	1	161	1		
	After 0900	0	32	1	149	1		
9/20/2023	1020	0	20	2	87	2	~23	01:10 AM 2.9FT 05:54 AM 2.1FT
	1218	0	NA	3	111	2		

	1518	0	NA	3	106	2		12:30 PM 4.6FT 08:29 PM 1.0FT
	1701	0	NA	3	104	0		
9/22/2023	1008	N/A	96	15	100	1	~23	02:45 PM 4.4FT 11:43 PM 0.5FT
	1037	N/A	88	18	98	1		
	1340	N/A	95	19	124	1		
	1642	N/A	75	18	143	1		
10/3/2023	1035	NA	NA	NA	115	1	25	12:59 AM 3.4FT 05:58 AM 2.0FT 12:11 PM 5.1FT 07:50 PM 0.3FT
	1109	NA	NA	NA	114	1		
	1357	NA	NA	NA	103	1		
	1636	NA	NA	NA	92	2		
10/13/2023	1044	NA	NA	NA	91	7	22	03:15 AM 0.7FT 09:18 AM 4.8FT 03:42 PM 0.7FT 09:31 PM 4.3FT
	1213	NA	NA	NA	89	10		
	1306	NA	NA	NA	89	15		
	1652	NA	NA	NA	64	14		
10/14/2023	1108	NA	NA	NA	67	6	24	03:35 AM 0.9FT 09:36 AM 5.0FT 04:14 PM 0.4FT 10:06 PM 4.1FT
	1140	NA	NA	NA	83	12		
	1302	NA	NA	NA	78	23		
	1756	NA	NA	NA	58	15		
10/23/2023	1029	NA	NA	NA	21	10	20	12:06 AM 0.0FT 07:00 AM 3.9FT 12:09 PM 2.5FT 05:39 PM 4.6FT
	1113	NA	NA	NA	27	7		
	1658	NA	NA	NA	NA	NA		
	1705	NA	NA	NA	NA	NA		
10/28/2023	1145	NA	NA	NA	63	2	21	03:14 AM 0.7FT 09:17 AM 5.9FT 04:10 PM -0.5FT 10:11 PM 4.2FT
	1250	NA	NA	NA	68	1		
	1413	NA	NA	NA	45	2		
	1436	NA	NA	NA	35	2		
10/31/2023	1037	NA	NA	NA	78	9	27	04:47 AM 2.0FT 10:54 AM 5.6FT 06:30 PM -0.3FT
	1100	NA	NA	NA	44	2		
	1349	NA	NA	NA	22	5		
	1515	NA	NA	NA	16	2		
11/17/2023	949	0	116	38	54	0	16	01:00 AM 3.0FT 04:16 AM 2.7FT 10:49 AM 5.2FT 07:06 PM -0.2FT
	1128	0	125	35	50	0		
	1409	1	179	35	25	0		
	1615	1	147	45	37	0		
11/23/2023	928	0	NA	NA	NA	NA	18	06:11 AM 5.2FT 12:54 PM 0.5FT 06:38 PM 3.9FT
	1249	0	NA	NA	NA	NA		
	1331	0	NA	NA	NA	NA		
	1510	0	NA	NA	NA	NA		

12/3/2023	907	NA	NA	NA	0	17	17	03:39 AM 3.3FT 07:19 AM 3.0FT 12:33 PM 3.9FT 08:45 PM 0.6FT
	1031	NA	NA	NA	0	15		
	1637	NA	NA	NA	0	0		
	1645	NA	NA	NA	0	0		
12/6/2023	912	0	6	1	55	9	20	05:17 AM 4.0FT 11:47 AM 1.9FT 04:46 PM 3.1FT 10:58 PM 1.2FT
	1004	0	8	0	38	3		
	1318	0	5	0	39	1		
	1432	0	3	0	26	1		
Launch Event 12/12/2023	Before 1032	0	NA	NA	63	4	17	01:43 AM 2.0FT 07:57 AM 5.8FT 03:34 PM -0.9FT 09:57 PM 3.2FT
	Before 1032	0	NA	NA	84	6		
	After 1032	0	NA	NA	7	3		
	After 1032	0	NA	NA	7	3		
Launch Event 12/13/2023	Before 1220	0	NA	NA	20	0	17	02:20 AM 2.1FT 08:34 AM 5.9FT 04:17 PM -1.1FT 10:45 PM 3.2FT
	Before 1220	0	NA	NA	22	3		
	After 1220	0	NA	NA	16	2		
	After 1220	0	NA	NA	17	2		
12/23/2023	957	0	15	1	NA	NA	16	06:13 AM 5.5FT 01:42 PM -0.5FT 07:55 PM 3.2FT
	1253	0	6	1	NA	NA		
	1403	0	19	1	NA	NA		
	1602	0	16	1	NA	NA		
1/3/2024	1030	0	35	0	51	4	17	03:02 AM 3.6FT 09:33 AM 2.2FT 02:01 PM 2.8FT 08:29 PM 1.3FT
	1230	0	NA	NA	20	2		
	1643	0	NA	NA	NA	NA		
	1738	0	NA	NA	NA	NA		
1/14/2024	1009	0	28	2	NA	NA	17	04:54 AM 1.7FT 10:49 AM 5.3FT 06:06 PM -0.8FT
	1255	0	NA	NA	NA	NA		
	1440	0	17	4	NA	NA		
	1704	0	15	6	NA	NA		
1/19/2024	924	0	242	26	50	11	16 / Rain	04:02 AM 4.7FT 11:52 AM 0.3FT 06:09 PM 2.6FT 10:20 PM 2.0FT
	1145	0	191	30	48	10		
	1512	0	163	21	50	11		
	1657	0	127	24	38	11		
1/29/2024	912	0	151	22	59	6	16	05:07 AM 1.7FT 10:47 AM 4.2FT 05:45 PM 0.2FT
	1014	0	185	37	34	7		
	1312	1	173	15	62	9		
	1736	0	179	17	80	8		
2/1/2024	942	0	62	4	77	6	15	01:12 AM 3.7FT 08:09 AM 1.7FT
	1001	0	17	3	63	4		

	1458	0	44	9	28	9		01:03 PM 2.5FT 06:44 PM 1.5FT
	1637	0	64	8	6	6		
2/8/2024	1112	0	62	1	22	11	13	01:32 AM 1.8FT 07:38 AM 5.8FT 03:04 PM -1.5FT 09:21 PM 3.6FT
	1116	0	99	1	52	11		
	1312	0	52	4	85	13		
	1454	0	45	6	78	13		
2/10/2024	1031	0	NA	NA	NA	NA	14	03:08 AM 1.1FT 09:08 AM 5.9FT 04:16 PM -1.4FT 10:25 PM 4.1FT
	1149	0	207	47	188	12		
	1513	0	249	3	95	10		
	1519	0	NA	NA	63	11		
2/23/2024	1017	0	153	4	NA	NA	18	02:38 AM 1.4FT 08:28 AM 5.0FT 03:31 PM -0.6FT 09:41 PM 3.7FT
	1046	0	175	6	NA	NA		
	1538	0	191	3	21	14		
	1627	0	205	9	2	16		
2/24/2024	1032	0	115	3	38	13	17	03:08 AM 1.2FT 08:58 AM 4.9FT 03:53 PM -0.4FT 10:00 PM 3.8FT
	1131	0	230	6	36	16		
	1553	0	167	6	42	20		
	1649	0	214	11	NA	NA		
3/1/2024	911	1	222	5	45	36	16	07:17 AM 1.0FT 12:50 PM 2.3FT 05:25 PM 1.7FT
	1051	1	201	5	34	30		
	1319	1	195	5	25	26		
	1737	0	178	5	37	19		
3/8/2024	1101	0	NA	NA	97	60	17	01:30 AM 1.3FT 07:28 AM 5.5FT 02:33 PM -1.3FT 08:42 PM 4.1FT
	1211	0	NA	NA	38	56		
	1515	0	NA	NA	15	56		
	1658	0	NA	NA	11	49		
Launch Event 3/22/2023	Before 1303	0	91	20	74	30	17	02:56 AM 1.2FT 08:41 AM 4.5FT 03:29 PM -0.2FT 09:36 PM 3.9FT
	Before 1303	0	97	24	76	36		
	After 1303	0	70	40	91	38		
	After 1303	0	64	31	78	35		
Launch Event 4/6/2024	Before 1040	1	122	36	85	38	14	02:25 AM 0.7FT 08:15 AM 4.9FT 02:54 PM -0.6FT 09:00 PM 4.7FT
	Before 1040	1	90	37	85	38		
	After 1040	0	98	38	40	54		
	After 1040	0	107	37	46	57		
4/17/2024	923	1	16	151	53	49	17 / Windy	12:44 AM 2.3FT 05:58 AM 3.7FT 01:15 PM 0.1FT 07:54 PM 3.6FT
	1236	0	51	205	89	36		
	1318	0	50	205	49	56		
	1514	0	56	201	62	58		

4/19/2024	1041	0	49	110	75	62	16	02:07 AM 1.4FT 07:40 AM 3.9FT 02:16 PM 0.3FT 08:30 PM 4.1FT
	1211	0	70	120	42	76		
	1356	0	4	144	50	53		
	1414	0	74	149	53	58		
5/4/2024	1037	6	NA	NA	61	107	17	01:31 AM 1.0FT 07:09 AM 4.1FT 01:34 PM 0.0FT 07:49 PM 4.8FT
	1151	4	19	32	33	90		
	1353	4	13	18	12	87		
	1528	5	14	13	19	84		
5/7/2024	1111	3	13	0	25	89	18	03:53 AM -1.0FT 09:56 AM 3.8FT 03:21 PM 0.9FT 09:26 PM 5.8FT
	1234	3	38	0	27	94		
	1452	7	26	0	18	94		
	1740	5	43	0	11	99		
5/13/2024	1200	9	1	64	58	83	14	12:58 AM 4.3FT 09:16 AM 0.0FT 05:02 PM 3.1FT 08:39 PM 2.8FT
	1207	10	4	41	65	85		
	1338	12	12	24	38	88		
	1752	4	1	62	59	94		
5/21/2024	1040	4	0	25	0	66	16	03:26 AM -0.1FT 09:26 AM 3.2FT 02:29 PM 1.6FT 08:39 PM 5.1FT
	1212	5	22	24	0	70		
	1551	8	14	16	0	80		
	1641	4	14	15	0	84		
6/3/2024	937	5	34	52	13	44	19	02:18 AM -0.2FT 08:13 AM 3.3FT 01:29 PM 1.2FT 07:46 PM 5.7FT
	1246	7	22	51	66	27		
	1301	8	25	85	61	25		
	1610	8	32	58	67	54		
6/6/2024	1059	0	45	104	123	52	18	04:36 AM -1.3FT 11:02 AM 3.3FT 03:34 PM 1.9FT 09:42 PM 5.9FT
	1154	0	62	68	107	63		
	1645	0	67	96	103	88		
	1718	0	73	109	133	58		
6/9/2024	912	0	99	81	124	32	19	06:51 AM -0.7FT 01:41 PM 3.1FT 05:49 PM 2.4FT 11:47 PM 4.9FT
	1119	3	65	96	142	41		
	1430	8	52	71	139	50		
	1610	7	82	64	166	42		
6/20/2024	1114	18	NA	NA	222	10	18	03:49 AM -0.6FT 10:15 AM 3.0FT 02:27 PM 2.2FT 08:43 PM 5.5FT
	1248	24	5	0	126	11		
	1524	23	19	0	172	7		
	1653	0	NA	NA	192	8		
6/21/2024	1000	17	41	0	NA	NA	19	04:27 AM -0.8FT 10:56 AM 3.1FT
	1221	20	39	0	NA	NA		

	1625	26	79	0	96	3		03:07 PM 2.2FT 09:21 PM 5.7FT
	1719	26	26	0	150	10		
7/2/2024	911	16	113	6	222	0	21	02:18 AM -0.4FT 08:36 AM 3.0FT 01:02 PM 2.0FT 07:23 PM 5.7FT
	1049	18	217	8	268	0		
	1326	0	175	9	230	1		
	1447	0	159	8	251	0		

Note: Temperature collected from 7/19/2023-9/22/2023 is an estimate. NAs indicate data could not be collected. HS= Harbor Seal; SL= Sea Lion; ES= Elephant Seal.

4.4 Discussion and Summary

Dos Coves 2023-2024 Sea Lion Abundance (Chart 4.1):

As shown in Chart 4.1 above, the number of sea lions hauled-out in the morning is similar to the numbers in the afternoon. As expected, there is a decrease in sea lion abundance on the same day after a launch event; however, this decrease does not appear to persist in the days following the launch. Based on this one-year study, there seems to be no significant impact on the number of hauled-out sea lions in the days before or after a launch event. Additionally, there does not appear to be a correlation between the number of hauled-out sea lions and temperature. Interestingly, one of the highest sea lion haul-out counts at Dos Coves occurred on a rainy day. There was also a slight decrease in numbers during the spring, as more elephant seals returned to shore to molt.

Dos Coves 2023-2024 Elephant Seal Abundance (Chart 4.2):

As shown in Chart 4.2 above, the number of elephant seals hauled-out in the morning is similar to the numbers in the afternoon. Unfortunately, many of the images taken during the elephant seal breeding season could not be analyzed. As expected, there was a noticeable spike in the number of elephant seals hauling out during the spring as they return to SNI to begin molting. Days before this significant increase, two launch events occurred at Rock Crusher, but they did not appear to affect the subsequent spike in elephant seal abundance. Unlike the sea lions (Figure 4.1), there was not a substantial decrease in elephant seal haul-out numbers on the day of the launch event. Overall, there seems to be little to no impact on the number of hauled-out elephant seals in response to a launch event, and there also appears to be no correlation between elephant seal abundance and temperature.

Red Eye Beach 2023-2024 Sea Lion Abundance (Chart 4.3):

As shown in Chart 4.3 above, the number of sea lions hauled-out in the morning is similar to those in the afternoon. There is an increase in sea lion abundance during June, July, and August, along with a general decrease in the winter months, which corresponds to their summer pupping and breeding seasons. On days when a launch event occurs, the graph indicates a slight decrease in the number of hauled-out sea lions on that specific day; however, this decrease does not persist into the following day. Therefore, based on these data, there appears to be no long-term negative impact of launch events on sea lion abundance. Additionally, there does not seem to be a correlation between sea lion abundance on Red Eye Beach and temperature.

Red Eye Beach 2023-2024 Elephant Seal Abundance (Chart 4.4.):

As shown in Chart 4.4 above, the number of elephant seals hauled-out in the mornings is similar to the number in the afternoons. On days when a launch event occurs, there does not seem to be a noticeable decrease in the number of hauled-out elephant seals, unlike the sea lions. Notably, there are relatively few hauled-out elephant seals during their winter breeding and mating season on this specific beach. However, there is a spike in the number of elephant seals using this beach during their spring molt. It will be interesting to see if this pattern continues in next year's monitoring period. Overall, there appears to be no long-term negative impact on elephant seal abundance following a launch event, and there does not seem to be a correlation between temperature and abundance.

Phoca Reef 2023-2024 Harbor Seal Abundance (Chart 4.5 and Table 4.1):

As shown in Chart 4.5 above, the number of harbor seals hauled-out in the mornings closely followed the peaks and dips of those hauled out in the afternoons. There was also an increase in the number of harbor seals on the reef during the spring, throughout the summer, and into the fall. This specific location is particularly sensitive to tides. During high tides, the reef is submerged and unavailable for the seals to haul out, while at low tides the reef is fully exposed allowing harbor seals to use the entire area. Table 4.1 includes tidal charts and times for each day throughout the year, primarily for Phoca Reef. Most of the images analyzed from 23 November 2023 to 17 April 2024 were taken under unfavorable tidal conditions, limiting the number of harbor seals that could haul out on the reef. Based on the graph, it is difficult to assess the impact of launch events on the hauled-out harbor seals, as there were not many present before the launch to be affected. Additionally, there does not seem to be a correlation between the number of hauled-out harbor seals and temperature.

5. IMPLEMENTATION OF MITIGATION MEASURES

Table 5.1 provides a summary of the mitigation measures that were specified by NMFS in the LOA, and how they were implemented during the July 2023 through July 2024 monitoring period.

TABLE 5.1. Implementation of mitigation measures.

Mitigation Measure	Implementation
Personnel must not enter pinniped haul-outs. Personnel may be adjacent to haul-outs prior to and following a launch for monitoring purposes.	Personnel on San Nicolas Island were prohibited from entering pinniped haul-out areas. Monitoring personnel cleaned and accessed the time-lapse cameras near haul-outs without disturbing pinnipeds.
Missile must not cross over pinniped haul-outs at [altitudes] less than 305 meters (m) (1000 feet).	No missiles crossed over pinniped haul-outs at less than 1000 feet.
The Navy may not conduct more than 10 launch events at night.	No launches were conducted at night during this period
Launches must not occur February through April, to the maximum extent practicable.	Two (2) launch events were conducted between February and April during this monitoring period.
Launches must be limited January through February and June through July, to the maximum extent practicable.	No launch events were conducted January through February. There was 1 launch event conducted June through July. The female sea lions and pups reacted to launches but there was no indication of pup abandonment or mortality.
All aircraft and helicopter flight paths must maintain a minimum distance of 305 m from recognized seal haul-out and rookeries, to the maximum extent practicable.	All aircraft maintained a minimum distance of 305 meters from recognized seal haul-out and rookeries.
For a species for which authorization has not been granted, or for a species for which authorization has been granted but authorized takes are met, the Navy must consult with NMFS before the next launch event.	No species for which authorization was not granted (e.g. Guadalupe fur seal, Steller sea lion) was observed during this period. Authorized take for other species not met.
The Navy must review launch procedure and monitoring methods, in cooperation with NMFS, if any injuries or mortality of a pinniped are discovered during post-launch surveys, or if surveys indicate possible effects to the distribution, size or productivity of the affected pinniped populations as a result of the specified activities.	No injured or dead pinnipeds were observed in post launch observations during the monitoring period. No evidence of effects to the distribution, size or productivity of affected pinniped populations.

6. TOTAL ESTIMATED TAKES OF PINNIPEDS DURING LAUNCH EVENTS

Table 6.1 summarizes the "take" estimates for each launch event and monitoring location.

Table 6.1. Estimated number of pinnipeds affected by launches July 2023 - July 2024

Date/Time Location	Monitoring Locations	Species	Observed	Reacted[8]	Percent Reacted	Multiple[9]	Total
07/24/2023 1030hrs Building 807/Rock Crusher	Dos Coves	Sea Lion	116	21	18%	1	21
		Elephant Seal	3	1	33%	1	1
	Red Eye West	Sea Lion	288	288	100%	1	288
		Elephant Seal	0	0	0%	1	0
	Phoca Reef	Harbor Seal	0	0	0%	1	0
09/14/2023 0900hrs Building 807/Rock Crusher	Dos Coves	Sea Lion	23	14	61%	1	14
		Elephant Seal	2	1	50%	1	1
	Red Eye West	Sea Lion	150	0	0%	1	0
		Elephant Seal	1	0	0%	1	0
	Phoca Reef	Harbor Seal	0	0	0%	1	0
12/12/2023 1032hrs Alpha Complex	Dos Coves	Sea Lion	0	0	0%	1	0
		Elephant Seal	0	0	0%	1	0
	Red Eye West	Sea Lion	82	70	85%	1	70
		Elephant Seal	6	1	17%	1	1
	Phoca Reef	Harbor Seal	0	0	0%	1	0
12/13/2023 1220hrs Alpha Complex	Dos Coves	Sea Lion	0	0	0%	1	0
		Elephant Seal	0	0	0%	1	0
	Red Eye West	Sea Lion	25	9	36%	1	9
		Elephant Seal	3	0	0%	1	0
	Phoca Reef	Harbor Seal	0	0	0%	1	0
03/22/2024 1303hrs Building 807/Rock Crusher	Dos Coves	Sea Lion	0	0	0%	1	0
		Elephant Seal	0	0	0%	1	0
	Red Eye West	Sea Lion	117	34	29%	1	34
		Elephant Seal	41	5	12%	1	5
	Phoca Reef	Harbor Seal	0	0	0%	1	0
04/06/2024 1040hrs Building 807/Rock Crusher	Dos Coves	Sea Lion	92	18	20%	1	18
		Elephant Seal	43	6	14%	1	6
	Red Eye West	Sea Lion	81	4	4.9%	1	4
		Elephant Seal	45	3	6.7%	1	3
	Phoca Reef	Harbor Seal	1	1	100%	1	1

[8] "Reacted" defined as an animal moving more than 10 meters (33 ft.) and/or entering the water.

[9] A multiplier of greater than (>) 1 was applied when the entire monitored area was not within the field of view of the camera. During this monitoring period, all monitoring sites had the entire monitored area within the field of view of the video camera.

Table 6.2 compares estimated "take" estimates with the estimated take allowed in the 2023-2024 LOA.

TABLE 6.2. Comparison of July 2022 through July 2023 estimates with LOA allowances for pinniped disturbance

Species	Total Reactions observed	Average/event (6 events)	LOA Average/event	LOA Maximum/year (40 events)
CA Sea Lion	458	76.3	275	11,000
N. Elephant Seal	17	2.83	0.61 (1)	40
P. Harbor Seal	1	0.17	2.39 (3)	120

SUMMARY

There was no evidence of pinniped injuries or fatalities related to launch noises or other launch operations was evident, nor was it expected based on past measurements and observations. It is also unlikely that any pinnipeds were exposed to received levels of sound energy above levels at which TTS or PTS would occur.

In total, 458 California sea lions, 1 Pacific harbor seal, and 17 northern elephant seals were estimated as "taken" during the July 2023 through July 2024 monitoring period. These figures are approximate because they (a) may count some of the same individuals more than once, and (b) exclude pinnipeds on beaches that were not monitored. The pinnipeds included in these estimates are assumed to have entered the water in response to the launch or are assumed to have moved more than 10 meters (33 ft.) immediately after a launch through time-lapse camera photo analysis.

The results from the July 2023 through July 2024 monitoring period (and those from previous monitoring periods) suggest that any effects of the launch operations were minor, short-term, and localized. On many of the haul-out locations during this monitoring period, the pinniped numbers hauled-out on the beach 1 hour after the launch event were comparable or higher to the number of pinnipeds hauled-out prior to the launch event. It is not likely that any of the pinnipeds on SNI were adversely affected by such behavioral reactions.

These results are supported by observed population increases of pinnipeds on SNI. Counts of all three species of pinnipeds have significantly increased on SNI over the past three decades (Barlow, et al., 1997; Fluharty, 1999; Le Boeuf, et al., 1978; Lowry 2002; Lowry and Maravilla, 2005; Lowry, et al., 1996, 2008, 2017, 2020, 2021). This includes increases in pinniped counts in the portions of the island closest to the missile launch trajectories.

7. ANNUAL PMSR STUDY AREA TRAINING AND TESTING ACTIVITY FOR EXPLOSIVE SOURCES

Each year, the Navy is required to submit a detailed explosive sources activity report PMSR (Annual Training and Testing Activity Report) to the Director, Office of Protected Resources, NMFS, within 3 months after the one-year anniversary of the date of issuance of the LOA. The annual report must also contain both the current year's data as well as explosive use quantity from previous years' reports. Since this is the second year of reporting under the 2022 LOA and Final Rule, this report is reporting both 2022-2023 and 2023-2024 reporting year's annual amounts. For this year, the Navy is well within the 2022 LOA permitted allocations for explosive expenditures in the 2023-2024 reporting period.

Summary of sources used. This section of the report includes the following information summarized from the authorized sound sources used in all training and testing events:

i. Total annual quantity (per the LOA) of each explosive bin; and

ii. Total annual expended/detonated ordnance (missiles, bombs, *etc*.) for each explosive bin for each reporting year

Table 7.1. PMSR Permitted and Actual Explosive Munition Expenditures Detonating at or Near the Surface for the 2022-2023 and 2023-2024 Permit Periods

Bin	Number of Explosive Munitions		
	Permitted Expenditures	2023-2024 Actual Expenditures	2022-2023 Actual Expenditures
E1	28,600	0	612
E3	5,530	0	251
E5	1,666	0	104
E6	104	0	3
E7	64	26	36
E8	71	0	24
E9	63	19	23
E10	13	1	0

SUMMARY

The PMSR is required to annually report a summary of explosive sources detonating at or near the surface (<10 m) used during at-sea testing and training activities for air warfare, electronic warfare, and surface warfare. During this 2023-2024 monitoring and reporting period, the total annual quantity of each explosive bin is well below the allowable amounts that may result in the authorized incidental take of marine mammals for Level A and Level B Harassment on the PMSR. Based on all data collected throughout this monitoring period, there is no evidence of any dead, injured or live stranded marine mammals or ship strikes resulting from testing and training activities that occurred on the PMSR.

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APPENDIX A:
LETTER OF AUTHORIZATION
07 JULY 2022 – 08 JULY2029

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 218

[220629–0147]

RIN 0648–BK07

Taking and Importing Marine Mammals; Taking Marine Mammals Incidental to the U.S. Navy Training and Testing Activities in the Point Mugu Sea Range Study Area

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Final rule; notification of issuance of Letter of Authorization.

SUMMARY: NMFS, upon request from the U.S. Navy (Navy), issues these regulations pursuant to the Marine Mammal Protection Act (MMPA) to govern the taking of marine mammals incidental to the training and testing activities conducted in the Point Mugu Sea Range (PMSR) Study Area. The Navy's activities qualify as military readiness activities pursuant to the MMPA, as amended by the National Defense Authorization Act for Fiscal Year 2004 (2004 NDAA). These regulations, which allow for the issuance of a Letter of Authorization (LOA) for the incidental take of marine mammals during the described activities and timeframes, prescribe the permissible methods of taking and other means of effecting the least practicable adverse impact on marine mammal species and their habitat, and establish requirements pertaining to the monitoring and reporting of such taking.

DATES: Effective from July 7, 2022, through July 7, 2029.

ADDRESSES: A copy of the Navy's application, NMFS' proposed and final rules and subsequent LOA for the existing regulations, and other supporting documents and documents cited herein may be obtained online at: *www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities.* In case of problems accessing these documents, please use the contact listed here (see **FOR FURTHER INFORMATION CONTACT**).

FOR FURTHER INFORMATION CONTACT: Leah Davis, Office of Protected Resources, NMFS, (301) 427–8401.

SUPPLEMENTARY INFORMATION:

Purpose of Regulatory Action

These regulations, issued under the authority of the MMPA (16 U.S.C. 1361 *et seq.*), provide the framework for authorizing the take of marine mammals incidental to the Navy's training and testing activities (which qualify as military readiness activities) from the use of at-surface and near-surface explosive detonations throughout the PMSR Study Area, as well as launch events from San Nicolas Island (SNI). The PMSR Study Area includes 36,000 square miles and is located adjacent to Los Angeles, Ventura, Santa Barbara, and San Luis Obispo Counties along the Pacific Coast of Southern California (see Figure 1.1 of the application). The two primary components of the PMSR are the Special Use Airspace (SUA) and the ocean Operating Areas (PMSR-controlled sea space). The PMSR-controlled sea space parallels the California coast for approximately 225 nautical miles (nmi) (417 km) and extends approximately 180 nmi seaward (333 km; see Figure 1–1 of the application).

NMFS received an application from the Navy requesting 7-year regulations and an authorization to incidentally take individuals of multiple species of marine mammals (''Navy's rulemaking/LOA application'' or ''Navy's application''). Take is anticipated to occur by Level A harassment and Level B harassment incidental to the Navy's training and testing activities, with no serious injury or mortality anticipated or authorized.

Section 101(a)(5)(A) of the MMPA (16 U.S.C. 1371(a)(5)(A)) directs the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if, after notice and public comment, the agency makes certain findings and issues regulations that set forth permissible methods of taking pursuant to that activity, as well as monitoring and reporting requirements. Section 101(a)(5)(A) of the MMPA and the implementing regulations at 50 CFR part 216, subpart I, provide the legal basis for issuing this final rule and the subsequent LOA. As directed by this legal authority, this final rule contains mitigation, monitoring, and reporting requirements.

Summary of Major Provisions Within the Final Rule

The following is a summary of the major provisions of this final rule regarding the Navy's activities. Major provisions include, but are not limited to:

- Measures to reduce the probability and/or severity of impacts expected to result from exposure to explosives and launch activities (*i.e.,* minimize the likelihood or severity of permanent threshold shift or other injury, and reduce instances of temporary threshold shift or more severe behavioral disruption caused by explosives and launch activities);
- Activity limitations in certain areas and times that are biologically important (*e.g.,* pupping season on San Nicolas Island) for marine mammals;
- Measures to reduce the likelihood of ship strikes;
- Implementation of a Notification and Reporting Plan (for dead or live stranded marine mammals); and
- Implementation of a robust monitoring plan to improve our understanding of the environmental effects resulting from the Navy training and testing activities.

Additionally, the rule includes an adaptive management component that allows for timely modification of mitigation or monitoring measures based on new information, when appropriate.

Background

The MMPA prohibits the take of marine mammals, with certain exceptions. Sections 101(a)(5)(A) and (D) of the MMPA direct the Secretary of Commerce (as delegated to NMFS) to allow, upon request, the incidental, but not intentional, taking of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if certain findings are made and either regulations are issued or, if the taking is limited to harassment, a notice of a proposed authorization is provided to the public for review and the opportunity to submit comments.

An authorization for incidental takings shall be granted if NMFS finds that the taking will have a negligible impact on the species or stocks and will not have an unmitigable adverse impact on the availability of the species or stocks for taking for subsistence uses (where relevant). Further, NMFS must prescribe the permissible methods of taking and other means of effecting the least practicable adverse impact on the affected species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of such species or stocks for taking for certain subsistence uses

(referred to in this rule as ''mitigation measures''). NMFS also must prescribe the requirements pertaining to the monitoring and reporting of such takings. The MMPA defines ''take'' to mean to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. The *Analysis and Negligible Impact Determination* section below discusses the definition of ''negligible impact.''

The NDAA for Fiscal Year 2004 (2004 NDAA) (Pub. L. 108–136) amended section 101(a)(5) of the MMPA to remove the ''small numbers'' and ''specified geographical region'' provisions indicated above and amended the definition of ''harassment'' as applied to a ''military readiness activity.'' The definition of harassment for military readiness activities (section 3(18)(B) of the MMPA) is: (i) Any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild (Level A Harassment); or (ii) Any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered (Level B harassment). In addition, the 2004 NDAA amended the MMPA as it relates to military readiness activities such that the least practicable adverse impact analysis shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

More recently, section 316 of the NDAA for Fiscal Year 2019 (2019 NDAA) (Pub. L. 115–232), signed on August 13, 2018, amended the MMPA to allow incidental take rules for military readiness activities under section 101(a)(5)(A) to be issued for up to 7 years. Prior to this amendment, all incidental take rules under section 101(a)(5)(A) were limited to 5 years.

Summary and Background of Request

On March 9, 2020, NMFS received an application from the Navy for authorization to take marine mammals by Level A harassment and Level B harassment incidental to training and testing activities (categorized as military readiness activities) from (1) the use of at-surface or near-surface explosive detonations in the PMSR Study Area, as well as (2) launch events from SNI, over a 7-year period beginning June 2022 through June 2029. We received a revised application on August 28, 2020, which provided minor revisions to the mitigation and monitoring sections, and upon which the Navy's rulemaking/LOA application was found to be adequate and complete. On September 4, 2020, we published a notice of receipt (NOR) of application in the **Federal Register** (85 FR 55257), requesting comments and information related to the Navy's request for 30 days. On July 16, 2021, we published a notice of proposed rulemaking (86 FR 37790) and requested comments and information related to the Navy's request for 45 days (''PMSR proposed rule''). All comments received during the NOR and the proposed rulemaking comment periods were considered in this final rule. Comments received on the proposed rule are addressed in this final rule in the *Comments and Responses* section.

The following types of training and testing, which are classified as military readiness activities pursuant to the MMPA, as amended by the 2004 NDAA, will be covered under the regulations and LOA: air warfare (air-to-air, surface-to-air), electronic warfare (directed energy—lasers and high-powered microwave systems), and surface warfare (surface-to-surface, air-to-surface, and subsurface-to surface). The activities will not include any underwater detonations, sonar, pile driving/removal, or use of air guns.

The Navy's mission is to organize, train, equip, and maintain combat-ready naval forces capable of winning wars, deterring aggression, and maintaining freedom of the seas. This mission is mandated by Federal law (10 U.S.C. 8062), which requires the readiness of the naval forces of the United States. The Navy executes this responsibility by training and testing at sea, often in designated operating areas (OPAREA) and testing and training ranges. The Navy must be able to access and utilize these areas and associated sea space and air space in order to develop and maintain skills for conducting naval operations. The Navy's testing activities ensure naval forces are equipped with well-maintained systems that take advantage of the latest technological advances. The Navy's research and acquisition community conducts military readiness activities that involve testing. The Navy tests ships, aircraft, weapons, combat systems, sensors, and related equipment, and conducts scientific research activities to achieve and maintain military readiness.

The Navy has been conducting testing and training activities in the PMSR Study Area since the PMSR was established in 1946. The tempo and types of training and testing activities fluctuate because of the introduction of new technologies, the evolving nature of international events, advances in warfighting doctrine and procedures, and changes in force structure (*e.g.,* organization of ships, submarines, aircraft, weapons, and personnel). Such developments influence the frequency, duration, intensity, and location of required training and testing activities. The activities include current activities, previously analyzed in the 2002 PMSR Environment Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS), and increases in the testing and training activities as described in the 2022 PMSR Final EIS/OEIS (FEIS/OEIS). NMFS promulgated MMPA incidental take regulations relating to missile launches from SNI from June 3, 2014, through June 3, 2019 (79 FR 32678; June 6, 2014). Since then, the Navy has been operating under incidental harassment authorizations (IHAs) (84 FR 28462, June 19, 2019; 85 FR 38863, June 29, 2020; and 86 FR 32372, June 21, 2021) for those similar activities on SNI. For this rulemaking, the Navy is requesting authorization for marine mammal take incidental to activities on SNI similar to those they have conducted under these and previous authorizations, as well as the use of at-surface and near-surface explosive detonations throughout the PMSR Study Area. The testing and training activities are deemed necessary to accomplish Naval Air System Command's mission of providing for the safe and secure collection of decision-quality data; and developing, operating, managing and sustaining the interoperability of the Major Range Test Facility Base at the PMSR into the foreseeable future.

The Navy's rulemaking/LOA application reflects the most up-to-date compilation of training and testing activities deemed necessary to accomplish military readiness requirements. The types and numbers of activities included in the rule account for fluctuations in training and testing in order to meet evolving or emergent military readiness requirements. These regulations will cover training and testing activities over a 7-year period beginning June 2022.

Description of the Specified Activity

A detailed description of the specified activity was provided in our **Federal Register** notice of proposed rulemaking (86 FR 37790; July 16, 2021); please see that notice of proposed rulemaking or the Navy's application for more information. The Navy has determined that explosive stressors and missile launch activities are most likely to result in impacts on marine mammals that could rise to the level of

harassment, and NMFS concurs with this determination. Descriptions of these activities are provided in section 2 of the 2021 PMSR FEIS/OEIS (U.S. Department of the Navy, 2021) and in the Navy's rulemaking/LOA application (*https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities*), and are summarized here.

Dates and Duration

The specified activities can occur at any time during the 7-year period of validity of the regulations, with the exception of the activity types and time periods for which limitations have explicitly been identified (to the maximum extent practicable; see *Mitigation Measures* section). The amount of training and testing activities are described in the *Detailed Description of the Specified Activity* section (Table 1).

Geographical Region

The PMSR Study Area is located adjacent to Los Angeles, Ventura, Santa Barbara, and San Luis Obispo Counties along the Pacific Coast of Southern California and includes a 36,000-square-mile sea range (see Figure 1 of the proposed rule). It is a designated Major Range Test Facility Base and is considered a national asset that exists primarily to provide test and evaluation information for Department of Defense (DoD) decision makers and to support the needs of weapon system development programs and DoD research needs. The two primary components of the PMSR Study Area are Special Use Airspace and the ocean Operating Areas. Additional detail can be found in Chapter 2 of the Navy's rulemaking/LOA application. The Navy plans to conduct launch activities on San Nicolas Island (SNI), California, for testing and training activities associated with operations within the PMSR Study Area.

Overview of Training and Testing Within the PMSR Study Area

The Navy categorizes its at-sea activities into functional warfare areas called primary mission areas. Each warfare community may train in some or all of these primary mission areas. The Navy also categorizes most, but not all, of its testing activities under these primary mission areas. Activities addressed for the PMSR Study Area are categorized under three primary mission areas: Air warfare (air-to-air, surface-to-air); Electronic warfare (directed energy—lasers and high-powered microwave systems); and Surface warfare (surface-to-surface, air-to-surface, and subsurface-to-surface). Within those three primary mission areas, there are more specific categories or activity scenarios that reflect testing and training activities. A description of the munitions, targets, systems, and other material used during training and testing activities within these primary mission areas is provided in Appendix A (Training and Testing Activities Descriptions) of the 2022 PMSR FEIS/OEIS.

The Navy also plans to continue a target and missile launch program from two launch sites on SNI for testing and training activities associated with operations within the PMSR Study Area. Missiles vary from tactical and developmental weapons to target missiles used to test defensive strategies and other weapons systems. Some launch events involve a single missile or target, while others involve the launch of multiple missiles or targets in quick succession. Missiles or targets launched from SNI fly generally west, southwest, and northwest through the PMSR Study Area. The primary launch locations are the Alpha Launch Complex, located 190 meters (m) above sea level on the west-central part of SNI and the Building 807 Launch Complex, which accommodates several fixed and mobile launchers, at the western end of SNI at approximately 11 m (12 yd) above sea level.

Description of Stressors

The Navy uses a variety of platforms, weapons, and other devices, including ones used to ensure the safety of Sailors and Marines, to meet its mission. Training and testing with these systems may introduce acoustic (sound) energy or shock waves from explosives into the environment. The following subsections describe explosives detonated at or near the surface of the water and launch noise associated with missiles launched from SNI for marine mammals and their habitat (including prey species) within the PMSR Study Area. Because of the complexity of analyzing sound propagation in the ocean environment, the Navy relied on acoustic models in its environmental analyses and rulemaking/LOA application that considered sound source characteristics and varying ocean conditions across the PMSR Study Area. Stressor/resource interactions that were determined to have de minimis or no impacts (*i.e.,* vessel, aircraft, or weapons noise) were not carried forward for analysis in the Navy's rulemaking/LOA application. NMFS reviewed the Navy's analysis and conclusions on de minimis sources and finds them complete and supportable.

Acoustic stressors include incidental sources of broadband sound produced as a byproduct of vessel movement and use of weapons or other deployed objects. Explosives also produce broadband sound but are characterized separately from other acoustic sources due to their unique hazardous characteristics. There are no sonar activities planned in the PMSR Study Area. Characteristics of explosives are described below.

In order to better organize and facilitate the analysis of various explosives used for training and testing by the Navy, including sonar and other transducers and explosives, a series of source classifications, or source bins, was developed by the Navy. The source classification bins do not include the broadband sounds produced incidental to vessel or aircraft transits, weapons firing, and bow shocks.

The use of source classification bins provides the following benefits:

- Provides the ability for new sensors or munitions to be covered under existing authorizations, as long as those sources fall within the parameters of a bin;
- Improves efficiency of source utilization data collection and reporting requirements anticipated under the MMPA authorizations;
- Ensures a conservative approach to all impact estimates, as all sources within a given class are modeled as the most impactful source (having the largest net explosive weight) within that bin;
- Allows analyses to be conducted in a more efficient manner, without any compromise of analytical results; and
- Provides a framework to support the reallocation of source usage (number of explosives) between different source bins, as long as the total numbers of takes remain within the overall analyzed and authorized limits. This flexibility is required to support evolving Navy training and testing requirements, which are linked to real world events.

Explosives

This section describes the characteristics of explosions during naval training and testing. The activities analyzed in the Navy's rulemaking/LOA application that use explosives are described in Appendix A (PMSR Scenario Descriptions) of the 2022 PMSR FEIS/OEIS.

To more completely analyze the results predicted by the Navy's acoustic effects model from detonations occurring in-air above the ocean surface, it is necessary to consider the transfer of energy across the air-water interface.

Detonation of an explosive in air creates a supersonic high pressure shock wave that expands outward from the point of detonation (Kinney and Graham, 1985; Swisdak, 1975). The near-instantaneous rise from ambient pressure to an extremely high peak pressure is what makes the explosive shock wave potentially injurious to an animal experiencing the rapid pressure change (U.S. Department of the Navy, 2017e). Farther from an explosive, the peak pressures decay and the explosive waves propagate as an impulsive, broadband sound. As the shock wave-front travels away from the point of detonation, it slows and begins to behave as an acoustic wave-front travelling at the speed of sound. Whereas a shock wave from a detonation in-air has an abrupt peak pressure, that same pressure disturbance when transmitted through the water surface results in an underwater pressure wave that begins and ends more gradually compared with the in-air shock wave, and diminishes with increasing depth and distance from the source (Bolghasi *et al.* 2017; Chapman and Godin, 2004; Cheng and Edwards, 2003; Moody, 2006; Richardson *et al.* 1995; Sawyers, 1968; Sohn *et al.* 2000; Swisdak, 1975; Waters and Glass, 1970; Woods *et al.* 2015). The propagation of the shock wave in air and then transitioning underwater, is very different from a detonation occurring deep underwater where there is little interaction with the surface. In the case of an underwater detonation occurring just below the surface, a portion of the energy from the detonation would be released into the air (referred to as surface blow off), and at greater depths a pulsating, air-filled cavitation bubble would form, collapse, and reform around the detonation point (Urick, 1983). The Navy's acoustic effects model for analyzing underwater impacts on marine species does not account for the loss of energy due to surface blow-off or cavitation at depth. Both of these phenomena would diminish the magnitude of the acoustic energy received by an animal under real-world conditions (U.S. Department of the Navy, 2018c).

Propagation of explosive pressure waves in water is highly dependent on environmental characteristics such as bathymetry, bottom type, water depth, temperature, and salinity, which affect how the pressure waves are reflected, refracted, or scattered; the potential for reverberation; and interference due to multi-path propagation. In addition, absorption greatly affects the distance over which higher-frequency components of explosive broadband noise can propagate. Because of the complexity of analyzing sound propagation in the ocean environment, the Navy relies on acoustic models in its environmental analyses that consider sound source characteristics and varying ocean conditions across the PMSR Study Area (Navy, 2019a).

Missiles, rockets, bombs, and medium and large-caliber projectiles may be explosive or nonexplosive, depending on the objective of the testing or training activity in which they are used. The planned activities do not include explosive munitions used underwater. Missiles, bombs, and projectiles that detonate at or near (within 10 m (11 yd) of) the water's surface are considered for the potential impact they may have on marine mammals. All explosives used during testing and training activities within the PMSR Study Area will detonate at or near the surface or in-air. Several parameters influence the acoustic effect of an explosive: the weight of the explosive warhead, the type of explosive material, the boundaries and characteristics of the propagation medium(s); and the detonation depth underwater and the depth of the receiver (*i.e.,* marine mammal). The net explosive weight (NEW), which is the explosive power of a charge expressed as the equivalent weight of trinitrotoluene (TNT), accounts for the first two parameters.

Land-Based Launch Noise on San Nicolas Island

Noise from target and missile launches on SNI can also occur. These ongoing activities affecting pinnipeds hauled out in the vicinity of launch sites have been analyzed previously (NMFS 2014, 2019, 2020) and are summarized below as part of the Navy's rulemaking/LOA application. As part of previous authorizations, the Navy could conduct up to 40 launch events annually from SNI, but the total may be less than 40 depending on operational requirements. Launch timing will be determined by operational, meteorological, and logistical factors. Up to 10 of the 40 launches may occur at night, but this is also dependent on operational requirements, and night-time launches are only conducted when required by test objectives.

Vessel Strike

Vessel strikes have the potential to result in incidental take from serious injury and/or mortality. Vessel strikes are not specific to any particular training or testing activity, but rather are a limited, sporadic, and incidental result of Navy vessel movement within a study area.

The number of Navy vessels in the PMSR Study Area at any given time varies and is dependent on scheduled testing and training requirements. Navy vessels transit at speeds that are optimal for fuel conservation or to meet training and testing requirements. Additional detail on vessel strike was provided in our **Federal Register** notice of proposed rulemaking (86 FR 37790; July 16, 2021); please see that notice of proposed rulemaking or the Navy's application for more information. Information on Navy vessel movement in the PMSR Study Area is provided in the *Vessel Movement* section of this rule.

Detailed Description of the Specified Activities

Planned Training and Testing Activities

Training and testing activities will be conducted at sea, in designated airspace, and on SNI, within the PMSR Study Area.

The training and testing activities are deemed necessary to accomplish Naval Air Systems Command's mission of providing for the safe and secure collection of decision-quality data; and developing, operating, managing and sustaining the interoperability of the Major Range Test Facility Base at the PMSR into the foreseeable future. Collectively, the training and testing activities support current and projected military readiness requirements into the foreseeable future, as shown in Table 1.

TABLE 1—MAXIMUM NUMBER OF ANNUAL PLANNED ACTIVITIES IN THE PMSR STUDY AREA

[Inclusive of SNI launches]

Activity	Activity sub category	Planned activities
Aerial Targets (# of targets)		176
Surface Targets (# of targets)		522
Ordnance (# of ordnance)	Bombs	30
	Gun Ammunition	281,230
	Missiles	584
	Rockets	40

Most of the factors influencing frequency and types of activities are fluid in nature (*i.e.,* continually evolving and changing), and the annual activity level in the PMSR Study Area will continue to fluctuate. The number of events may not be the same year to year, but the maximum number of events were predicted annually. Total annual events will not exceed what is planned in Table 1 above. Training and testing duration and frequency varies depending on Fleet requirements, and funding and does not occur on a predictable annual cycle.

Fleet training activities occur over scheduled continuous and uninterrupted blocks of time, focusing on the development of core capabilities/skills. Training events in the PMSR Study Area are conducted to ensure Navy forces can sustain their training cycle requirements. Primarily, changes occur with increases or decreases in annual operational tempo of activities, in addition to changes in the types of aircraft, vessels, targets, ordnance, and tasks that are actions or processes performed as part of Navy operations.

Future testing depends on scientific and technological developments that are not easy to predict, and experimental designs may evolve with emerging science and technology. Even with these challenges, the Navy makes every effort to forecast all future testing requirements. As a result, testing requirements are driven by the need to support Fleet readiness based on emerging national security interests, and alternatives must have sufficient annual capacity to conduct the research, development, and testing of new systems and technologies, with upgrades, repairs, and maintenance of existing systems.

Fleet Training

Fleet training within the PMSR Study Area includes the same types of warfare of the primary mission areas. Training conducted in conjunction with testing activities provide Fleet operators unique opportunities to train with ship and aircraft combat weapon systems and personnel in scripted warfare environments, including live-fire events. For example, Fleet training would occur while testing a weapon system, in which Sailors would experience (be trained in) the use of the system being tested. Combat ship crews train in conjunction with scheduled ship testing and qualification trials, to take advantage of the opportunity to provide concurrent training and familiarization for ship personnel in maintaining and operating installed equipment, identifying design problems, and determining deficiencies in support elements (*e.g.,* documentation, logistics, test equipment, or training). Live and inert weapons, along with chaff, flares, jammers, and lasers may be used.

Typically concurrent with testing, surface training available within the PMSR Study Area includes tracking events, missile-firing events, gun-firing events, high-speed anti-radiation missile events, and shipboard self-defense system training, (*e.g.,* Phalanx (Close-in Weapons System), Rolling Airframe Missile, and Evolved Sea Sparrow Missile). These events are limited in scope and generally focus on one or two tasks. Missiles may be fired against subsonic, supersonic, and hypersonic targets. Certain training events designed for single ships are conducted to utilize unique targets only available for training in the PMSR Study Area.

Aviation warfare training conducted in the PMSR Study Area, categorized as unit-level training, is designed for a small number of aircraft up to a squadron of aircraft. These training events occur within the PMSR Study Area, as it is the only West Coast Navy venue to provide powered air-to-air targets. They are limited in scope and generally focus on one or two tasks. These scenarios require planning and coordination to ensure safe and effective training.

Combat Systems Testing

The System Command Program Executive Offices are tasked with conducting extensive combat systems tests and trials on each new platform prior to releasing the platform to the Fleet, to include ships that have been in an extended upgrade or overhaul status. The PMSR Study Area is the preferred site to conduct these tests, as it offers a venue for a thorough evaluation of combat and weapons system performance through the actual employment of weapon systems. The comprehensive tests are conducted by the responsible Test or Program Manager, with close cooperation from the Fleet Type Commanders (Surface Force, Air Force, or Submarine Force). Frequent tests conducted in the PMSR Study Area are Combat Systems Ship Qualification Trials (CSSQTs). This is a series of comprehensive tests and trials designed to show that the equipment and systems included in the CSSQT program meet combat system requirements. Live and inert weapons, along with chaff, flares, jammers, and lasers may be used. Naval Sea Systems Command has recently developed two new reporting programs to test and evaluate combat and weapons system performance on new classes of ships, resulting in an increased tempo in the PMSR Study Area.

Explosives At-Surface or Near the Surface

Missiles, bombs, and projectiles that detonate at or near (within 10 m (11 yd) of) the water's surface are considered for the potential that they could result in an acoustic impact to marine mammals that may be underwater and nearby. The maximum number of explosives and the appropriate events modeling bin for the planned activities are provided in Table 2. Table 2 describes the maximum number of explosives that could be used in any year under the planned training and testing activities. Under the planned activities, bin use could vary annually (but will not exceed the maximum), and the 7-year totals for the planned training and testing activities take into account that annual variability.

TABLE 2—EXPLOSIVES DETONATING AT OR NEAR THE SURFACE BY BINS ANNUALLY AND FOR A 7-YEAR PERIOD FOR TRAINING AND TESTING ACTIVITIES WITHIN THE PMSR STUDY AREA

[Inclusive of SNI launches]

Primary mission area activity scenarios	Explosive bin	Munition Type	Maximum number of high explosive munitions used annually	Maximum number of high explosives used over a 7-year period planned activity
Surface-Surface	E1	Gunnery	22,110	154,770
	E3	Gunnery	4,909	34,363
	E5	Gunnery	1,666	11,662
Air-Surface	E5	Rockets	24	168
Air-Surface; Surface-Air	E6	Missiles	72	504
Air-Surface	E7	Missiles, Bombs	45	315
Air-Surface; Surface-Air	E8	Missiles	45	315
Air-Surface; Surface-Surface	E9	Missiles, Bombs, Rockets	58	406
Surface-Surface; Subsurface-Surface	E10	Missiles	13	91

Note: Bins E1–E5 are gunnery events that involve guns with high rates of firing ''clusters'' of munitions (*e.g.,* >80–200 rounds per minute for Bin E1, 500–650 rounds per minute for Bin E3, and 16–20 rounds per minutes for Bin E5), hence the high number of HE munitions used during these activities. The numbers above do not reflect the actual number of events, which can vary and typically last 1–3 hrs. The increase in tempo under the planned action is a result of an increase in Combat Systems Ship Qualification Trials as discussed in Section 2.2.1 (Current and Proposed Activities) of the 2021 PMSR FSEIS/OEIS.

Explosions that occur during air warfare will typically be at a sufficient altitude that a large portion of the sound refracts upward due to cooling temperatures with increased altitude. Based on an understanding of the explosive energy released by detonations in air, detonations occurring in air at altitudes greater than 10 m (11 yd) are not likely to result in acoustic impacts to marine mammals and thus are not carried forward in the analysis.

Missile Launch Activities on SNI

A combination of missiles and targets are launched from SNI, including aerial targets, surface-to-surface missiles, and surface-to-air missiles, with aerial targets representing the majority of the launches from SNI. For information on the sound levels these missiles produce please refer to Section 1.2 of the application. Under this rule, missiles launched from SNI will have sound source levels the same or lower than missiles described above or previously launched from the island.

Table 3 shows the number of launches that have occurred at SNI since 2001 and the number of launch events that have occurred during the associated comprehensive reporting timeframes. There have not been more than 25 launch events conducted in any given year since 2001. However, as part of the planned activities, 40 launch events per year from SNI involving various missiles and aerial targets are requested for take authorization.

TABLE 3—THE TOTAL NUMBER OF LAUNCHES THAT HAVE OCCURRED SINCE 2001 AT SNI

Time period	Number of launches
August 2001 to March 2008	77
June 2009 to June 2014	36
June 2014 to June 2019	27

Vessel Movement

The number and type of scheduled Navy vessels or Navy support vessels operating within the PMSR Study Area depends on the requirements for mission-essential activities, such as the test and evaluation of new weapon systems or qualification trials for upgraded existing ships. The types of Navy vessels or Navy support vessels operating within the PMSR are highly variable and range from small work boats used for nearshore work to major Navy combatants, up to and including aircraft carriers. Navy activities are conducted in large subdivisions of the total PMSR Study Area, and blocks of range times are allocated based on activity requirements. Most activities include either one or two vessels and may last from a few hours to 2 weeks. Vessel movement as part of the planned activities will be widely dispersed throughout the PMSR Study Area.

The PMSR Study Area military vessel activity can be divided into two categories: project ships and support boats. Project ships are larger Navy combatant vessels, such as destroyers, cruisers, or any other commissioned Navy or foreign military ship directly involved in events. They may operate anywhere within the PMSR Study Area depending on activity needs, although most ship operations occur within 60 nmi (111 km) of SNI. Most project ships and scheduled training ships operating in the PMSR Study Area transit there from off-range (*e.g.,* San Diego). Support boats are smaller vessels directly involved in test activities and operate from the Port Hueneme Harbor. While they may also operate throughout the PMSR Study Area, support boat operations occur mainly within the range areas receiving the most use. Smaller support boats have limited range and usually operate close to shore near Point Mugu and SNI. The activity level of ships or boats is characterized by a ship or boat event.

The Navy tabulated annual at-sea vessel steaming days for training and testing activities projected for the PMSR Study Area. Approximately 333 annual events of Navy at-sea vessel usage will occur over 2,085 hours (approximately 87 at-sea days) in the PMSR Study Area (Table 4). In comparison to the Southern California portion (SOCAL) of the Hawaii-Southern California Training and Testing (HSTT) Study Area, the estimated number of annual at-sea days in the PMSR Study Area is less than 3 percent of what occurs in SOCAL annually.

TABLE 4—ANNUAL AT-SEA VESSEL STEAMING DAYS FOR TRAINING AND TESTING ACTIVITIES PROJECTED FOR THE PMSR STUDY AREA

Vessel	Ship type	Planned activity	
		Events	Hours
CG	Guided Missile Cruiser	41	275
DDG–51	Guided Missile Destroyer	36	132
LHA	Amphibious Assault Ship	40	200
SDTS	Self-Defense Test Ship	50	190
WMSL–751/OPC	Coast Guard Cutter	6	28
LCS Variant (LCS 1)	Littoral Combat Ship	40	360
LCS Variant (LCS 2)		40	360
FF	Future Frigate	40	360
DDG 1000 Zumwalt Class	Guided Missile Destroyer	3	30
LHD	Amphibious Assault Ship	4	13
LPD	Amphibious Transport Deck	4	13
LSD	Dock Landing Ship	4	13
CVN	Nuclear-Powered Aircraft Carrier	6	16
SSBN	Ballistic Missile Submarine	19	95
Total		333	2,085

Standard Operating Procedures

For training and testing to be effective, personnel must be able to safely use their sensors and weapon systems as they are intended to be used in military missions and combat operations and to their optimum capabilities. Because standard operating procedures are essential to safety and mission success, the Navy considers them to be part of the planned Specified Activities, and has included them in the environmental analysis (see Chapter 3 (Affected Environment and Environmental Consequences) of the 2021 PMSR FSEIS/OEIS for further details). Additional details on standard operating procedures were provided in our **Federal Register** notice of proposed rulemaking (86 FR 37790; July 16, 2021); please see that notice of proposed rulemaking or the Navy's application for more information.

Comments and Responses

We published the proposed rule in the **Federal Register** on June 16, 2021 (86 FR 37790), with a 45-day comment period. With that proposed rule, we requested public input on our analyses, our preliminary findings, and the proposed regulations, and requested that interested persons submit relevant information and comments. During the 45-day comment period, we received four comment submissions: one from the Marine Mammal Commission (Commission); one from a non-governmental organization, the Natural Resources Defense Council (NRDC); and two from private citizens. The private citizens' comments, one of which expressed general disapproval of the action, and the other of which was unrelated to this action, have been reviewed, but did not include information pertinent to NMFS' decision in this final rule, and therefore, are not addressed further.

NMFS has reviewed and considered all public comments received on the proposed rule and issuance of the LOA. All substantive comments and our responses are described below. We organize our comment responses by major categories.

Density Estimates

Pinniped Density Estimates

Comment 1: The Commission commented that the following pinniped information was omitted in Navy documents for the PMSR Study Area, but has been previously included in other Navy environmental compliance documents as well as versions of the Navy Marine Species Density Database (NMSDD).

- Abundance(s), percentages of occurrence in the area and whether those percentages were dependent on age and sex, and percentages within the three stipulated geographic distances from shore for California sea lions. Only fall and winter densities were parsed by the three geographic distances, spring and summer were parsed by two distances (*e.g.,* see Figures 7–40 to 7–43 in Navy 2020 technical report, ''Quantifying Acoustic Impacts on Marine Species: Methods and Analytical Approach for Activities at the Point Mugu Sea Range'') (hereinafter referred as the ''PMSR Density Technical Report'').
- Abundance(s), percentages of the population at sea, and percentages within the two depth regimes for Guadalupe fur seals.
- Abundance and whether haulout correction factors or percentages of the population at-sea were incorporated for harbor seals, as was done for other locations (*e.g.,* Navy 2019 technical report, ''U.S. Navy Marine Species Density Database Phase III for the Northwest Training and Testing Study Area'').

Response: The Navy's application indicated in Section 6.5.2.1.4 (Marine Mammal Density) that to characterize the marine species density for large areas such as the PMSR Study Area, the Navy compiled data from several sources and the PMSR densities were in most cases consistent with the densities in the Hawaii-Southern California Training and Testing (HSTT) or Northwest Training and Testing (NWTT) Study Areas. The Navy developed a protocol to select the best available data sources for each species, distribution area, and time of year (season). The resulting Geographic Information System database, the NMSDD, includes seasonal density values for every marine mammal species present within the PMSR Study Area (U.S. Department of the Navy, 2017d, 2019a). The Navy applied these densities to the PMSR Study Area and relied on detailed explanations presented previously in the technical reports, ''Navy Marine Species Density Database Phase III for the Hawaii-Southern California Training and Testing Study Area (2017)'' (hereinafter ''HSTT Density Technical Report'') and the ''U.S. Navy Marine Species Density Database Phase III for the Northwest Training and Testing Study Area'' (hereinafter ''NWTT Density Technical Report'').

The Navy has provided additional details on the density derivations in this final rule in this *Comments and Responses* section to address the Commission's comments. It is important to note that the Navy is continuously updating species densities in the NMSDD based on new survey data, updated species distribution models, telemetry data, and, in the case of pinnipeds, new information on post breeding and molting distributions and haulout behavior. The availability of updated density estimates for use in the NMSDD may not coincide with the Navy's schedule for acoustic impacts modeling, which runs simultaneously for numerous projects, and can lead to differences in densities used based on timing of different projects.

California sea lions—The densities used for the PMSR Study Area were taken from the latest density derivations presented in the NWTT Density Technical Report. The California sea lion densities in the NWTT Study Area were based on in-water abundance estimates by Lowry and Forney (2005) off the California coast. The Navy only needs in-water densities to complete acoustic effects modeling, so these data were of particular interest and relevancy. Because the abundance estimates were for sea lions occurring in the water (as opposed to at haulouts), the Navy did not need to derive an in-water abundance for the density calculation, and the other factors, such as age- and sex- specific haulout correction factors that are typically applied, were not needed. The Navy used the in-water abundance provided by Lowry and Forney (2005) to derive an in-water density. Figures 7–40 through 7–43 in the Navy 2020 PMSR Density Technical Report depicted densities for California sea lions in the PMSR Study Area used three strata defined by distance from shore (0 to 40 km (0 to 22 nmi), 40 to 70 km (22 to 38 nmi), and 0 to 450 km (0 to 243 nmi)). The third stratum was included as an attempt to account for a wider distribution of sea lions documented during El Niño conditions. For the two figures appearing to have only 2 strata (Figures 7–40 and 7–43), the density ranges shown in the legends span two of the three uniform density estimates, making it appear as if there are only two strata. In Figure 7–40 of the Navy's 2020 PMSR Density Technical Report, the two strata, 40 to 70 km (22 to 38 nmi) and 0 to 450 km (0 to 243 nmi), had densities that fall within the range 0.0037–0.0065 sea lions/km^2 and therefore used one color. A similar overlap in densities occurs in Figure 7–43, except that in this figure the first two strata (0 to 40 km (0 to 22 nmi) and 40 to 70 km (22 to 38 nmi)) represent densities in the same density range shown in the legend and therefore are the same color on the map.

The following description of the density derivation for California sea lions is taken from the NWTT Study Area Technical Report (Navy 2020).

> Seasonal at-sea abundance is estimated from strip transect survey data collected offshore along the California coastline (Lowry and Forney, 2005). The survey area was divided into 7 strata, labeled A through G. Abundance estimates from the two northernmost strata (A and B, note this refers to a different area/set of strata than are addressed in the paragraph above) were used to estimate the abundance of California sea lions occurring in the [NWTT] Study Area. While the northernmost stratum (A) only partially overlaps with the [NWTT] Study Area, this approach conservatively assumes that all sea lions from the two strata would continue north into the Study Area . . . The abundance estimates used in this report, based on Lowry and Forney (2005), were: 2,822 sea lions in fall, 3,977 in spring, and 3,288 in winter. An estimate of 3,000 male sea lions is used for the month of August. Projected 2017 seasonal abundance estimates were derived by applying an annual growth rate of 5.4 percent (Carretta *et al.* 2017) between 1999 and 2017 to the abundance estimates from Lowry and Forney (2005). No correction for hauled-out sea lions was needed because counts were of sea lions in the water (Lowry and Forney, 2005).
>
> The strata used to calculate densities were based on distribution data from Wright *et al.* (2010) and Lowry and Forney (2005) indicating that approximately 90 percent of California sea lions occurred within 40 km (22 nmi) of shore and 100 percent of sea lions were within 70 km (38 nmi) of shore. The offshore distribution is consistent with survey data reported by Oleson *et al.* (2009) and migration patterns observed by Gearin *et al.* (2017), which showed that males remained within the 1,000 m (1,094 yd) isobath as they migrated between Puget Sound and the Channel Islands. Sea lions tagged in Puget Sound and tracked as they traveled along the U.S. West Coast were within a mean distance of 14 nmi (26 km) from shore (DeLong *et al.* 2017). A third stratum was added that extends from shore to 450 km (243 nmi) offshore to account for anomalous conditions, such as changes in sea surface temperature and upwelling associated with El Niño, during which California sea lions have been encountered farther from shore, presumable seeking prey (DeLong and Jeffries, 2017; Weise *et al.* 2010). Sample density calculations are provided below.
>
> Fall Density = (7,273 sea lions × 0.90)/11,744 km^2 = 0.5573 sea lions/km^2 (0 to 40 km Stratum)
>
> Spring Density = (10,249 sea lions × 0.10)/791 km^2 = 1.2951 sea lions/km^2 (40 to 70 km Stratum)
>
> Winter Density = (8,473 sea lions × 1.00)/143,518 km^2 = 0.0590 sea lions/km^2 (0 to 450 km Stratum)
>
> August Density = 3,000 sea lions/93,747 km^2 = 0.0288 sea lions/km^2 (0 to 40 km Stratum)

Densities in the NWTT Density Technical Report were the most recently calculated densities for California sea lion and were used instead of densities calculated for the HSTT Density Technical Report (U.S. Department of the Navy, 2017).

Guadalupe fur seals—A more detailed description of the density derivation for Guadalupe fur seal was missing from the PMSR Density Technical Report, but is provided here. Densities for Guadalupe fur seals were derived for both the HSTT Study Area and later for the NWTT Study Area. However, following completion of acoustic impact modeling for the HSTT EIS/OEIS, new data became available on the abundance and distribution of Guadalupe fur seals in southern California. These data showed that the fur seals were distributed farther offshore than presented in the HSTT Density Technical Report. Densities for Guadalupe fur seal off California were revised for use in subsequent projects, including the 2022 PMSR EIS/OEIS, as noted in a footnote in the HSTT Density Technical Report. A description of the derivation of the updated densities for Guadalupe fur seal was prepared but was not appended to the HSTT Density Technical Report and was not otherwise available to the public. The same data prompting the revised densities for the HSTT Study Area were used in deriving densities for Guadalupe fur seals in the NWTT Study Area, and a detailed explanation of how the data were used in the NWTT Study Area is described in the NWTT Density Technical Report. However, it would not be possible to derive the revised HSTT densities, later applied to the PMSR Study Area, from information in the NWTT Density Technical Report. Therefore, a description of the revised HSTT density derivation for Guadalupe fur seal is provided below. These densities were used for the PMSR Study Area acoustic analysis and are shown in the PMSR Density Technical Report.

To determine the density of Guadalupe fur seals in the Southern California area, the entire population (33,485 fur seals) was divided by the area of the NMFS Southern California Stratum seaward of the 3,000 m (3,281 yd) isobath. The Southern California portion of the HSTT Study Area extends to just north of Isla Guadalupe, so a majority of the range of the Guadalupe fur seal overlaps with the offshore

portion of the SOCAL Range Complex. Guadalupe fur seals are expected to occur year-round in the Southern California portion of the HSTT Study Area, with abundance in the region varying seasonally and by life stage (Norris, 2017). In summer (June–August), adult males are expected to be hauled-out on Guadalupe Island south of the HSTT Study Area. Adult females would also be expected to be on or in the vicinity of Guadalupe Island in summer and south of the Study Area. Satellite-tagged juveniles and weaned pups (<2 years old) have been shown to migrate north after the breeding season through the Southern California portion of the HSTT Study Area and to areas north of the Study Area and remain there from June through November (*i.e.,* summer and fall) (Norris 2017).

Seasonal densities were calculated by estimating the percentage of the population occurring at sea in HSTT the Study Area for each season. For all life stages combined, approximately 73 percent of the population is expected to be in the HSTT Study Area in winter and spring (non-breeding season) and approximately 33 percent of the population is expected to be in the HSTT Study Area in summer and fall, encompassing the breeding season (Norris 2017). Spatially, two thirds of the Guadalupe fur seal population (66.7 percent) would be expected in the Baja stratum and one third (33.3 percent) would be expected in the SOCAL stratum during the year. Furthermore, while at sea, healthy Guadalupe fur seals are not expected to haul out. Sick or stranded fur seals may be sighted along the coast or on offshore islands during the non-breeding season, however, these cases are not representative of the population at sea. Therefore, no adjustment to account for hauled-out fur seals is needed.

Densities are calculated by estimating the number of fur seals in the two strata during winter/spring and summer/fall. The spatial area for the SOCAL stratum is approximately 66,058 km^2 (19,259 nmi^2) and the spatial area for the Baja stratum is approximately 152,889 km^2 (44,575 nmi^2).

SOCAL Offshore (>3,000 m (3,281 yd) isobath)

Winter/Spring: $(33{,}485 \times 0.73) \times 0.333/66{,}058\ km^2 = 0.1232$ fur seals/km^2

Summer/Fall: $(33{,}485 \times 0.33) \times 0.333/66{,}058\ km^2 = 0.0557$ fur seals/km^2

Extrapolating these densities into the PMSR likely overestimated occurrence in the PMSR Study Area, because Guadalupe fur seals are more prevalent farther south off southern California and Baja California, Mexico where breeding colonies are located.

Harbor seals—A density estimate for PMSR Study Area was extrapolated from the NWTT Study Area. As described below, an in-water abundance was calculated using published haulout correction factors and used to estimate an annual density. The following description from the NWTT Density Technical Report is provided.

> An estimate of 30,968 harbor seals make up the California stock (Carretta *et al.* 2017). As with the Washington and Oregon Coast stock, growth is assumed to be flat (Carretta *et al.* 2017; DeLong and Jeffries, 2017). Based on surveys in 2002 and 2004, Lowry *et al.* (2008) estimated that 37.8 percent of harbor seals in the California stock are in northern California, defined as the area from Point Reyes to the California/Oregon border (*i.e.,* the coastline from 38.00 N to 42.000° N). Harbor seals in northern California are expected to be in the water 36 percent of the time (Harvey and Goley, 2011), and a single stratum extending 30 km (16 nmi) from shore between 38.00 N to 42.000° N along the California coastline was used to define the spatial area.

Density = $(30{,}968 \times 0.378) \times 0.36/15{,}496\ km^2 = 0.2719$ seals/km^2

As shown in the PMSR Density Technical Report (Navy 2020), the Navy used an annual harbor seal density of 0.2719 areas within 50 miles around all known haulout sites within the PMSR Study Area. Zero density was used beyond 50 miles from shore.

Comment 2: The Commission also comments that the area metrics necessary to derive the density estimates were omitted by the Navy's 2020 PMSR Density Technical Report. Since the densities were exactly the same for elephant seals and northern fur seals in that report as had been used previously for the HSTT Study Area in the HSTT Density Technical Report (Navy 2017), the same presumed occurrence areas had to have been used. For northern fur seals, the area used was based on the NMFS SOCAL stratum for its vessel-based surveys (*i.e.,* Barlow 2010); while for elephant seals, the area was based on the Navy SOCAL modeling area (Department of the Navy 2017c). None of the underlying abundance data that were provided in the reports above are related to either of those areas. As such, it is unclear why the Navy felt it necessary to use two different areas, when neither of them relates to the abundance data. Both areas are similar in extent, with the Navy SOCAL modeling area being approximately 13 percent larger than the NMFS SOCAL stratum.

Response: As noted in the comment, the densities for northern fur seal and northern elephant seal used for the PMSR acoustic analysis were extrapolated from the HSTT Study Area, and the derivations of those densities were described in detail in the HSTT Density Technical Report. The northern fur seal density calculation used the NMFS SOCAL Bight stratum (318,541 km^2; 92,872 nmi^2) to represent fur seal distribution and the northern elephant seal density calculation used the Navy SOCAL modeling area stratum (361,872 km^2) to represent northern elephant seal distribution. While there is not a substantial difference between the sizes of the two areas (as pointed out in the comment), and both areas were used in the pinniped density estimates for these and other species, the smaller NMFS SOCAL Bight Stratum was used for the northern fur seal calculation, because most northern fur seals were expected to move north of San Miguel Island after the breeding season and would not be distributed over as wide an area as elephant seals off California. Northern elephant seals in the California stock also migrate north of the Channel Islands after breeding and molting periods, and elephant seals from the Mexico population are known to migrate into SOCAL from the south. Elephant seals would be distributed over a larger area off California and farther offshore, so the larger of the two strata, the Navy SOCAL Modeling Stratum, was used for elephant seals.

At the time that HSTT Phase III densities were calculated, the Navy sought to estimate densities in pre-defined strata to focus where densities were needed for modeling acoustic impacts. The practice was relevant to creating models of cetacean densities, which were based on repeated surveys of the California Current Ecosystem (CCE) and other well defined areas; however, published descriptions of pinniped abundances and distributions were based mainly on seals and sea lions at haulout sites with some complimentary telemetry data, and less often on line transect surveys at sea. Beginning with the NWTT EIS/OEIS, the Navy moved away from using pre-defined strata for pinnipeds and relied more on published data describing distributions based on depth, distance from shore, and other habitat preferences as well as telemetry data to define pinniped strata.

Comment 3: The Commission comments that for the other three pinniped species (harbor seal, California sea lion, and Guadalupe fur seal), some of the densities provided in the Navy 2020 PMSR Density Technical Report differ by orders of magnitude from those provided in the Navy's technical report, HSTT Density Technical Report (Navy

2017), even though some of the same data appear to have been used and are based on some of the same geographic areas. The Commission said that the Navy stated that, although the density estimates may not be accurate given interannual variability and fluctuations in population size or may not exactly reflect spatial distributions, they represent the best available science due to the paucity of other data and are considered to be the most conservative in the technical report Navy 2020 PMSR Density Technical Report. The Commission further claims it is unclear how such a statement can be evaluated when the underlying data were not provided for public review and comment. As such, the Commission recommends that, prior to issuing any final rule, NMFS provide information regarding the data and assumptions used to inform the pinniped density estimates and allow for additional public review and comment on that information.

Response: NMFS has provided additional detail regarding how the densities for PMSR were calculated and the underlying assumptions in the response to Comment 1. The Navy maintains the Navy Marine Species Density Database (NMSDD), which uses standard protocols to support spatially explicit density estimates for all of the Navy training and testing rules. The Navy develops NMSDD reports for all major training regions (*e.g.,* HSTT and NWTT) and the reports detail the standard methods used across all areas and specify the results for the given region/Study Area. The HSTT and NWTT NMSDD reports have been provided for public review and comment through the National Environmental Policy Act (NEPA) (draft EIS) and MMPA (proposed rule) compliance documentation associated with the Navy's NWTT and HSTT actions over the last few years. The Point Mugu proposed rule included an overview of the methods used for estimating density in the PMSR, and referenced the more detailed NMSDD report for HSTT, which NMFS considered sufficient to support the necessary determinations. As further described below, while the proposed rule referenced the HSTT NMSDD report in supporting the PMSR density estimates, in some cases the more up-to-date estimates from the NWTT NMSDD report were actually used to support the NMSDD estimate for PMSR. While this inadvertently omitted reference to the NWTT report created some confusion, the density estimates presented in the proposed rule were correct, the general methodology was available for public review, and our findings remain the same. Below we include additional information to address the Commission's comment regarding the densities differing by order of magnitude.

New densities were derived for the NWTT Study Area using an improved approach, and those densities were used for PMSR Study Area instead of the older HSTT densities that the Commission is making comparisons to. As the Commission points out, the new densities were in some cases orders of magnitude greater than the older HSTT densities. The increases were due to several factors. The main factors were (1) the calculation of more refined in-water abundance estimates using species-specific and seasonal haulout factors for example, and (2) smaller and more representative areas of occurrence over which the in-water abundance estimates were distributed to calculate the densities. Generally, smaller distribution areas translate to higher densities when the abundance estimates are about the same.

For example, for harbor seals, the highest HSTT density was 0.0183. The highest density for the NWTT Study Area, which was 0.2719, was the density used for the PMSR Study Area. The HSTT density was based on an abundance of 6,813 seals in southern California, approximately 22 percent of the population. The NWTT density assumed 37.8 percent of seals occurred in northern California for an abundance of 11,706 seals. So, one factor contributing to an increase in density is an increase in abundance. For the HSTT Study Area, we used the Southern California stratum to be consistent with strata used for cetacean densities, but, in retrospect, this was an overestimation (and oversimplification) of where harbor seals would most likely occur. For the NWTT Study Area, we used a distribution area along the coastline extending from shore to 30 km (16 nmi) offshore, which is considerably smaller than the Southern California stratum and a better representation of the typical distribution of harbor seals. Since harbor seals are more common farther north, off central and northern CA where approximately 88 percent of the population occurs, it was more appropriate to use the NWTT density instead of the HSTT density for PMSR Study Area.

For California sea lions, the highest HSTT density was 0.0596 (excluding San Diego Bay and Silver Strand). The highest density in NWTT was 1.49. Similar to the approach used in HSTT for harbor seals, the in-water abundance from Lowry and Forney (2005) was distributed over the expansive SOCAL Modeling Area to ensure a density was provided in all areas where modeling was needed. In contrast, for the NWTT Study Area, the distribution area was based more on California sea lion's preferred habitat, which was divided into three strata based on distance from shore, resulting in a more realistic range that better represented where the sea lions predominantly occur. This resulted in a smaller distribution area and a larger density. The details of these calculations are provided in the NWTT Density Technical Report.

For Guadalupe fur seal, the source data on abundance and distribution changed based on new research available after the HSTT densities were finalized, as explained in Comment 1. A comparison with the older HSTT densities published in the HSTT Density Technical Report is not relevant.

Comment 4: The Commission commented that it had previously provided extensive comments regarding the manner in and the data upon which the Navy had derived its pinniped density estimates, including for the densities that were used by the Navy for the HSTT Study Area, as provided in Navy (2017c; see the Commission's 13 July 2018 letter). The Commission comments that both NMFS and the Navy failed to recognize that the original abundance estimate that they had used of 18,430 elephant seals from Lowry (2002) was based on elephant seal counts from only Santa Barbara Island (SBI), San Clemente Island (SCI), and SNI (Navy 2017c). Navy (2017c) specified that large rookeries also occur on San Miguel Island (SMI) and Santa Rosa Island (SRI), but both islands are located at least 55 km (30 nmi) north of the HSTT Study Area and thus were not included. That may be appropriate for the HSTT Study Area, but SMI and SRI are both well within the PMSR Study Area. A total of 37,294 elephant seals were sighted at SBI, SNI, SMI, and SRI in 2001 (Lowry 2002), which is greater than the 36,646 seals that NMFS estimated would occur in the PMSR Study Area presently. If the relevant abundance estimates had been forward-projected using the applicable 3.8-percent growth rate into 2021, the California population estimate would be 81,618 elephant seals. Added to the Mexico population estimate, 112,618 seals would be expected to occur in the PMSR Study Area rather than the 36,646 seals used to inform the density estimate for the proposed rule. An underestimation by a factor of more than three is not considered

insignificant. Moreover, NMFS cannot deem one growth rate best available science for incidental taking purposes and another best available science for its Stock Assessment Reports (SARs), particularly since NMFS used the same overall stock abundance for both purposes (Tables 5, 31, and 32 in the proposed rule). At a minimum and until additional data are provided for the other pinniped species and additional assumptions are provided for elephant seals, the Commission recommends that NMFS (1) re-estimate the density for elephant seals based on (a) the 2001 abundance of 37,294 elephant seals from SBI, SNI, SMI, and SRI (Lowry 2002) forward-projected to 2021 using the 3.8-percent growth rate from Lowry *et al.* (2014) for the California population, and (b) at least 31,000 seals from Lowry *et al.* (2014) as representative of the Mexico population; and (2) then re-estimate the numbers of takes accordingly in the final rule.

Response: This Commission is correct that San Miguel Island (SMI) and Santa Rosa Island (SRI) are in PMSR Study Area and inhabited by elephant seals during molting and breeding periods. However, elephant seals travel north and west of the PMSR Study Area (post breeding/molting) as far as the Gulf of Alaska and the central North Pacific (*e.g.,* Robinson *et al.* 2012), and the density estimated for the PMSR Study Area assumed a large percentage of elephant seals remained in the PMSR Study Area year round. This conservative assumption overestimates the abundance in the PMSR year round and, while not ideal, essentially offsets the lack of abundance data from SMI and SRI that were left out of the density calculations for the PMSR Study Area. Furthermore, when breeding and molting in California, elephant seals are mainly hauled out or near haulout sites, with the exception of short foraging bouts by lactating females. Therefore, time in the water, particularly from shore, while in the PMSR Study Area is less than assumed in the density estimate, further reducing the probability of exposures.

A growth rate of 1.7 percent was applied to the abundance estimate for elephant seals in southern California, as described in the HSTT Density Technical Report. The growth rate was not used to predict future, unpredictable changes in species' abundance (*i.e.,* ''forward project''), but rather to estimate changes in abundance from the most recent survey date to the present time. That is, the Navy only brought the abundance from the date of the latest survey up to the time of the analysis by applying a published annual growth rate to some species' abundances. If an abundance was based on a 10 year old survey, then the Navy used the growth rate to calculate an estimated abundance for ''the present time.'' The reasoning for this approach is abundance for some species has been impacted by UMEs or El Nino events or higher recruitment years since the most recent surveys were conducted, and in some cases it may be reasonable to assume a growth rate accounts for those factors and can be used to estimate a present day abundance. The analysis is not attempting to forecast abundances or predict future changes due to UMEs or climate change, *etc.,* rather it is attempting to update an older abundance where appropriate, to better represent species' density at the time of analysis. The MMC commented that different growth rates were used in the calculation of elephant seal abundance. The discussion in the HSTT Density Technical Report (Section 11.1.3) reviews two approaches to estimating the abundance: (1) using island-specific abundances from the three islands (SBI, SNI, and SCI) from Lowry (2002) and a 1.7 percent growth rate, and (2) using the 2010 pup count and a multiplier from Lowry *et al.* (2014) and a 1.1 percent growth rate. The 1.1 percent growth rate is the average growth rate of populations on the three islands (SBI, SNI, and SCI) (Lowry *et al.* 2014). The growth rate of 3.8 percent reported in the 2014 SAR (Carretta *et al.* 2015) is for the entire population. Given their migratory behavior, which differs by sex and lifestage, it is not realistic to assume that 112,618 elephant seals would be in the PMSR Study Area at any time. While not relevant to the PMSR density, the Navy notes that in the most recent version of the SAR (Carretta *et al.* 2021) NMFS has revised the annual growth rate for the population down to 3.1 percent, further illustrating the variability and level of imprecision in estimating abundances and densities, particularly when attempting to project changes. The MMC recommended estimating the Mexico population of elephant seals at 31,000 seals. The Navy also considers this to be an overestimation based on studies by Elorriaga-Verplancken *et al.* (2015) and Garcia-Aguilar *et al.* (2018) indicating the population is in decline. Garcia-Aguilar *et al.* (2018) cite a 2009 abundance of 22,000 seals. Applying the −3.2 percent annual growth rate from Elorriaga-Verplancken *et al.* (2015) to the 2009 population estimate reduces that population to approximately 18,000 seals in 2015 (time of analysis). Most of the seals would only transit through the HSTT Study Area, limiting their time in the HSTT Study Area and potential for exposure to acoustic stressors, as explained in the HSTT Density Technical Report. Based on these factors, an abundance estimate of 15,083 seals occurring in the HSTT Study Area is a reasonable and conservative estimate.

NMFS has reviewed the additional information provided by the Navy, and agrees that the information has been applied appropriately to develop density and population numbers.

Comment 5: The Commission states that pinniped densities must be refined for the Navy's Phase IV compliance documents. The Commission recommends that NMFS consult with the Navy and experts in academia and at its own Science Centers to develop more refined pinniped density estimates that account for pinniped movements, distribution, at-sea correction factors, and density gradients associated with proximity to haulout sites or rookeries.

Response: For future Navy Phase IV compliance documents (*e.g.,* EISs), the Navy explained that it did and will continue to consult with authors of the papers relevant to the analyses as well as other experts in academia and at the NMFS Science Centers during the development of the Navy's analyses. During the development of the HSTT and NWTT Density Technical Reports, which supplied densities for the PMSR analysis, the Navy had ongoing communications with various subject matter experts and specifically discussed pinniped movements, the distribution of populations within the study areas to support the analyses, the pinniped haulout or at-sea correction factors, and the appropriateness of density gradients associated with proximity to haulout sites or rookeries. As shown in the references cited, the personal communications with researchers have been made part of the public record, although many other informal discussions with colleagues have also assisted in the Navy's approach to the analyses presented. Moving forward in Phase IV, the Navy has continued to engage with pinniped experts to improve the representation of species' occurrence and distribution by calculating monthly densities as appropriate for each species and basing distribution areas on habitat preferences and region specific haul out behavior. Revised and updated densities for the California coast will also apply to the PMSR Study Area which is being reanalyzed as part of the new Hawaii-California Study Area (HCTT) EIS/OEIS project.

Cetacean Density Estimates

Comment 6: The Commission comments that similar to the pinniped densities, the Navy did not specify the underlying data and assumptions used to estimate most of its cetacean density estimates for the PMSR NMSDD in the technical report, ''Quantifying Acoustic Impacts on Marine Species: Methods and Analytical Approach for Activities at the Point Mugu Sea Range'' (Navy 2020). The lack of transparency does not afford either the Commission or the public an opportunity to provide informed comments. Further, many of the densities in the same geographic areas differ by an order of magnitude or more from those provided in the technical report, ''U.S. Navy Marine Species Density Database Phase III for the Hawaii-Southern California Training and Testing Study Area Navy'' (Navy 2017) and/or Becker *et al.* (2020), which included updated models of some of the densities that were provided in ''U.S. Navy Marine Species Density Database Phase III for the Hawaii-Southern California Training and Testing Study Area Navy'' (Navy 2017). The Commission understands that densities provided by Becker *et al.* (2020) are considered best available science, and it is unclear why those were not used for the PMSR Study Area. Therefore, the Commission recommends that, prior to issuing any final rule, NMFS provide information regarding the data and assumptions used to inform the cetacean density estimates, allow for additional public review and comment on that information, and, if Becker *et al.* (2020) was not used to inform those estimates, explain why.

Response: At the time that the Navy's acoustic modeling and analysis was conducted Becket *et al.* 2020 was not available. The Navy did consult with E. Becker to ensure consistency with the information in the paper that was published in 2020.

For the HSTT Phase III analysis, the HSTT Density Technical Report (cited as Navy 2017c in the MMC comment above), density estimates from Becker *et al.* (2016; ''Moving Towards Dynamic Ocean Management: How Well Do Modeled Ocean Products Predict Species Distributions?'', Remote Sensing, 8, 149) were used; these estimates were based on distribution models (SDMs) developed from line-transect survey data collected within the Southwest Fisheries Science Center (SWFSC) CCE study area from 1991–2009. Subsequently, for the NWTT Phase III analysis, the NWTT Density Technical Report (Navy 2019), updated density estimates were available, and these were based on line-transect survey data collected within the CCE study area during summer and fall from 1991–2014. Since the updated models included the 2014 anomalously warm year, a greater range of habitat conditions was available to parameterize the SDMs, and they were developed using improved modeling methods. Multi-year (1991–2014) average density surfaces from these SDMs were developed for 13 cetacean species and one small beaked whale guild (the guild includes Cuvier's beaked whale and species from the genus *Mesoplodon*), and were provided to the Navy for the NWTT Phase III analysis. A subset of these models was subsequently published in 2020 (Becker *et al.* 2020, ''Performance evaluation of cetacean species distribution models developed using generalized additive models and boosted regression trees'', Ecology and Evolution, 10, 5759–5784). Density estimates from both these sources were available at the time the Navy was identifying data to use for the PMSR analysis.

The Commission references the most recent SDMs built with 1991–2018 data, as presented in Becker *et al.* (2020; ''Habitat-based density estimates for cetaceans in the California Current Ecosystem based on 1991–2018 survey data'', U.S. Department of Commerce, NOAA Technical Memorandum NMFS–SWFSC–638), hereafter ''Becker *et al.* 2020 TM'' to differentiate from the 2020 Ecology and Evolution manuscript mentioned above. The SDMs presented in the Becker *et al.* 2020 TM represent an improvement over the previous models because they included additional sighting data collected over the continental shelf and slope that were surveyed more sparsely in previous years, they better accounted for population changes in the CCE study area over the 1991–2018 survey period, and they more accurately accounted for uncertainty than prior iterations owing to methodological improvements. In addition, to ensure that the multi-year average density surfaces reflect more recent conditions and were based on those survey years that more comprehensively covered the study area, predictions for 1991, 1993, and 2009 were not included in the multi-year average. The multi-year average density surfaces derived from these models are thus based on predictions for summer/fall 1996–2018. Furthermore, for two species with documented population increases in the study area (*i.e.,* fin whale and humpback whale), the year covariate was set to 2018 to decrease the potential for biased-low density estimates derived from the multi-year average surfaces. Density estimates from the Becker *et al.* 2020 TM SDMs were not available at the time the Navy was identifying the best estimates to use for the PMSR analysis. As noted above, this manuscript was subsequently published in Ecology and Evolution in 2020, and was based on SDMs developed with the 1991–2014 SWFSC survey data.

Regarding the Commission's comment that ''many of the densities in the same geographic areas differ by an order of magnitude or more from those provided in Department of the Navy (2017c) and/or Becker *et al.* (2020)''—it is difficult to respond to this comment without more information on which species estimates the Commission is referring to. Also, since the estimates from Becker *et al.* models are spatially-explicit, it is unclear if the Commission is comparing specific pixel values, or looking at the highest density ranges on the PMSR maps and comparing them to the density plots included in the Becker *et al.* 2020 TM, in which case the difference in the highest density range can be due to just a few high pixel values and/or the density ranges selected for presentation purposes. Comparisons are also challenging since the Becker *et al.* TM presents density surfaces for the entire CCE study area while the PMSR density plots are specific to that study area, and thus appear more pixelated given the finer spatial resolution. To help address this comment, the density estimates provided in the PMSR Density Technical Report were compared to those presented in the Becker *et al.* 2020 TM. The latter presents density estimates for 14 cetacean species and the small beaked whale guild for summer/fall. The comparison was thus based on these species and seasons. For their 5–7 year environmental planning analysis, the Navy incorporates the multi-year average density plots into the Navy Marine Species Density Database (NMSDD) and uses these for their acoustic analyses. Therefore, the comparison was based on these density surfaces (vs. yearly plots), although the yearly predictions for the three large whale species were also compared to see if any substantial differences were apparent.

Below is a brief summary that compares the density values and distribution patterns presented in the PMSR Density Technical Report with those presented in the Becker *et al.* 2020 TM. Note that all density values are presented in number of animals per square km (anis/km^2), or as abundance

estimates (number of whales/dolphins occurring in a defined study area).

Blue whale. The data source is cited as ''Becker *et al.* in prep.'' so the density estimates used for the PMSR analysis were the multi-year average predictions from the SDMs built with 1991–2014 survey data, while the multi-year average density surfaces presented in Becker *et al.* (2020 TM) were based on predictions from 1996–2018. The blue whale density plot presented in the PMSR Study Area has the highest density value (0.0091) as compared to the density plot included in the Becker *et al.* 2020 TM with the highest value (0.0117), and predicted distribution patterns from the two models within the PMSR Study Area are similar. Although not presented in the 2020 Ecology and Evolution paper, Table 5 compares the yearly CCE study area abundance estimates derived from the SDMs built with 1991–2014 data (left) with those presented in Becker *et al.* (2020 TM) built with 1991–2018 data on the right, and provides the 95 percent confidence intervals (presented for overlapping years). As shown below, all of the abundance estimates derived from the model used for the PMSR analysis fall within the confidence limits of the SDMs presented in Becker *et al.* (2020 TM).

TABLE 5—BLUE WHALE SDM AND BECKER *et al.* (2020) ABUNDANCE ESTIMATES

Year	Abundance (1991–2014 SDMs)	Abundance (Becker *et al.* 2020 TM)	Log-normal 95 percent Cis (Becker *et al.* 2020 TM)	
1996	1,901	1,946	945	4,009
2001	1,720	1,657	868	3,162
2005	1,201	1,042	542	2,004
2008	1,081	919	445	1,899
2014	1,574	1,077	495	2,342

As noted above, the Navy used the multi-year averages in their analyses, so the data used in the PMSR analysis reflect the 1991–2014 average, while the Becker *et al.* (2020 TM) data reflect the 1996–2018 average. For blue whale, the CCE study area point estimate for 2018 was the lowest yet (670 whales), resulting in a slightly lower point estimate for the 1996–2018 multi-year average density surface (1,219 whales) than the 1991–2014 average density surface (1,572 whales); density estimates within the PMSR are similar for both sets of predictions. NMFS concurs with this analysis and confirms it does not change our analysis or findings for blue whales.

Fin whale. A source was not provided in the PMSR document for the density data used for fin whale but based on the density figure in the PMSR Density Technical Report, it was the multi-year average density surface from the SDM built with 1991–2014 data (*i.e.,* the model presented in the Becker *et al.* 2020 Ecology and Evolution paper). The fin whale density plot for the PMSR Study Area had the highest density value (0.0310) as compared to the density plot included in the Becker *et al.* 2020 TM with the highest density value (0.0821). Predicted distribution patterns from the two models within the PMSR Study Area are similar. Although not presented in the 2020 Ecology and Evolution paper, Table 6 compares the CCE study area abundance estimates derived from the SDMs built with 1991–2014 data (left), with those presented in Becker *et al.* (2020 TM) on the right. The estimates are so similar that the 95 percent confidence intervals are not presented below, but they are presented in Becker *et al.* (2020 TM). Therefore, yearly predictions from the two models are similar for those years that overlap.

TABLE 6—FIN WHALE SDM AND BECKER *et al.* (2020) ABUNDANCE ESTIMATES

Year	Abundance (1991–2014 SDMs)	Abundance (Becker *et al.* 2020 TM)
1996	3,358	3,804
2001	5,753	5,733
2005	7,533	7,319
2008	7,668	7,606
2014	10,504	10,139

As noted above, the Navy used the multi-year averages in their analysis, so the data used in the PMSR analysis reflect the 1991–2014 average while the Becker *et al.* (2020 TM) data reflect the 1996–2018 average. For fin whale, this created a notable increase in the latter since the point estimate for 2018 was the highest yet (11,065 whales), and, given documented population increases in the study area, the year covariate was set to 2018 to decrease the potential for biased-low density estimates derived from the multi-year average surfaces. Therefore, the fin whale density surface used in the PMSR analysis is likely biased-low to some extent, but as noted above, the updated Becker *et al.* (2020 TM) estimates were not available at the time the Navy was identifying density data for the PMSR analysis. NMFS concurs with this analysis and confirms it does not change our analysis or findings for fin whales.

Humpback whale. A source was not provided in the PMSR document for the density data used for humpback whale, but, based on the density figure, it was the multi-year average density surface from the SDM built with 1991–2014 data (*i.e.,* the model presented in the Becker *et al.* 2020 Ecology and Evolution paper). The humpback whale density plot presented in Hulton *et al.* (2020) for the PMSR study area had the highest density value (0.0479) as compared to the density plot included in the Becker *et al.* 2020 TM with the highest density value (0.194), so this is a case where the highest values do differ by an order of magnitude, although highest densities mainly occur north of

Point Conception and outside the PMSR Study Area. Although not presented in the 2020 Ecology and Evolution paper, Table 7 compares the CCE study area abundance estimates derived from the SDMs built with 1991–2014 data (left) with those presented in Becker *et al.* (2020 TM) on the right. The estimates are so similar that the 95 percent confidence intervals are not presented below, but they are presented in Becker *et al.* (2020 TM).

TABLE 7—HUMPBACK WHALE SDM AND BECKER *et al.* (2020) ABUNDANCE ESTIMATES

Year	Abundance (1991–2014 SDMs)	Abundance (Becker *et al.* 2020 TM)
1996	1,267	1,181
2001	1,361	1,364
2005	1,454	1,575
2008	1,638	1,727
2014	3,162	2,178

As noted above for fin whale, exclusion of the early years (1991 and 1993) and accounting for the documented increase in humpback whale abundance in the study area over the survey period when deriving the multi-year average density surfaces resulted in higher densities for the more recent 1996–2018 multi-year average. Also, the point estimate for 2018 was the highest yet (4,784 whales). Therefore, the humpback whale density surface used in the PMSR analysis is likely biased-low to some extent, but, as noted above, the updated Becker *et al.* (2020 TM) estimates were not available at the time the Navy was identifying density data for the PMSR analysis. NMFS concurs with this analysis and confirms it does not change our analysis or findings for humpback whales.

Minke whale. Since the new minke whale SDM developed in Becker *et al.* (2020 TM) was not available at the time the Navy was identifying density data for the PMSR Study Area, the Navy used a uniform density estimate of 0.000737. (The estimate came from Barlow 2016, Table 7, and is an average of the Southern and Central CA strata estimates.)

Baird's beaked whale. The HSTT Density Technical Report (Navy 2017) was erroneously cited as the source of the Baird's beaked whale density surface in the PMSR Density Technical Report, when in fact, the plot is consistent with the multi-year average density plot developed using 1991–2014 survey data as described in Becker *et al.* 2020 (the 2020 Ecology and Evolution paper). Predicted distribution patterns from this and the Becker *et al.* (2020 TM) SDM for Baird's beaked whale are very similar, and although the highest density value on the PMSR plot is 0.0072 and on the Becker *et al.* (2020 TM) plot it is 0.0932, the top density RANGES overlap (*i.e.,* 0.0048–0.0072 vs. 0.0032–0.0932, respectively); this is a case where there were a few high pixel values in northern waters of the CCE study area and outside the PMSR Study Area, thus increasing the highest value of the density range in the Becker *et al.* 2020 TM plot. Density values within the PMSR Study Area are similar. NMFS concurs with this analysis and confirms it does not change our analysis or findings for Baird's beaked whales.

Small beaked whale guild (Cuvier's beaked whale and species in the genus Mesoplodon). The HSTT Density Technical Report (Navy 2017) was erroneously cited as the source of the density surface for the small beaked whale guild in the PMSR Density Technical Report, but the plot is consistent with the multi-year average density plot developed using 1991–2014 survey data as described in Becker *et al.* 2020 (the 2020 Ecology and Evolution paper). Higher density values are included in the 1991–2014 average density surface used for the PMSR analysis as compared to the Becker *et al.* (2020 TM) average density surface, and the distribution pattern in the former better matches the SWFSC sighting data. As noted in Becker *et al.* (2020 TM), the small beaked whale guild SDM had some of the worst model metrics among all species and predicted distribution patterns matched poorly to actual sightings during the surveys, so the density data used for the PMSR Study Area analysis are more appropriate than the more recent model for this group of species. NMFS concurs with this analysis and confirms it does not change our analysis or findings for the small beaked whale guild.

Bottlenose dolphin (offshore stock). Becker *et al.* (2016) was erroneously cited as the source of the density surface for the offshore stock of common bottlenose dolphin in the PMSR Density Technical Report, but the plot is consistent with the multi-year average density plot developed using 1991–2014 survey data as described in Becker *et al.* 2020 (the 2020 Ecology and Evolution paper). Predicted distribution patterns from this and the Becker *et al.* (2020 TM) SDM for common bottlenose dolphin are very similar, and although the highest density value on the PMSR plot is 0.2282 and on the Becker *et al.* (2020 TM) plot it is 1.55, the top density RANGES overlap (*i.e.,* 0.1295–0.2282 vs. 0.0085–1.55, respectively); similar to Baird's beaked whale, this is a case where there were a few high pixel values (in this case in the extreme SW corner of the CCE study area and outside the PMSR Study Area), which served to increase the highest value of the density range presented in the Becker *et al.* 2020 TM plot. Density values within the PMSR Study Area are similar for this species. NMFS concurs with this analysis and confirms it does not change our analysis or findings.

Dall's porpoise. Becker *et al.* (2016) was erroneously cited as the source of the density surface for the Dall's porpoise in the PMSR Density Technical Report, but the plot is consistent with the multi-year average density plot developed using 1991–2014 survey data as described in Becker *et al.* 2020 (the 2020 Ecology and Evolution paper). While the legend in the PMSR density plot presents density values up to 0.4939, the range of the highest value plotted on the map within the PMSR Study Area is 0.0911–0.1435. In summer/fall, highest densities of Dall's porpoise occur north of the PMSR Study Area. Density values within the PMSR Study Area are similar between those presented in the PMSR Density Technical Report and Becker *et al.* (2020 TM), although a bit lower in the latter, but of the same order of magnitude. NMFS concurs with this analysis and confirms it does not change our analysis or findings.

Long-beaked common dolphin. The data source is cited as ''Becker *et al.* in prep.'', so the density estimates used for the PMSR analysis were the multi-year average predictions from the SDMs built

(2020 TM) SDMs, as well as SDMs developed recently for the Southern California Current (Becker *et al. In Press,* Frontiers in Marine Science), will be used in the Navy's upcoming Hawaii-California Testing and Training (HCTT) analysis, which includes the PMSR Study Area.

Uncertainty in Density Estimates

Comment 7: The Commission comments that for Phase III activities in the HSTT Study Area, the Navy used more refined density estimation methods for cetaceans and accounted for uncertainty in the density and group size estimates that seeded its animat modeling (Navy 2018). The PMSR Density Technical Report indicated that uncertainty in its density and group size estimates for the PMSR Study Area was incorporated but did not specify what type of uncertainty or what, if any, distribution was used. The PMSR Density Technical Report also did not specify whether uncertainty was used for its density estimates for pinnipeds. NMFS similarly did not include in the preamble to the proposed rule any details regarding whether and how uncertainty was incorporated into either the density or group size estimates. The Commission recommends that NMFS (1) clarify whether and how uncertainty was incorporated in the density and group size estimates, including densities for pinnipeds, and specify the distribution(s) used and, (2) if uncertainty was not incorporated, re-estimate the numbers of takes based on the uncertainty inherent in the density estimates (*e.g.,* Becker *et al.* 2020) or the underlying references (*e.g.,* Lowry 2002, Lowry *et al.* 2014, NMFS SARs, *etc.*). If NMFS chooses not to incorporate uncertainty in its density estimates, including for pinnipeds, the Commission recommends that NMFS specify why it did not do so in the preamble to the final rule.

Response: As noted in the PMSR Density Technical Report the Navy did not apply statistical uncertainty outside the survey boundaries into non-surveyed areas, since it deemed application of statistical uncertainty would not be meaningful or appropriate. We note that there are no measures of uncertainty (*i.e.,* no coefficient of variation (CV), standard deviation (SD), or standard error (SE)) provided in NMFS Pacific Stock Assessment Report (SAR) Appendix 3 (Carretta *et al.* 2019) as well as the 2021 draft Pacific SAR, associated with the abundance data for any of the pinniped species present in Southern California. Although some measures of uncertainty are presented in some citations within the SAR and in other relevant publications for some survey findings, it is not appropriate for the Navy to attempt to derive summations of total uncertainty for an abundance when the authors of the cited studies and the SAR have not. For additional information regarding use of pinniped density data, see the HSTT Density Technical Report Section 11. As a result of the lack of published applicable measures of uncertainty for pinnipeds during this analysis, the Navy did not incorporate measures of uncertainty into the pinniped density estimates. NMFS independently reviewed the methods and densities used by the Navy and concurs that they are appropriate and reflect the best available science.

Criteria Thresholds

General Threshold Comments

Comment 8: The Commission has supported the weighting functions and associated thresholds used for Navy Phase III activities (Navy 2017b). However, numerous more recent studies provide additional information on behavioral audiograms (*e.g.,* Cunningham and Reichmuth 2015, Branstetter *et al.* 2017, Kastelein *et al.* 2017b and 2019a, Sills *et al.* 2020a, Kastelein 2021a and b, Ruscher *et al.* 2021, and Sills *et al.* 2021) and temporary threshold shift (TTS) (*e.g.,* Kastelein *et al.* 2017a and c, Popov *et al.* 2017, Kastelein *et al.* 2018a and b, 2019b–d, and 2020a–f, Sills *et al.* 2020b, Kastelein *et al.* 2021a and b). The Navy discussed only a few of these references in its Draft Supplemental Environmental Impact Statement (DSEIS) and LOA application. It also noted that the otariid and phocid composite audiograms are consistent with recently published behavioral audiograms of pinnipeds but did not provide any references, including those denoted herein, in its LOA application. NMFS similarly did not discuss any of the aforementioned references in its preamble to the proposed rule, whether the composite audiograms were consistent with the recently-reported behavioral audiograms or whether the criteria, presumably the TTS (and thus permanent threshold shift (PTS)) thresholds, were still considered conservative as compared to the recently-reported TTS data for harbor porpoises, harbor seals, and California sea lions. As such, the Commission recommends that NMFS specify in the preamble to the final rule whether the aforementioned references support the continued use of the current weighting functions and PTS and TTS thresholds for the various functional hearing groups and, if the newer data indicate that either the current weighting functions or PTS and TTS thresholds would significantly underestimate impacts, specify whether and how it plans to revise them.

Response: NMFS is aware of these recent papers (Kastelein *et al.* 2021a and b) and is currently working with the Navy to update NMFS' Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing Version 2.0 (Acoustic Technical Guidance) (NMFS 2018) to reflect relevant papers that have been published since the 2018 update on our 3–5 year update schedule in the Acoustic Technical Guidance. First, we note that the recent peer-reviewed updated marine mammal noise exposure criteria by Southall *et al.* (2019a) provide identical PTS and TTS thresholds and weighting functions to those provided in NMFS' Acoustic Technical Guidance.

NMFS will continue to review and evaluate new relevant data as it becomes available and consider the impacts of those studies on the Acoustic Technical Guidance to determine what revisions/updates may be appropriate. However, any such revisions must undergo peer and public review before being adopted, as described in the Acoustic Guidance methodology. In the meanwhile, NMFS has also carefully considered the other references that the commenter cites, and while some of the relevant data may potentially suggest changes to TTS/PTS thresholds for some species, any such changes would not be expected to change the predicted take estimates in a manner that would change the necessary determinations supporting the issuance of these regulations, and the data and values used in this rule reflect the best available science.

In-Water Behavior Thresholds for Explosives

Comment 9: The Commission comments that the Navy routinely requests and NMFS routinely authorizes behavior takes of marine mammals associated with exposure to single in-air explosive events (*e.g.,* missile launch noise and sonic booms), including those that occur in the PMSR Study Area (section 6.6 in the Navy's LOA application). The Commission states that NMFS has based its take estimates on the numbers of animals that have responded behaviorally to single launch events, including for the PMSR proposed rule (see section 6.6 in the Navy's LOA application and 84 FR 28470 (June 19, 2019), as one example for previous authorizations issued for launch activities at SNI). The

Commission states that ''[c]ontinuing to dismiss the fact that a single explosive event, including that of a 500-lb bomb, has the potential to cause behavior takes to marine mammals underwater is illogical . . . given that an animal exposed to such an event is expected to exhibit the factors the Navy differentiated as a behavioral response in Department of the Navy (2017b) and NMFS routinely authorizes behavior takes for such events when exposed in air, including for the Navy's own proposed launch activities under the PMSR proposed rule.'' The Commission also states that the Navy, and in turn NMFS, has not provided adequate justification for dismissing the possibility that single underwater detonations can cause a behavioral response and therefore again recommends that NMFS estimate and ultimately authorize behavior takes of marine mammals during all in-water explosive activities, including those that involve single detonations consistent with in-air explosive activities in the final rule. If NMFS does not authorize behavior takes of marine mammals for all in-water explosive activities, the Commission recommends that NMFS justify in the preamble to the final rule why it believes that marine mammals, including pinnipeds, would only be taken by single in-air explosive detonations and not single in-water explosive detonations. The Commission further recommends that NMFS and the Navy revise the behavior thresholds for in-water explosive sources for Phase IV activities and ensure that any such threshold is based on data that involve impulsive sources, rather than the currently-used threshold that was based on non-impulsive tones.

Response: NMFS does not ignore the possibility that single underwater detonations can cause a behavioral response. The current take estimate framework allows for the consideration of animals exhibiting behavioral disturbance during single explosions as they are counted as ''taken by Level B harassment'' if they are exposed above the TTS threshold, which is 5 decibels (dB) higher than the behavioral harassment threshold. We acknowledge in our analysis that individuals exposed above the TTS threshold may also be harassed by behavioral disruption and those potential impacts are considered in the negligible impact determination. Neither NMFS nor the Navy are aware of evidence to support the assertion that animals will have significant behavioral responses (*i.e.,* those that would rise to the level of a take) to temporally and spatially isolated explosions at received levels below the TTS threshold. However, if any such responses were to occur, they would be expected to be few and to result from exposure to the somewhat higher received levels bounded by the TTS thresholds and would thereby be accounted for in the take estimates. The derivation of the explosive injury criteria is provided in the 2017 technical report titled ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)''.

Regarding the assertion that the approaches for assessing the impacts from a single underwater detonation and a single in-air detonation are inconsistent, we disagree. Both approaches/thresholds are based on the best available data. As noted above, we are unaware of data suggesting that marine mammals will respond to single underwater explosive detonations below the TTS threshold in a manner that would qualify as a take. Conversely, for single in-air detonations such as missile launch noise and sonic booms, there are extensive data supporting the application of the lower behavioral thresholds, *i.e.,* pinnipeds moving significant distances or flushing in response to these in-air levels of sounds.

Regarding the recommendation that explosive thresholds used for assessing impacts in Phase IV be based on impulsive sources, NMFS will continue to work with the Navy to ensure that the best available science is used in the development and revision of the thresholds to be used to assess acoustic impacts in Phase IV of the Navy actions.

In-Water Takes for Explosives

Comment 10: The Commission comments that the number of takes that NMFS proposed to authorize does not accurately reflect the group sizes of various species. The Navy's 2017 report, ''Dive Distribution and Group Size Parameters for Marine Species Occurring in the U.S. Navy's Atlantic and Hawaii-Southern California Training and Testing areas'', specified that the mean group size of long-beaked common dolphins was 255, 16 for the offshore stock of common bottlenose dolphins, and 56 for striped dolphins. However, NMFS proposed to authorize a total of 119 takes of long-beaked common dolphins, 11 takes of offshore bottlenose dolphin, and 2 takes of striped dolphins per year (see Table 18 of the proposed rule)—all of which are less than the mean group sizes reported by the Navy. The numbers of takes of northern right whale dolphins, Pacific white-sided dolphins, Risso's dolphins, short-beaked common dolphins, and sperm whales also are less than the mean group sizes specified in Table 48 of the above report. For other species that routinely occur in the PMSR Study Area but for which model-estimated takes were zero (*e.g.,* Cuvier's beaked whales, Baird's beaked whales, Kogia spp., *etc.*), NMFS did not propose to authorize any takes (see Table 18 of the proposed rule). The Commission recommends that NMFS, at minimum, authorize Level B harassment (behavior) takes that are at least the mean group size reported in Table 48 of the Navy 2017 report for all species in which model-estimated takes are either less than mean group size (long- and short-beaked common dolphins, offshore bottlenose dolphins, striped dolphins, northern right whale dolphins, Pacific white-sided dolphins, Risso's dolphins, and sperm whales) or zero for those species that routinely occur in the PMSR Study Area (*e.g.,* Cuvier's beaked whales, Baird's beaked whales, Kogia spp., *etc.*) in the final rule.

Response: NMFS indicates in the *Description of Marine Mammals and Their Habitat in the Area of the Specified Activities* section of this final rule that the following species/stocks had zero calculated estimated takes: Bryde's whale (Eastern Tropical Pacific), Gray whale (Western North Pacific), Sei whale (Eastern North Pacific), Baird's beaked whale (California, Oregon, and Washington), Bottlenose dolphin (California Coastal), Cuvier's beaked whale (California, Oregon, and Washington), Harbor Porpoise (Morro Bay), Killer whale (Eastern North Pacific Offshore, Eastern North Pacific Transient or West Coast Transient), Mesoplodont spp. (California, Oregon, and Washington), Short-finned pilot whale (California, Oregon, and Washington), and Northern fur seal (California). NMFS continues to agree with the Navy's analysis; therefore, no takes were authorized for those species where takes were modeled to be zero.

However, to precautionarily ensure adequate incidental take coverage should the Navy encounter and expose a larger group than was originally estimated and proposed, the authorized annual take by Level B harassment was increased to group size for 7 dolphin species where the annual takes proposed were fewer than the species group size, specifically for Long- and Short-beaked common dolphins, Offshore Bottlenose dolphins, Striped dolphins, Northern right whale dolphins, Pacific white-sided dolphins, and Risso's dolphins. These changes are reflected in Table 21 and explained in detail in the *Changes from the Proposed Rule to the Final Rule* section of this final rule. For sperm whales, however,

given they prefer deeper waters and Navy activities are at the surface or near-surface, their secondary range includes areas of higher latitudes in the PMSR Study Area, NMFS concurs with the Navy's initial proposed take and does not find that an increase in the take estimates is warranted.

In-Air Thresholds for Explosives

Comment 11: The Commission comments that the in-air PTS, TTS, and behavior thresholds were absent from both the Navy's LOA application and NMFS' preamble to the proposed rule, and that it is unclear what, if any, thresholds were used to inform either the Navy's or NMFS' impact analyses. The Commission recommends that NMFS provide any Phase IV in-air and in-water PTS and TTS thresholds and associated weighting functions to the public for review and comment, consistent with the Phase III in-water auditory thresholds. The Commission also stated that, in its May 2019 letter regarding a proposed incidental harassment authorization for launch activities at SNI, the unweighted behavior threshold of 100 dB re 20 µPa2-sec to be applied to all pinnipeds from Department of the Navy (2017b) was inconsistent with other recent proposed and final rules for the U.S. Air Force (Air Force; 84 FR 335; January 24, 2019 and 84 FR 14321; April 10, 2019) and other recent proposed rules or authorizations involving other launch activities (83 FR 57434; November 15, 2018, 82 FR 49334; October 25, 2017, 82 FR 6463; January 19, 2017, 81 FR 18584; March 31, 2016, *etc.*). Further, the Commission reiterates its 2019 recommendation that NMFS compile all in-air response data and determine whether the in-air behavior thresholds can be revised or whether additional paired visual and acoustic monitoring data are necessary to refine the in-air thresholds before issuing the PMSR final rule. If the thresholds cannot be revised with data currently available, the Commission recommends that NMFS (1) ensure that the Navy, the Air Force, and any other relevant entities collect the necessary data to inform in-air behavior thresholds, and (2) revise, allow for public comment on, and finalize those thresholds in the next 3 years.

Response: The Commission is correct that the in-air behavioral thresholds were missing, but these have now been added to Table 12 (Behavioral Thresholds). However, the Navy's testing and training activities (outside of target and missile launches) are modeled at or near-surface (essentially underwater) and the in-air behavioral thresholds would not apply to those other testing and training activities, as they were modeled underwater. The in-air thresholds would apply to the target and missile launches on SNI.

Regarding the Commission's comment that the unweighted behavior threshold of 100 dB re 20 µPa2-sec applied to all pinnipeds from Department of the Navy (2017b) was inconsistent with other recent proposed and final rules for the U.S. Air Force (Air Force; 84 FR 335; January 24, 2019 and 84 FR 14321; April 10, 2019), it is true that the Navy is using in-air behavior thresholds different from what is used by the U.S. Air Force. The Navy's thresholds in the Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III) Technical Report (U.S. Department of the Navy, 2017) for TTS/PTS are correct, while for behavior, the Navy uses a value of 100 dB sound exposure level (SEL) for all pinnipeds rather than 90 dB sound pressure level (SPL) for harbor seals/100 dB SPL for all other pinnipeds. In this case, the issues the Commission points out regarding in-air behavioral thresholds are not applicable, as the estimated takes are based on the last 3 years of pinniped observation from Navy's monitoring reports and are not directly based on specific in-air thresholds.

The Navy selects beaches to survey based largely on where sound received is expected to reach 100 dB SEL or greater and where animals are reacting to launch noises. In the case of harbor seals, the Navy is already monitoring beaches where sound levels are less than 100 dB SEL and often under 90 dB SPL (site O—Phoca Reef and Pirates Cove). The Navy is monitoring at site O because oftentimes the harbor seals are not hauled out on the western end of SNI on the typically monitored beaches during launch events. The Navy is cognizant of the fact that some harbor seals are reacting to sound levels lower than 90 dB SPL. Accordingly, the Navy is monitoring those pinnipeds and requesting additional take by Level B harassment to account for this potential.

NMFS indicated in the *Acoustic Thresholds* sections of both the proposed rule and this final rule that using the best available science, NMFS, in coordination with the Navy, has established acoustic thresholds that identify the most appropriate received level of underwater sound above which marine mammals exposed to these sound sources could be reasonably expected to directly experience a disruption in behavior patterns to a point where they are abandoned or significantly altered, to incur TTS (equated to Level B harassment), or to incur PTS of some degree (equated to Level A harassment). Thresholds have also been developed to identify the pressure levels above which animals may incur non-auditory injury from exposure to pressure waves from explosive detonation. Refer to the ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)'' report (U.S. Department of the Navy, 2017c) for detailed information on how the criteria and thresholds were derived. The criteria and thresholds in this document have been available for the public at *https://www.hstteis.com/Documents/2018-Hawaii-Southern-California-Training-and-Testing-Final-EIS-OEIS/2018-Final-EIS-OEIS-Supporting-Technical-Documents.* That said, regarding the recommendation that NMFS compile all in-air response data and determine whether the in-air behavior thresholds can be revised or whether additional paired visual and acoustic monitoring data are necessary to refine the in-air thresholds before issuing the PMSR final rule. NMFS will not be refining the in-air thresholds for this final rule. The Navy's proposed Phase IV criteria are still in development and NMFS will work with the Navy and others within NOAA on any proposed changes and review the in-air thresholds for pinnipeds and, if appropriate, update NMFS' Acoustic Technical Guidance, which will include peer review and public comment. NMFS will continue to review and evaluate new relevant data as it becomes available and consider the impacts of those studies on the Acoustic Technical Guidance to determine what revisions/updates may be appropriate. In the meanwhile, the data and values used in this rule reflect the best available science.

In-Air Behavior Takes for Launch Activities

Comment 12: The Commission comments that, similar to the various in-air thresholds, the take estimation method for launch activities was omitted from the preamble to the proposed rule. NMFS indicated in the preamble to the proposed rule that it had reviewed the Navy's data, methodology, and analysis and determined that it was complete and accurate (86 FR 37822; July 16, 2021). If that was the case, it is unclear why the details were omitted from the proposed rule for the very activities that were estimated to result in the greatest numbers of takes for California sea lions, harbor seals, and elephant seals (see Tables 18 and 19 in the proposed rule). The Commission claims that the Navy's 2019 proposed authorization

also indicated that a total of 4,940 Level B harassment takes of California sea lions occurred during 18 launches in the 2015–2017 monitoring seasons (84 FR 18822; May 2, 2019), which equates to an average of 275 takes per launch. The Commission claims there were only 15 launches and the average number of takes per launch in the 2019 IHA should have been 329 rather than 275. The Commission comments that NMFS must specify the underlying references, assumptions, and methods used to estimate the numbers of takes for all activities for which taking would be authorized for each **Federal Register** notice.

Response: NMFS indicated in the preamble to the proposed rule that it had reviewed the Navy's data, methodology, and analysis presented in section 5.2 (Incidental Take of Marine Mammals from Launch Activities at San Nicolas Island) of the Navy's rulemaking/LOA application, which were based on monitoring results from past launches, and determined that it was complete and accurate. Specifically, the estimation of the amount of take by Level B harassment that would be expected to occur as a result of launch events was based on the total take by species observed for three previous monitoring seasons divided by the number of launch events over that time period. NMFS has added additional details in the preamble in the *Estimated Take of Marine Mammals* section of this final rule to clarify how the takes estimated were derived for target and missile launches on SNI. This is also described in the paragraphs below.

For California sea lions, take estimates were derived from three monitoring seasons where an average of 274.44 instances of take of sea lions by Level B harassment occurred per launch event. Therefore, 275 sea lions was then multiplied by 40 launch events, for a conservative take estimate of 11,000 instances of take for California sea lions by Level B harassment. This estimate is conservative because the Navy has not conducted more than 25 launch events (although authorized for more) in a given year since 2001.

For harbor seals a total of 12 takes were derived from previous monitoring seasons and multiplied by 40 launch events for a total of 480 instances of take by Level B harassment.

For northern elephant seals, take estimates were derived from previous monitoring seasons where an average of 0.61 instances of take of northern elephant seals by Level B harassment occurred per launch event. Therefore, one northern elephant seal was then multiplied by 40 launch events for a conservative take estimate of 40 instances of take of northern elephant seals by Level B harassment. Generally, northern elephant seals do not react to launch events other than by exhibiting simple alerting responses, such as raising their heads or temporarily going from sleeping to being awake; however, to account for the rare instances where they have reacted, the Navy considered that some northern elephant seals could be taken during launch events.

The Commission is incorrect about the number of launches that took place during the monitoring periods from 2015–2017; it was, in fact, 18 launches that took place. The launch activities are described in the Navy's 2014–2019 monitoring report, which NMFS provided to the Commission. Monitoring reports can also be found at *https://www.fisheries.noaa.gov/action/incidental-take-authorization-us-navy-target-and-missile-launch-activities-san-nicolas.* The average number of takes per launch in the 2019 IHA was correct (275 animals) as is the underlying data used to determine the estimated take for the 2019 IHA, the 2020 renewal IHA, and this final rule.

Comment 13: The Commission comments that the method NMFS used to determine in-air takes is flawed for several reasons. The Commission states the Navy is only able to monitor at most three haulout sites during each launch event. However, California sea lions and harbor seals are present at several additional haulout sites on the west side of SNI. The Navy also estimates the number of pinnipeds hauled out at least 2 hours before the launch occurs. For safety reasons, the observers are not allowed to be at the haulout sites for at least 2 hours before and during a launch. The video cameras that document the responses of the hauled-out animals are able to view only a portion of the animals. Thus, the Commission says it is unclear whether new animals haul out or enter the water in the more than 2 hours after the animals were last counted. When equipment failures occur or launches occur at night, responses are not observed.

Response: The Navy is committed to several types of monitoring in order to document the responses of hauled-out animals. NMFS has approved the Navy's monitoring methods in previous authorizations and does not believe the methods are flawed. It is correct that the Navy monitors at most 3 haulout sites during each launch and the Navy attempts to vary the sites they are monitoring during each launch, so the Navy is not always monitoring the same 3 sites. This is precisely for the reason the Commission pointed out, as there are several haulout sites on the west side of SNI. During visual surveys, the Navy also estimates the number of pinnipeds hauled out at least 2 hours before the launch occurs. For safety reasons, the observers are not allowed to be at the haulout sites for at least 2 hours before and during a launch. However, the Navy conducts more than just visual surveys in order to obtain the most accurate information on the number of hauled out animals. Video and acoustic monitoring of up to three pinniped haulout areas and rookeries will be conducted during launch events that include missiles or targets that have not been previously monitored using video and acoustic recorders for at least three launch events. Video monitoring cameras would be either high-definition video cameras, or Forward-Looking Infrared Radiometer (FLIR) thermal imaging cameras for night launch events. The Navy is also experimenting with time-lapse photography to fill in any data gaps that may occur from the other methods of monitoring. Marine mammal monitoring includes multiple surveys during the year that record the species, number of animals, general behavior, presence of pups, age class, gender and reactions to launch noise or other natural or human caused disturbances, in addition to environmental conditions that may include tide, wind speed, air temperature, and swell. Between the different methods of monitoring, NMFS is confident that the Navy will be able to continue to complete their monitoring requirements and record accurate data if equipment issues arise or launches occur during the day or night.

Comment 14: The Commission comments that the criteria that the Navy used to enumerate takes under a previous authorization and in previous monitoring reports were based on animals moving at least 10 m (11 yd; 84 FR 37845; August 2, 2019). NMFS' more recent criteria, including those that it used for the U.S. Air Force's 2019 final rule (see Table 9; 84 FR 337; January 24, 2019), are based on animals moving at least two body lengths (Level 2 response). The 10-m (11-yd) metric is much greater than the estimated 4 or 5 m (4 or 5 yd) that adult female and male sea lions move in two body lengths. The Commission is concerned that NMFS is allowing Department of Defense agencies to use two different sets of criteria for the same activities (*i.e.,* launch activities) as related to the same definition of Level B harassment under section 3(18)(B)(ii) of the MMPA. The

Commission recommends that NMFS specify in the PMSR final rule that the Level B harassment criteria are based on the definitions of Level 2 and 3 responses provided in § 217.65(b)(3)(ii) of the Air Force's final rule.

Response: In contrast to the activities considered for this final rule, which are considered military readiness activities, the activities that were the subject of NMFS' 2019 rule for the Air Force were not evaluated as military readiness activities; therefore a different definition of Level B harassment applied. For the U.S. Air Force rule, the standard non-military-readiness pinniped thresholds were used. For military readiness activities, the MMPA defines Level B harassment as: ''Any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered.'' The Navy proposed a slightly different version of the criteria for determining when behavioral response of a hauled pinniped rises to the level of harassment, as is appropriate for use with the definition of Level B harassment associated with military readiness activities. NMFS concurred that this version, which has been used in prior incidental take authorizations associated with launch activities on SNI, is appropriate for evaluating Level B harassment in association with this specified activity. NMFS may re-evaluate these criteria with the Navy for any subsequent applications we receive for these activities.

Comment 15: The Commission comments that NMFS underestimates harbor seal takes as well on SNI. NMFS previously had noted, and the Navy's monitoring reports have confirmed, that harbor seals were not always present when the Navy conducted its monitoring during launch events, and there have not been many places to observe harbor seals during the launches (84 FR 18821; May 2 2019). NMFS indicated that most of the beaches where harbor seals have been hauled out, and which the Navy has been able to monitor, occur in area O, which is not in the trajectory of most of the launches. That may be the case, but the animals still have responded to sound levels that range from 79–99 dB 20 re μPa at those beaches. NMFS also indicated that harbor seal presence at the haulout sites is dependent on tides. Since the Navy cannot predict whether it will conduct launches during high or low tide, the Commission states NMFS must assume that harbor seals have the potential to be present during each launch irrespective of the tidal cycle. Furthermore, the Navy focuses much of its monitoring on sea lion haulout sites, where harbor seals generally do not haul out. NMFS noted that harbor seals do not prefer beaches with California sea lions present (84 FR 18821; May 2, 2019). Moreover, and as routinely is the case for harbor seals, Navy monitoring reports from 2014–2017 indicated that for all but one launch 100 percent of the hauled-out harbor seals within the view of the camera responded to the launch. Thus, the Commission says that 12 harbor seals taken per launch on all of SNI is illogical and a vast underestimate.

Response: NMFS disagrees with the Commission's assertion that harbor seal takes are too low. Approximately 42 harbor seals were estimated to have been affected during the June 2019 through March 2020 monitoring period. These figures are approximate and included extrapolations for pinnipeds on portions of the beach that were not within the field of view of the camera. These estimates correspond to an average rate of 4.08 harbor seals affected per launch and are certainly within the estimated 12 harbor seals taken per launch. Only 12 missile launch events occurred during that period, while the Navy was authorized for 40 events. It is incorrect to state that the Navy only focuses on California sea lion beaches. During the 2019–2020 monitoring period, the Navy had cameras set up on Phoca Reef, which corresponds to site O (referred to by the commenter) where harbor seals tend to haul out. The Navy was able to monitor Phoca Reef during approximately half of the launches. The Navy is required to monitor 3 sites during launches, and these sites can consist of any combination of Dos Coves South, Vizcaino Point South, Red Eye West, Red Eye East, Bachelor Beach, and Phoca Reef. It is not possible to monitor all of these sites for every launch, and the Navy makes a decision about where to monitor based on several factors, including local weather conditions, the type of launch activity planned, the types and location of pinnipeds hauled out, as well as tidal factors.

Comment 16: The Commission commented that Navy's take estimation method is not consistent with either the method recently used by the U.S. Air Force for its proposed and final rule (84 FR 321; January 24, 2019 and 84 FR 14314; April 10, 2019, respectively) or the intent of the MMPA to estimate the numbers of marine mammals that are likely to be disturbed. The U.S. Air Force based its take estimates on abundance estimates at the various haulout sites based on Lowry *et al.* (2017), previous response rates of the various pinniped species, and the number of launches per year. Specifically for harbor seals, the Commission says NMFS should have estimated the number of takes based on a 100-percent response rate and the number of animals that were documented in areas J through N on SNI in 2015 and area O in 2014, as stipulated in Lowry *et al.* (2017) and as was considered best available science for the U.S. Air Force's proposed and final rule. Using that approach, 110 harbor seals could be taken during each of the 40 proposed launch events, for a total of 4,400 harbor seal takes. For California sea lions, the response rate should be based on the number of sea lions that moved a 'short distance' according to the 2014–2017 monitoring reports multiplied by the number of sea lions in the same areas in 2015 from Lowry *et al.* (2017) and the number of launches. The Commission states that a similar approach should be taken for elephant seals. Accordingly, the Commission recommends that NMFS (1) authorize 4,400 Level B harassment takes of harbor seals, and (2) estimate Level B harassment takes of California sea lions and elephant seals based on the numbers of both species in areas J through N in 2015 as stipulated in Lowry *et al.* (2017), response rates based on each species moving a short distance according to the 2014–2017 monitoring reports, and 40 proposed launch events in the final rule.

Response: The difference in methods of take estimation between the Navy and the U.S. Air Force are based on what is appropriate for each agency based on the activities that are being conducted. It does not mean that one method is not appropriate for estimating take.

For harbor seals, NMFS believes the amount of Level B harassment take suggested as appropriate by the Commission would be an overestimate based on previous observations during Navy's launch events. Before the launch events, the Navy monitors several sites around the western end of SNI to determine where pinnipeds are hauled out and what species are on the beaches. During this pre-launch monitoring, harbor seals are frequently not present. For harbor seals on SNI, the estimated takes are based on pinniped observation from Navy's monitoring reports and not directly based on specific in-air thresholds. The beaches that the Navy surveys are largely based on where sound received is expected to reach 100 dB SEL or greater and where animals are reacting to launch noises. In the case of

harbor seals, the Navy is already monitoring beaches where sound levels are less than 100 dB SEL and often under 90 dB SPL (site O—Phoca Reef and Pirates Cove). The Navy is monitoring at site O because oftentimes the harbor seals are not hauled out on the western end of SNI on the typically monitored beaches during launch events. In addition, the Navy has previously surveyed other parts of SNI to determine if pinnipeds are reacting in response to launch events. The Navy conducted surveys of the eastern end of SNI and did not find pinnipeds reacting to launch events. The estimated take for harbor seals was based on the total number of takes (12) over a 3-yr monitoring period multiplied by 40 launch events for a total of 480 instances of take by Level B harassment. Using the total number of takes (12) was a change from the proposed IHA in 2019 (84 FR 18809; May 2, 2019) in which we used an average number of takes multiplied by the number of launches. The estimated take would be lower (120 harbor seals) if the average was used, as was the case for California sea lions and Northern elephant seals. The take estimate was revised from 120 to 480 harbor seal instances of take by Level B harassment to possibly account for any additional harbor seals that hauled out and reacted to launch events.

NMFS concludes that the number of authorized take is adequate and sufficient for California sea lions and Northern Elephant seals. For California sea lions, take estimates were derived from Navy monitoring reports in which an average of 274.44 instances of take of sea lions by Level B harassment occurred per launch event. Therefore, 275 sea lions was multiplied by 40 launch events, for a conservative take estimate of 11,000 instances of take for California sea lions by Level B harassment. Generally, northern elephant seals do not react to launch events other than by exhibiting simple alerting responses, such as raising their heads or temporarily going from sleeping to being awake; however, to account for the rare instances where they have reacted, the Navy considered that some northern elephant seals could be taken during launch events. For Northern elephant seals an average of 0.61 instances of take of northern elephant seals by Level B harassment occurred per launch event from the Navy's monitoring reports. Therefore, one northern elephant seal was then multiplied by 40 launch events for a conservative take estimate of 40 instances of take of northern elephant seals by Level B harassment.

As reported in the Navy 2014–2019 comprehensive monitoring report from the previous rule, approximately 3,876 California sea lions, 99 Harbor seals, and 11 Northern elephant seals (average 144 California sea lions, 3.5 harbor seals, and 0.4 Northern elephant seals) were estimated to have been affected by launches conducted during that monitoring period. The estimates also included extrapolations for pinnipeds on portions of the beach that were not within the field of view of the camera. During the 2014–2019 monitoring period 27 launch events occurred at SNI even though 40 launch events annually were authorized. If NMFS had used these averages the estimated take would have been even lower than what NMFS is authorizing in this final rule.

In summary, NMFS believe the Level B harassment take estimates for pinnipeds on SNI are sufficient based on actual field monitoring conducted by the Navy of the pinniped haulout areas that could potentially be affected by noise from launch events.

In-Water Mortality and Injury Thresholds for Explosives

Comment 17: The Commission notes that the constants and exponents associated with the impulse metrics for both onset mortality and onset slight lung injury have been amended from those used in Tactical Training Theater Assessment and Planning (TAP) I and Phase II activities, and that the Navy did not explain why the constants and exponents have changed when the underlying data have not. The modifications yield both smaller and larger zones. The Commission states the results are counterintuitive since the Navy presumably amended the impulse metrics to account for lung compression with depth, thus the zones would be expected to be smaller rather than larger the deeper the animal dives. The Commission states that the Navy should provide a sufficient explanation regarding the constants and exponents or specify the assumptions made. NMFS, however, did provide a response in the preamble to the NWTT final rule. It stated that the numerical coefficients are slightly larger in Phase III than in Phase II, resulting in a slightly greater threshold near the surface. It also stated that the rate of increase for the Phase II thresholds with depth is greater than the rate of increase for Phase III thresholds with depth because the Phase III equations take into account the corresponding reduction in lung size with depth (making an animal more vulnerable to injury per the Goertner model; 85 FR 72327; November 12, 2020). The Commission says that NMFS' response in the NWTT final rule does not explain why lower absolute thresholds prevail below 8 m (9 yd) in depth, and why, if lung compression is accounted for in Phase III, the rate of increase of the Phase II thresholds with depth would be greater when lung compression was not accounted for. The Commission again recommends that NMFS explain in the preamble to the final rule why the constants and exponents for onset mortality and onset slight lung injury thresholds for Phase III that consider lung compression with depth result in lower rather than higher absolute thresholds when animals occur at depths greater than 8 m.

Response: The derivation of the explosive injury equations, including any assumptions, is provided in the 2017 technical report titled ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)''. Specifically, the equations were modified for the current rulemaking period (Phase III) to fully incorporate the injury model in Goertner (1982), specifically to include lung compression with depth. NMFS independently reviewed and concurred with this approach.

The impulse mortality/injury equations are depth dependent, with thresholds increasing with depth due to increasing hydrostatic pressure in the model for both the previous 2015–2020 phase of rulemaking (Phase II) and Phase III. The Commission correctly observes that above 8 m, the Phase II threshold is lower than the Phase III threshold, and below 8 m, the Phase II threshold is greater than the Phase III threshold. The differences in injury and mortality thresholds are due to taking into account the complete Goertner (1994) model in the Phase III criteria, as the Navy has shown in the technical report ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)''. The underlying experimental data used in Phase II and Phase III remain the same, and two aspects of the Phase III revisions explain the relationships the Commission notes:

(1) The numeric coefficients in the equations are computed by inserting the Richmond *et al.* (1973) experimental data into the model equations. Because the Phase III model equation accounts for lung compression, the plugging of experimental exposure values into a different model results in different coefficients. The numeric coefficients are slightly larger in Phase III versus Phase II, resulting in a slightly greater threshold near the surface.

(2) The rate of increase for the Phase II thresholds with depth is greater than the rate of increase for Phase III

thresholds with depth because the Phase III equations take into account the corresponding reduction in lung size with depth (making an animal more vulnerable to injury per the Goertner model), as the commenter notes.

Comment 18: The Commission comments that, consistent with other Phase III documents, the Navy used the onset mortality and onset slight lung injury criteria to determine only the range to effects, while it used the 50 percent mortality and 50 percent slight lung injury criteria to estimate the numbers of marine mammal takes. That approach is inconsistent with the manner in which the Navy estimated the numbers of takes for PTS, TTS, and behavior for explosive activities. All of those takes have been and continue to be based on onset, not 50-percent values. The Commission comments that NMFS' responses in the corresponding preambles to the final rules, that over predicting impacts by using onset values would not afford extra protection to any animal, is irrelevant from an impact analysis standpoint. NMFS' additional response in the preamble to the NWTT final rule, that estimating takes based on the onset values would over predict effects because many of those exposures would not happen because of effective mitigation (85 FR 72328; November 12, 2020), is unsubstantiated. The Navy has not determined the effectiveness of any of its mitigation measures, and explosive activities for which mitigation measures were implemented still resulted in the deaths of multiple common dolphins in 2011. It would be more prudent for the Navy and NMFS to estimate injuries and mortalities based on onset rather than a 50-percent incidence of occurrence. The Commission recommends that NMFS use onset mortality, onset slight lung injury, and onset gastrointestinal (GI) tract injury thresholds rather than the 50-percent thresholds to estimate both the numbers of marine mammal takes and the respective ranges to effect in the final rule. If NMFS does not implement the Commission's recommendation, the Commission further recommends that in the preamble to the final rule NMFS (1) specify why it is inconsistently basing its explosive thresholds for Level A harassment on onset PTS and for Level B harassment on onset TTS and onset behavioral response, while the explosive thresholds for mortality and non-auditory Level A harassment are based on the 50-percent criteria for mortality, slight lung injury, and GI tract injury, (2) provide scientific justification supporting the assumption that slight lung and GI tract injuries are less severe than PTS and thus the 50-percent rather than onset criteria are more appropriate for estimating Level A harassment for those types of injuries, and (3) justify why the number of estimated mortalities should be predicated on at least 50 percent rather than 1 percent of the animals dying.

Response: For explosives, the type of data available are different than those available for hearing impairment, and this difference supports the use of different prediction methods. Nonetheless, as appropriate, and similar to take estimation methods for PTS, NMFS and the Navy have used a combination of exposure thresholds and consideration of mitigation to inform the take estimates. The Navy used the range to 1 percent risk of onset mortality and onset injury (also referred to as ''onset'' in the 2022 PSMR FSEIS/OEIS and the Navy's 2017 technical report titled ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)'') to inform the development of mitigation zones for explosives. Ranges to effect based on 1 percent risk criteria to onset injury and onset mortality were examined to ensure that explosive mitigation zones would encompass the range to any potential mortality or non-auditory injury, affording actual protection against these effects. In all cases, the mitigation zones for explosives extend beyond the range to 1 percent risk of onset non-auditory injury, even for a small animal (representative mass = 5 kg). Given the implementation and expected effectiveness of this mitigation (based on the smaller size of the zone and available monitoring data), the application of the indicated 50-percent threshold is appropriate for the purposes of estimating take. Using the 1 percent onset non-auditory injury risk criteria to estimate take would result in an over-estimate of take, and would not afford extra protection to any animal. Specifically, calculating take based on marine mammal density within the area that an animal might be exposed above the 1 percent risk to onset injury and onset mortality criteria would over-predict effects because many of those exposures will not happen because of the effective mitigation. The Navy and NMFS consider the 50-percent incidence of onset injury and onset mortality occurrence a reasonable representation of a potential effect, and thereby appropriate for take estimation, given the mitigation requirements at the 1-percent onset injury and onset mortality threshold, and the area ensonified above this threshold would capture the appropriate reduced number of likely injuries.

While the approaches for evaluating non-auditory injury and mortality are based on different types of data and analyses than the evaluation of PTS and behavioral disturbance, and are not identical, NMFS disagrees with the commenter's assertion that the approaches are inconsistent, as both approaches consider a combination of thresholds and mitigation (where applicable) to inform take estimates. For the same reasons, it is not necessary for NMFS to ''provide scientific justification supporting the assumption that slight lung and GI tract injuries are less severe than PTS,'' as that assumption is not part of NMFS' rationale for the methods used. NMFS has explained in detail its justification for the number of estimated mortalities, which is based on both the 50 percent threshold and the mitigation applied at the one percent threshold. Further, we note that many years of Navy monitoring following explosive exercises has not detected evidence that any injury or mortality has resulted from Navy explosive exercises with the exception of one incident with dolphins in California, after which mitigation was adjusted to better account for explosives with delayed detonations (*i.e.,* zones for events with time-delayed firing were enlarged).

Furthermore, for these reasons, the methods used for estimating mortality and non-auditory injury are appropriate for estimating take, including determining the ''significant potential'' for non-auditory injury consistent with the statutory definition of Level A harassment for military readiness activities, within the limits of the best available science. Using the one percent threshold would be inappropriate and would result in an overestimation of effects, whereas, given the mitigation applied within this larger area, the 50 percent threshold results in an appropriate mechanism for estimating the significant potential for non-auditory injury.

Mitigation Measures

Extents of Zones and Passive Acoustic Monitoring

Comment 19: The Commission commented that the proposed mitigation zones would not protect high-frequency (HF) cetaceans from PTS. For example, the mitigation zone for a missile is 1,829 m (2,000 yd; Table 23 in the proposed rule), but the mean PTS zones range from 2,177–3,791 m (2,381–4,146 yd) for HF Cetaceans (Table 6–8 in the LOA application).

Similarly, the mitigation zone for an explosive bomb is 2,286 m (2,500 yd; Table 24 in the proposed rule), but the mean PTS zones similarly range from 2,177–3,791 m (2,381–4,146 yd) for HF cetaceans. The appropriateness of such zones is further complicated by aircraft deploying bombs at surface targets directly beneath the aircraft, minimizing the ability to observe the entire extent of the zone(s). In addition, missiles and rockets can be fired from vessels at targets 139 km (75 nmi) away from the firing platform (Table 23 in the proposed rule). In either case, marine mammals could be present in the target area at the time of the launch unbeknownst to the Navy.

Response: NMFS is aware that some mitigation zones do not fully cover the area in which an animal from a certain hearing group may incur PTS. The mitigation zones extend beyond the respective average ranges to PTS for all marine mammal hearing groups except HF cetaceans (the mitigation zones extend into a portion of the respective average ranges to PTS for this hearing group). The mitigation zones also extend into a portion of the average ranges to TTS for marine mammals. Therefore, depending on the species, mitigation will help avoid or reduce all or a portion of the potential for exposure to mortality, non-auditory injury, PTS, and higher levels of TTS for the largest explosives in bins E10 and bin E6. Explosives in smaller source bins (*e.g.,* missiles in bin E9, rockets in bin E3) have shorter predicted impact ranges; therefore, the mitigation zones will cover a greater portion of the impact ranges for these explosives.

For this small subset of circumstances, NMFS discussed potential enlargement of the mitigation zones with the Navy, but concurred with the Navy's assessment that further enlargement would be impracticable. Specifically, the Navy explained that, as discussed in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS, for explosive mitigation zones any additional increases in mitigation zone size (beyond what is depicted for each explosive activity), or additional observation requirements, would be impracticable to implement due to implications for safety, sustainability, the Navy's ability to meet requirements under Title 10 of the U.S. Code (Title 10 requirements) to successfully accomplish military readiness objectives, and the Navy's ability to conduct testing and training associated with required acquisition milestones or as required to meet operational requirements.

Increasing the mitigation zone sizes would result in larger areas over which firing would need to be ceased in response to a sighting, and therefore would likely increase the number of times detonations would be ceased, which could extend the length of the activity. These impacts could significantly diminish event realism in a way that would prevent the activity from meeting its intended objectives. Explosive missile and rocket events require focused situational awareness of the activity area and continuous coordination between the participating platforms as required during military missions and combat operations. Additionally, Navy determined that the mitigation detailed in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS and mirrored in this final rule, provides the greatest extent of protection that is practicable to implement. NMFS has analyzed the fact that, despite these mitigation measures, some Level A harassment may occur in some circumstances (*i.e.,* for HF cetaceans, as noted by the commenter); the Navy is authorized for these takes by Level A harassment.

Comment 20: The Commission notes that NMFS included only the SELcum-based ranges to effect in the preamble to the proposed rule (Tables 11–15) and specified that sound from multiple successive explosions can be expected to increase the range to the onset of an impact based on the SELcum thresholds (86 FR 37817; July 16, 2021). Although that may be true relative to the SELcum of a single detonation, the SPLpeak thresholds result in larger ranges to effect for the majority of the explosive bins for HF, low-frequency (LF), and mid-frequency (MF) cetaceans and phocids for PTS and LF cetaceans and otariids for TTS (see Tables 6–7 to 6–16 in the Navy's LOA application). For otariids and phocids, the range to onset PTS is larger for the SPLpeak rather than the SELcum threshold for clusters of 10, 12, and/or 25 munitions. As such, NMFS should have included the relevant zones in the preamble to the proposed rule for transparency purposes.

Response: The peak pressure range-to-effect tables are in Navy's LOA application submittal, next to the SEL range-to-effect tables and the relevant zones as noted by the Commission; thus, there is no issue of NMFS not being transparent. NMFS references (and often provides links to access) additional documents such as the application or previous monitoring reports that are relevant to the incidental take authorization process when a proposed authorization is published.

Comment 21: The Commission commented that the Navy indicated in the PMSR DEIS/OEIS that lookouts would not be 100 percent effective at detecting all species of marine mammals for every activity because of the inherent limitations of observing marine species and because the likelihood of sighting individual animals is largely dependent on observation conditions (*e.g.,* time of day, sea state, mitigation zone size, observation platform) and animal behavior (*e.g.,* the amount of time an animal spends at the surface of the water and group size). The Commission agrees and has made recommendations regarding the effectiveness of the Navy's visual monitoring.

Since 2010, the Navy has been collaborating with researchers at the University of St. Andrews to study Navy lookout effectiveness, but they have not been conducted on a scale and in a manner sufficient to provide useful results. Accordingly, the Commission asserts that a precautionary approach should be taken until such time that sufficient data are available, and that the Navy should supplement its visual monitoring measures with other monitoring measures rather than simply reducing the size of the zones it plans to monitor and instead use passive acoustic monitoring. The Navy did not propose to supplement visual monitoring with passive acoustic monitoring during any of its explosive activities, nor did it mention passive acoustic monitoring in relation to mitigation in either its LOA application or its DEIS/OEIS for the PMSR Study Area. Further, NMFS did not propose to require the Navy to use passive acoustic monitoring and did not mention passive acoustic monitoring in regard to mitigation in the preamble to the proposed rule.

The Commission comments that sonobuoys, which are deployed and used during many of the Navy's activities, could be deployed and used without having to construct or maintain additional systems. For example, multiple sonobuoys could be deployed with the target prior to an activity to better determine whether the target area is clear and remains clear until the munition is launched. The Navy previously specified that passive acoustic detections would not provide range or bearing to detected animals and therefore cannot be used to determine an animal's location or confirm its presence in a mitigation zone. The Commission does not agree, as Directional Frequency Analysis and

Recording (DIFAR) sonobuoys perform both functions and are routinely used by the Navy. The Commission contends that, at a minimum for PMSR, passive acoustic monitoring should be used to supplement visual monitoring, especially since the activities that the Navy proposed to conduct could injure or kill marine mammals.

Contrary to NMFS' assertion in the preamble to the NWTT final rule that sonobuoys have a narrow band that does not overlap with the vocalizations of all marine mammals (85 FR 72349; November 12, 2020), the Navy has highlighted numerous instances of sonobuoys being used to detect and locate baleen whales, delphinids, and beaked whales. All instances represent detection of a broadband, rather than narrow band, repertoire of frequencies. NMFS also indicated that bearing or distance of detections cannot be provided based on the number and type of devices typically used (85 FR 72349; November 12, 2020), and the Commission asserts this is incorrect.

The Commission further notes that personnel who monitor hydrophones and sonobuoys used by the Navy on the operational side also have the ability to monitor for marine mammals. The Commission stated that ability exists—four independent sightings were made not by the Navy lookouts but by the passive acoustic technicians (Department of the Navy (2013)), among other examples. The Commission asserts that although aircraft may not have passive or active acoustic capabilities, aircraft carriers or other vessels from which the aircraft originated very likely do have such capabilities. Given that the effectiveness of Navy lookouts conducting visual monitoring has yet to be determined, the Commission contends that, at a minimum for the PMSR Study Area, passive acoustic monitoring should be used to supplement visual monitoring. Therefore, the Commission again recommends that NMFS require the Navy to use passive acoustic monitoring (*i.e.,* DIFAR and other types of sonobuoys), whenever practicable, to supplement visual monitoring during implementation of its mitigation measures for all explosive activities in the final rule.

Response: The Lookout effectiveness study referenced by the Commission is now complete. Previously, this type of study has never been conducted; itis extremely complex to ensure data validity, and required a substantial amount of data to conduct meaningful statistical analysis. As noted by the Commission, previously there has not been enough data collected to conduct a sufficient analysis; therefore, drawing conclusions on an incomplete data set is not scientifically valid. The draft report was submitted to NMFS in April 2022 and is currently being reviewed as of the drafting of this final rule. The report provides a statistical assessment of the data available to date characterizing the effectiveness of Navy Lookouts relative to trained marine mammal observers for the purposes of implementing the mitigation measures.

There are no applicable passive acoustic monitoring arrays within the PMSR Study Area that could both detect marine mammals and alert vessels in the area to their presence. However, the Navy queries ''real-time'' whale/dolphin sighting record sources in the days leading up to an event. These include Whale Safe (*www.whalesafe.com*) and Island Packers marine mammal sightings updated on their website daily (*www.islandpackers.com/marine-mammal-sightings*), and any recent reports of cetacean strandings in the local area. Whale Safe focuses on three large cetacean species (blue, humpback, and fin whales) and is a tool that displays both visual and acoustic whale detections in the Santa Barbara Channel. It also includes a blue whale habitat model that predicts the likelihood of blue whale presence, whereas Island Packers reports on a broad range of cetacean species they observe in the Channel Islands National Park and the Channel Islands National Marine Sanctuary.

As discussed with the Navy for explosive mitigation zones, any additional increases in mitigation zone size (beyond what is depicted for each explosive activity) or observation requirements would be impracticable to implement due to implications for safety, sustainability, and the Navy's ability to meet Title 10 requirements to successfully accomplish military readiness objectives. As discussed in the comment, the Navy does employ passive acoustic monitoring when practicable to do so in other Study Areas (*i.e.,* when assets that have passive acoustic monitoring capabilities are already participating in the activity). For other explosive events, there are no platforms participating that have passive acoustic monitoring capabilities. Adding a passive acoustic monitoring capability (either by adding a passive acoustic monitoring device to a platform already participating in the activity, or by adding a platform with integrated passive acoustic monitoring capabilities to the activity) for mitigation is not practicable. The Navy does not have sufficient resources to construct and maintain additional passive acoustic monitoring systems or platforms for each training and testing activity. Additionally, diverting platforms that have passive acoustic monitoring platforms would impact their ability to meet their Title 10 requirements and reduce the service life of those systems.

The Navy uses recent marine mammal sighting data to determine general presence of marine mammal species in the Southern California area and issue alerts to event managers. These data are not used to alter schedules or siting of events because of geographic bias in marine mammal reporting, lag times in data reporting, and the highly dynamic nature of cetacean movements. The Navy instead focuses efforts on event participant awareness and marine mammal surveys in a hazard area within hours or minutes of an event.

The time spent surveying for marine mammals varies with the size of the area being searched. A typical flight would include approximately 1–1.5 hours of search time for an area within 5 miles of the target location. Smaller search areas would require less time. In all cases, multiple passes are made over the target location. Effort does not change when there have been recent sightings in the general vicinity. In this way, the Navy's survey and notification efforts parallel efforts to notify ships to be more vigilant as they traverse designated shipping lanes. We note that whales that do not vocalize can never be detected using passive acoustic monitoring. We note that sonobuoys have a narrow band that does not overlap with the vocalizations of all marine mammals, and there is no bearing or distance on detections based on the number and type of devices typically used; therefore it is not possible to use these to implement mitigation shutdown procedures. Although the Navy is continuing to improve its capabilities to use range instrumentation to aid in the passive acoustic detection of marine mammals, at this time it is not effective or practicable for the Navy to monitor instrumented ranges for the purpose of real-time mitigation.

Mitigation Areas and Least Practicable Adverse Impact Standard

Comment 22: The NRDC comments that despite the increase in activities, the proposed rule contemplates no additional mitigation measures to minimize harm to the environment and ''rejects outright any mitigation measures such as time-area restrictions to protect the high value habitats for marine mammals that are present in the PMSR [Study Area]''. Of particular concern to NRDC is habitat for endangered blue whale, fin whale, and

humpback whale, as well as the gray whale, which is currently undergoing an Unusual Mortality Event (UME). The comment asserts that NMFS fails to require mitigation that would protect these populations and high-value habitats from increased Navy activities that contribute to acoustic harm and ship-strike risk.

Response: NMFS has addressed this comment regarding high-value habitats for blue, fin, gray, and humpback whales as it relates to biologically important areas in responses to Comments 24 through 26, below. NMFS has also addressed any risk from vessel strike in response to Comment 27, below. The proposed and final rules do include time/area restriction on SNI, where target and missile launches would be scheduled to avoid peak pinniped pupping periods between January and July, to the maximum extent practicable.

Comment 23: The NRDC commented that NMFS must conduct its own analysis and clearly articulate it, and asserted that NMFS parrots the Navy's position on mitigation, accepting, without any meaningful evaluation of its own, the Navy's assertions of impracticability. The NRDC cites the outcome of *Conservation Council* v. *NMFS,* 97 F. Supp. 3d 1210 (D. Haw. 2015), in which the parties were able to reach a settlement agreement establishing time-area management measures on the Navy's HSTT Study Area notwithstanding NMFS' finding, following the Navy, that all such management measures would substantially affect military readiness and were not practicable. NRDC states that NMFS is simply accepting what the Navy says without conducting its own analysis. NRDC cites *Conservation Council* in stating that ''if time/area restrictions are practicable and NMFS chooses not to impose them'' then the agency must consider ''measures of equivalent effect'' to minimize injury to marine mammals. 97 F.Supp.3d at 1231.

Response: First, the commenter's reference to mitigation measures implemented pursuant to a prior settlement agreement is entirely inapplicable to a discussion of NMFS' responsibility to ensure the least practicable adverse impact under the MMPA. Specifically, for those areas that were previously covered under the 2015 settlement agreement for the HSTT Study Area, it is essential to understand that: (1) the measures were developed during negotiations with the plaintiffs and were not evaluated during those negotiations under NMFS' least practicable adverse impact mitigation assessment, and (2) the Navy's agreement to restrictions on its activities as part of a relatively short-term settlement (which did not extend beyond the expiration of the 2013 regulations) did not mean that those restrictions were practicable to implement over the longer term.

Regarding the remainder of the comments, NMFS disagrees with much of what the commenter asserts. First, we have carefully explained our interpretation of the least practicable adverse impact standard and how it applies to both stocks and individuals and habitat, in the proposed and final rule where we refer the reader to the NWTT Study Area rule (85 FR 72312; November 12, 2020) for further explanation of our interpretation of least practicable adverse impact, and what distinguishes it from the negligible impact standard.

Furthermore, we have applied the standard correctly in this rule in requiring measures that reduce impacts to individual marine mammals in a manner that reduces the probability and/or severity of population-level impacts.

NMFS agrees that we must conduct our own analysis, which we have done here, and not just accept what is provided by the Navy. That does not mean, however, that NMFS should not review the Navy's analysis of effectiveness and practicability of its proposed mitigation measures, which by regulation the Navy was required to submit with its application, and concur with those aspects of the Navy's analysis with which NMFS agrees. NMFS has described our process for identifying the measures needed to meet the least practicable adverse impact standard in the *Mitigation Measures* section in this final rule, and we have followed the approach described there when analyzing potential mitigation for the Navy's activities in the PMSR Study Area. Responses to specific recommendations for mitigation measures provided by the commenters are discussed separately.

Comment 24: NRDC comments that NMFS has identified seven Biologically Important Areas (BIAs) located within the PMSR Study Area that provide important habitats for endangered and vulnerable marine mammal species. NMFS and its experts identified their BIAs for the west coast in areas with consistently high sighting concentrations, using data from years of coastal small-boat surveys that were designed to maximize encounters with target species, as well as from other sources. The nine BIAs for blue whales represent only 2 percent of U.S. waters in the West Coast region but encompass 87 percent of documented sightings; similarly, the seven BIAs for humpback whales represent 3 percent of U.S. waters in the West Coast region, but encompass 89 percent of documented sightings. NRDC asserts that the proposed rule concurs with the Navy's assessment that any geographic mitigation measures, including within the BIAs that occur in the PMSR Study Area, would have ''significant direct negative effects on mission effectiveness'' and are thus considered impractical (86 FR 37823; July 16, 2021). NRDC states that by the Navy's own admission, testing and training activities have historically not taken place in five out of seven of the BIAs in the PMSR Study Area, and the Navy has no current plans to use these areas for activities involving explosives or ordnance. NRDC disagrees with NMFS' determination that time-area closures in at least the five BIAs where the Navy has no current plans for testing and training are impracticable. NRDC states the proposed rule fails to discuss why such mitigation is impracticable, beyond a simple adoption of the Navy's assessment, or consider measures ''of equivalent effect,'' in violation of the least practicable adverse impact standard per *Conservation Council,* 97 F.Supp.3d at 1231.

Response: NMFS evaluated the potential effectiveness and practicability of geographic mitigation. Specifically, we reviewed the Navy's analysis in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS (including section 5.3.6.2 on Geographic Mitigation), which considers and discusses the same factors that NMFS considers to satisfy the least practicable adverse impact standard (including practicability), and we concur with the analysis and conclusions. Chapter 5 (Standard Operating Procedures and Mitigation) Section 5.3.6.2 (Geographic Mitigation) of the 2022 PMSR FEIS/OEIS includes a detailed discussion of time-area management considerations for blue whale, humpback whale, and gray whale. Chapter 5 of the 2022 PMSR FEIS/OEIS discusses and reflects the integration of standard operating procedures and mitigation measures along with consideration of in the Measures Considered but Eliminated section, includes an analysis of an array of different types of mitigation that have been recommended over the years by non-governmental organizations or the public, through scoping or public comment on environmental compliance documents. Also described in Chapter 5 (Standing Operating Procedures and

Mitigation) of the 2022 PMSR FEIS/OEIS, it has been recommended that the Navy reinclude area restrictions. Some of these mitigation measures could potentially reduce the number of marine mammals taken, via direct reduction of the activities or amounts. However, as described in Chapter 5 of the 2022 PMSR FEIS/OEIS, the Navy needs to train and test in the conditions in which it conducts warfare, and these types of modifications fundamentally change the activity in a manner that would not support the purpose and need for the training and testing (*i.e.,* are entirely impracticable) and therefore are not considered further. The mitigation required from the Navy as described in this final rule and the 2022 PMSR FSEIS/OEIS represents the least practicable adverse impact, as described further below. Any further mitigation, including entirely prohibiting training or testing activities or time/area restriction within the BIAs as discussed above, is impracticable due to implications for safety, sustainability, and mission requirements for the reasons described in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FSEIS/OEIS.

In this rule, we have required time-area mitigation on SNI for hauled out pinnipeds during the pupping season based on a combination of factors that include higher densities and observations of specific important behaviors of marine mammals themselves, and in areas that clearly reflect preferred habitat. In addition to being delineated based on physical features that drive habitat function, the high densities and concentration of certain important behaviors (*e.g.,* breeding, resting) in these particular areas clearly indicate the presence of preferred habitat.

As described in our description of how we implement the least practicable adverse impact standard, we consider the degree to which the successful implementation of a potential measure is expected to reduce adverse impacts to marine mammal species or stocks and their habitat (to include consideration of the nature and scope of the anticipated impacts in the absence of the mitigation) and the practicability of applicant implementation. To begin, as described in the *Estimated Take of Marine Mammals* section of this final rule, predicted impacts to, and total authorized take of, humpback, blue, and gray whales is at a minimal level (no more than 11, 11, and 14 takes by level B harassment annually, respectively). Given this very limited number of instances of take within a year, and the fact that these species do not have notable site fidelity in the area beyond potentially staying in one area to feed for several days, there is no reason to think that any individual whale would be taken on more than a couple days within a year. As described in the Negligible Impact Analysis section, this low severity and magnitude of impacts is not expected to impact the reproduction or survival of any individuals, much less the species or stock. We recognize that repeated disturbances over longer durations have a greater chance of impacting the reproduction or survival of any individual marine mammals, and time/area restrictions in biologically important areas are one of the best means of reducing the severity and magnitude of impacts. However, in situations with minimal impacts to begin with, such as one or two exposures/year of a handful of individuals, there is a much smaller margin of potential added protection/reduction of impacts. Such is the case here. Moreover, time-area restrictions would be less effective to reduce potential impacts from testing and training activities within the PMSR Study Area for the relatively small areas identified as BIAs, given the variability in the presence of marine mammals. While blue whales and humpback whales generally return annually to the same large-scale regional foraging grounds that these BIAs are within, satellite tagging data shows these foraging grounds are large, with the locus of highest use shifting year to year within those regional areas (Mate *et al.* 1999; Mate *et al.* 2016; Mate *et al.* 2018a, 2018b). This is confirmed by surveys and studies, some of which have occurred since the 2015 BIAs were identified, comparing inter-annual variability in modeled abundance and distribution (Becker *et al.* 2016; Becker *et al.* 2018) and explained by studies documenting both shifts in the distribution of prey (Santora *et al.* 2020; Santora *et al.* 2017; Santora *et al.* 2011), and shifts in their foraging in response to ecosystem changes (Fleming *et al.* 2016).

When these factors are considered in combination with the fact that the Navy has adequately described why these measures would not be practicable, NMFS concurs that the additional geographic mitigations are not warranted. In some cases, the Navy has noted that they have no current plans to conduct certain activities in certain areas. While these statements suggest a lower likelihood that impacts will occur in such an area, they do not preclude the potential for activities to occur in the area should the need arise in the future, nor do they eliminate the impracticability of associated geographic limitations.

Comment 25: NRDC comments that NMFS should require time-area restrictions in at least the Point Conception/Arguello blue whale feeding area and the Santa Barbara Channel-San Miguel blue whale feeding area during the June to October season when blue whales are most likely to occur in concentrations in the PMSR Study Area.

Response: First, as described in the *Estimated Take of Marine Mammals* section and the response to Comment 24, predicted impacts on and total take of blue whales throughout the Study Area and in any given year is already at a minimal level (no more than 11 takes by Level B harassment). Only a subset of those impacts/takes might reasonably be expected to fall within these blue whale BIAs randomly in space and in time (only a portion of the training area, and active 5 of 12 months) and, further, when the fact that these BIAs are in an area of low Navy use (because of oil platforms, vessel routes to large ports, and other reasons) is considered, it is questionable whether any impacts will occur in the areas at all. Given this, and the specific nature of blue whale feeding in the region discussed above, time/area restrictions in these areas would likely afford little, if any, additional reduction of numbers or severity of take. When combined with the impracticability of implementation, NMFS concurs that these additional measures are not warranted. NMFS has explained that geographic mitigation in large whale feeding areas is impracticable due to implications for safety, sustainability, and mission requirements for the reasons described in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FSEIS/OEIS, for which NMFS is a cooperating agency.

Of additional note, the Santa Barbara to San Miguel Blue Whale Feeding Area BIA that is within the PMSR Study Area largely overlaps the Channel Islands National Marine Sanctuary (CINMS) and the Channel Islands National Park (CINP) boundaries, which are areas where the Navy is not planning to conduct training and testing activities involving explosives, as stated in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS. Furthermore, no missiles, munitions, explosives, or other live testing or training would be conducted within the CINMS boundaries, as stated in Chapter 6 (Other Regulatory Considerations) of the

2022 PMSR FEIS/OEIS. In addition, the Navy is not proposing the use of remotely operated vehicles, unmanned underwater vehicles, or bottom crawlers as part of this 2022 PMSR FEIS/OEIS's action. Surface targets may be towed or operated under their own power as they transit through the CINMS to the PMSR Study Area. The Navy's standard operating procedures for vessel transits would minimize impacts to sanctuary resources, including large whales. Specifically, the Navy will implement Large Whale Awareness Notification Messages through which the Navy will issue a seasonal awareness notification message to alert ships and aircraft operating in the area to the possible presence of concentrations of large whales, including blue whales (June 1 through October 31), gray whales (November 1 through March 31) and fin whales (November 1 through May 31). Any Navy activity that would occur within these boundaries would typically include vessels and targets transiting through the area to the PMSR Study Area. No explosives or gunnery events would occur within the Santa Barbara to San Miguel BIA or within the boundaries of the CINMS or Channel Islands National Park.

Comment 26: NRDC comments that NMFS should prohibit the use of explosives and gunnery activities and require vessel speed restrictions in the Morro Bay to Point Sal feeding area and the Santa Barbara Channel-San Miguel feeding area in order to protect humpback whales and humpback whale critical habitat units of high conservation value.

Response: First, as described in the *Estimated Take of Marine Mammals* section and the response to Comment 24, predicted impacts to, and total authorized take of, humpback whales throughout the Study Area and any given year is already at a minimal level (no more than 11 takes by Level B harassment). Only a subset of those impacts/takes might reasonably be expected to fall within the humpback whale BIAs randomly in space and in time (only a portion of the training area, and active a subset of 12 months). Given this, time/area restrictions in these areas would likely afford little, if any, additional reduction of number or severity of take. When combined with the impracticability of limiting explosive use in certain geographic areas, as described in sections 5.3.6.1 and 5.3.6.2 of the point Mugu Sea Range Final EIS, which NMFS concurs with, NMFS has determined that these additional measures are not warranted.

Regarding impacts to humpback whale critical habitat, while Navy activities in the PMSR could potentially kill or injure a small amount of krill, other crustaceans, or forage fish (*e.g.,* sardine, anchovy), other prey items would likely be available to humpback whales in the immediate area surrounding the activity, or would return to the area after the activity is complete, and the impacts would not be at the level that it would adversely affect the availability of prey in a manner that might impact growth, reproduction, or survival of any individual humpback whales. The 2021 biological opinion concluded that given the frequency of the events that are part of the proposed action, the short duration of these events, the various mitigation measures (including halting of activities until marine mammals are out of the area and are not observed feeding), the fact that detonations are not proposed to occur in the water column but rather at or near (within 10 m (11 yd) above) the surface, and the relatively large number of prey items available throughout the critical habitat, any impacts of explosives resulting from PMSR activities on prey availability for the humpback whales would be insignificant.

The Navy has discussed the threat from vessel strikes (''ship strikes'') (see the ''General Threats'' Section 3.7.4.1.6.2, Commercial Industries/ Vessel Strike; and Section 3.7.5.2.3, Vessels as a Strike Stressor of the 2022 PMSR FEIS/OEIS), and NMFS continues to concur with the Navy that a vessel strike is highly unlikely in the PMSR Study Area. There has not been any documented vessel strike in the PMSR Study Area. NMFS acknowledges that there have been four naval vessel strikes of large whales recently in the SOCAL Range Complex of the HSTT Study Area (two by the U.S. Navy and two by the Australian Navy) as discussed in the *Vessel Strike* section of this final rule. Overall, activities involving Navy vessel movement in the PMSR Study Area are variable in duration (*i.e.,* hours to days), would be widely dispersed throughout the action area, and occur intermittently. Average military vessel speed for the PMSR Study Area is approximately 10.6 knots (19.6 km/ hour) for the types of vessels typically involved in PMSR activities (Mintz, 2016). In comparison to the SOCAL Range Complex, the estimated number of annual at-sea days in the PMSR Study Area is less than 3 percent of what occurs in the SOCAL Range Complex annually. Accordingly, given the description of the specified activities, the requirements of Navy vessels to travel at safe speeds, and the vessel movement mitigation already in place to reduce the likelihood of strikes, NMFS has determined vessel speed restrictions would not appreciably reduce the likely severity/magnitude of expected impacts; and it is not practicable to impose vessel speed restrictions because of the Navy's testing and training needs, as described in the Navy's Point Mugu Sea Range EIS, which NMFS reviewed and concurs with. Also, see the response to Comment 27 below.

Comment 27: The commenter states that NMFS should require time-area and vessel speed restrictions in waters between the 200 m (219 yd) and 1,000 m (1,093 yd) isobaths to reduce ship-strike risks for fin whales during the months of November through February, when the whales aggregate in the area. Over the last decade, the Navy has reported two ship-strikes of fin whales in waters adjacent to the PMSR Study Area; and in May 2021, an Australian destroyer struck and killed two fin whales; these strikes were discovered only when the ship berthed in Naval Base San Diego. The comment states that this demonstrates that—just as with large commercial ships and other vessel classes—military vessels do pose ship-strike risks to whales beyond what reporting may indicate. The comment states that, although Navy reports of ship strikes are rare, if the whales weren't stuck to the bow (which seldom happens), these latest strikes wouldn't have been detected or reported.

Response: NMFS does not anticipate and has not authorized vessel strikes of any species, based on our analysis of the specified activity (volume of vessel use in the area, maneuverability of Navy ships at higher speeds), the history of strikes in the from these activities (none), and the Navy's standard operational measures (watchstanders), as well as those specifically targeted at reducing the likelihood of a strike (avoidance zones). Therefore, speed restrictions would afford limited additional reduction in risk, if any. In addition, it is impracticable.

The main reason for ship speed reduction is to reduce the possibility and severity of ship strikes to large whales. However, even given the wide ranges of speeds from slow to fast that Navy ships must use to meet training and testing requirements, the Navy has a very low strike history worldwide and in Southern California, and no history of strikes in the PMSR Study Area. Current Navy Standard Operating Procedures and mitigations require a minimum of at least one Lookout on duty while underway (in addition to bridge watch personnel) and, so long as safety of navigation is maintained, to keep 500

yards away from large whales and 200 yards away from other marine mammals (except for bow-riding dolphins and pinnipeds hauled out on shore or man-made navigational structures, port structures, and vessels). The most recent model estimate of the potential for civilian ship strike risk to blue, humpback, and fin whales off the coast of California found the highest risk near San Francisco and Long Beach associated with commercial ship routes to and from those ports (Rockwood *et al.* 2017).

Previously, the Navy commissioned a vessel density and speed report based on an analysis of Navy ship traffic in the HSTT Study Area between 2011 and 2015. Median speed of all Navy vessels within the HSTT and PMSR Study Areas is typically already low, with median speeds between 5 and 12 knots. Furthermore, the presence and transits of commercial and recreational vessels, annually numbering in the thousands, pose a more significant risk to large whales than does the presence of Navy vessels. The Vessel Strike subsection of the *Potential Effects of Specified Activities on Marine Mammals and their Habitat* section of this final rule and the 2022 PMSR FEIS/OEIS Chapter 3 (Affected Environment and Environmental Consequences) Section 3.0.5.8.1 (Vessels), Chapter 5 (Standard Operating Procedures and Mitigation) Section 5.1.1.2 (Vessel Safety), and Appendix D (Military Expended Material and Direct Strike Impact Analyses) Section D.3 (Direct Vessel Strike With Marine Mammals) explain the important differences between most Navy vessels and their operation and commercial ships that make Navy vessels much less likely to strike a whale.

When developing Phase III mitigation measures, the Navy analyzed the potential for implementing additional types of mitigation, such as vessel speed restrictions within the PMSR Study Area. The Navy determined that, based on how the training and testing activities will be conducted within the PMSR Study Area, vessel speed restrictions would be incompatible with practicability criteria for safety, sustainability, and training and testing missions, as described in Chapter 3 (Affected Environment and Environmental Consequences) Section 3.0.5.8.1 (Vessels), Chapter 5 (Standard Operating Procedures and Mitigation) Section 5.1.1.2 (Vessel Safety) of the 2022 PMSR FEIS/OEIS. NMFS fully reviewed this analysis and concurs with the Navy's conclusions. The Navy is unable to impose a 10-kn ship speed limit because it would not be practical to implement and would impact the effectiveness of Navy's activities by putting constraints on training, testing, and scheduling. The Navy requires flexibility in use of variable ship speeds for training, testing, operational, safety, and engineering qualification requirements. Navy ships typically use the lowest practical speed given individual mission needs. NMFS has reviewed the Navy's analysis of these additional restrictions and the impacts they would have on military readiness and concurs they are not practicable.

The Navy has discussed the threat from vessel strikes (''ship strikes'') (see the ''General Threats'' Section 3.7.4.1.6.2, Commercial Industries/Vessel Strike; and Section 3.7.5.2.3, Vessels as a Strike Stressor, and Appendix D (Military Expended Material and Direct Strike Impact Analyses) Section D.3 (Direct Vessel Strike With Marine Mammals) of the 2022 PMSR FEIS/OEIS), and NMFS continues to concur that there is a very low likelihood of vessel strike in the PMSR Study Area. There has not been any documented vessel strike in the PMSR Study Area. NMFS acknowledges that there have been four vessel strikes of large whales recently in the SOCAL Range Complex of the HSTT Study Area, as discussed in the *Vessel Strike* section of this final rule. Overall, activities involving Navy vessel movement in the PMSR Study Area are variable in duration (*i.e.,* hours to days), would be widely dispersed throughout the action area, and occur intermittently and in much lower volume than in the HSTT Study Area. Average military vessel speed for the PMSR Study Area is approximately 10.6 knots (19.6 km/hour) for the types of vessels typically involved in PMSR activities (Mintz, 2016). In comparison to the SOCAL Range Complex, the estimated number of annual at-sea days in the PMSR Study Area is less than 3 percent of what occurs in the SOCAL Range Complex annually.

Comment 28: NRDC comments that the California gray whale is presently experiencing a major UME and as of August 5, 2021, the total number of strandings across the whales' range was 487 animals. NRDC states that it is well established that animals already exposed to one stressor may be less capable of responding successfully to another; that stressors can combine to produce adverse synergistic effects; and that NMFS should require time-area restrictions within the active migration areas that bisect the PMSR Study Area to avoid unnecessary harm to this population.

Response: As of April 1, 2022, the gray whale UME was 531 whales total from the United States, Canada, and Mexico. (The UME total for California (2019–2021) is 72 whales.) Full or partial necropsy examinations were conducted on a subset of the whales. Preliminary findings in several of the whales have shown evidence of emaciation. While it is true that animals already exposed to one stressor may, in some cases, be less capable of responding successfully to another, as described in the Estimated Take section, very few gray whales are predicted to be exposed to Navy stressors. Take of gray whales is already at a minimal number and level (no more than 14 takes by Level B harassment annually). In the PMSR Study Area or nearby vicinity, there are no known or otherwise identified gray whale feeding areas. The nearest gray whale feeding BIA is located well to the north off Point St. George in Northern California (Calambokidis *et al.* 2015). There are four gray whale migration BIAs that overlap with the PMSR Study Area. The Navy has considered the potential disruption of gray whale migration as presented in the Behavioral Reactions to Impulse Noise section in the 2022 PMSR FEIS/OEIS; behavioral reactions from mysticetes, if they occur at all, are likely to be short term and of little to no consequence. Based on the best available science and the prior findings from NMFS, Navy activities should have little if any on gray whale migration behavior, with no anticipated effect on reproduction or survival from Level B harassment (see 85 FR 41780; July 10, 2020, 83 FR 66846; December 27, 2018, 80 FR 73556; November 24, 2015, and NMFS (2018b)). In short, the activities in the PMSR Study Area are not anticipated to have an effect on the reproduction or survival of any gray whales. For these reasons, and in consideration of the impracticability of requiring additional time/area restrictions as described in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS, NMFS has not adopted the commenter's recommendation.

Comment 29: The Commission states that the Navy did not identify and NMFS did not propose any geographic mitigation areas where certain activities would be restricted during specific timeframes. The Navy and NMFS included basic information regarding certain BIAs in the LOA application and preamble to the proposed rule, and the Navy mentioned the SNI mitigation area that was included in the HSTT final rule (83 FR 66956; December 27, 2018) in the

LOA application. The Commission states that the analysis is insufficient. The Commission understands that the training and testing activities that would occur in the PMSR Study Area involve only explosives and at a much-reduced tempo than those in the HSTT Study Area.

The Commission states that NMFS restricted the Navy from using explosives (including various types of gunnery rounds, bombs, rockets, and missiles) at any time of the year in the Santa Barbara Island Mitigation Area to protect blue and gray whales and other species under the HSTT final rule (50 CFR 218.74), but that mitigation area was not mentioned by NMFS in the preamble to the proposed rule, nor was justification for its exclusion provided. For humpback whales, NMFS mentioned the Morro Bay to Point Sal and the Santa Barbara Channel–San Miguel Feeding Areas in regard to its negligible impact determination but not in regard to whether inclusion of the areas as mitigation areas was practicable or warranted under the least practicable adverse impact requirement of the MMPA (86 FR 37839; July 16, 2021). Instead, NMFS indicated that the Navy's explosive training and testing activities could occur year round within the PMSR Study Area, although they generally would not occur in those relatively nearshore feeding areas, because both areas are close to the northern Channel Islands National Marine Sanctuary, oil production platforms, and major vessel routes leading to and from the ports of Los Angeles and Long Beach (86 FR 37839; July 16, 2021). NMFS further stated that, even if some small number of humpback whale takes occurred in these BIAs and feeding behavior was disrupted, the short-term nature of the anticipated takes from these activities, combined with the likelihood that they would not occur on more than one day for any individual within a year, means that they are not expected to impact the reproduction or survival of any individuals (86 FR 37839; July 16, 2021). None of that justification is related to the practicability of implementing mitigation measures. Furthermore, NMFS has no basis for stating that takes to individuals would not occur on more than one day, particularly in known feeding areas.

Response: Please see responses to comments 23 through 26 and 30 for our responses regarding geographic mitigation areas.

Comment 30: The Commission also comments that NMFS is co-mingling its negligible impact determination and the least practicable adverse impact standard required under section 101(a)(5)(A)(i)(II)(aa) of the MMPA. Rather than including the necessary information in the preamble to the PMSR proposed rule, NMFS referred the reader to the NWTT final rule for its explanation of its interpretation of least practicable adverse impact and what distinguishes it from the negligible impact determination (86 FR 37822–37823; July 16, 2021). The Commission also states that NMFS' least practicable adverse impact analysis for the PMSR proposed rule is cursory at best and much less detailed than even the one previously provided in the preamble to the NWTT proposed rule (85 FR 33987–33991; June 2, 2020), on which the Commission had extensive comments. As such, the Commission recommends that NMFS clearly separate its application of the least practicable adverse impact requirement from its negligible impact determination—both analyses must be included in all preambles to a proposed and final rule for the subject activities, not for previously authorized and unrelated activities. The Commission also recommends that NMFS follow an analysis framework consisting of three elements to (1) determine whether the impacts of the proposed activities are negligible at the species or stock level, (2) if so, determine whether some of those impacts nevertheless are adverse either to marine mammal species or stocks or to key marine mammal habitat, and (3) if so, determine whether it is practicable for the applicant to reduce or eliminate those impacts through modifying those activities or by other means (*e.g.,* requiring additional mitigation measures to be implemented). If NMFS is using some other legal standard to implement the least practicable adverse impact requirement, then the Commission further recommends that NMFS provide a clear and concise description of that standard and explain why it believes it to be sufficient to meet the statutory legal requirements.

Response: NMFS is not co-mingling its negligible impact determination and the least practicable adverse impact standard required under section 101(a)(5)(A)(i)(II)(aa) of the MMPA. The relevant standards and analyses are articulated separately in separate sections of both the proposed and final rules and in our responses to public comments. In the proposed rule, we referred the reader to the Navy's Northwest Training and Testing (NWTT) rule (85 FR 72312; November 12, 2020) for a more detailed explanation of our interpretation of least practicable adverse impact and what distinguishes it from the negligible impact standard. We have included the full interpretation of the least practicable adverse impact in the *Mitigation Measures* section of this final rule.

Comment 31: The Commission comments that in regards to mitigation areas, NMFS did not justify why the humpback, blue and gray whale BIAs were impracticable to implement and that NMFS' discussion of those areas leads one to believe that the Navy generally does not conduct its activities in those areas, or in the Santa Barbara Island Mitigation Area from the HSTT final rule. The Commission states that as such, limiting explosive activities to avoid unintentionally injuring or killing a large whale and restricting activities in an area where the Navy generally does not train would meet both tenets of the least practicable adverse impact requirement. That is, implementation of the measure would reduce the adverse impact of either killing or injuring an animal and implementing such a measure is practicable. The Commission recommends that, at a minimum, NMFS restrict the Navy from conducting explosive activities in (1) the Morro Bay to Point Sal Humpback Whale Feeding Area from April to November and the Santa Barbara Channel–San Miguel Humpback Whale Feeding Area from March to September, (2) the Point Conception/Arguello to Point Sal Blue Whale Feeding Area and the Santa Barbara Channel and San Miguel Feeding Areas from June to October, and (3) the SBI Mitigation Area in the PMSR final rule. The Commission further recommends that NMFS include in the preamble to the final rule justification regarding why the various Gray Whale Migration Areas were not included as mitigation areas in the final rule.

Response: Please see our responses to comments 23 through 26 for relevant responses regarding geographic mitigation areas related to BIAs for large whales, as well as the specific points raised related to areas of low use.

Comment 32: The Commission comments that NMFS' analyses regarding the marine mammal habitat component of the least practicable adverse impact requirement were incorrect. For the proposed rule for the PMSR Study Area, NMFS indicated that the Navy agreed to implement procedural mitigation measures that would reduce the probability and/or severity of impacts expected to result from acute exposure to explosives and launch activities, vessel strike, and impacts on marine mammal habitat (86 FR 37823; July 16, 2021). Specifically,

the Navy would use a combination of delayed starts and cease firing to avoid mortality or serious injury, minimize the likelihood or severity of PTS or other injury, and reduce instances of TTS or more severe behavioral disruption caused by explosives and launch activities (86 FR 37823; July 16, 2021). The Commission states that all of those procedural mitigation measures are intended to protect the animal, not its habitat, whereas mitigation areas are intended to protect the habitat as well as the animal. Similarly, all the aforementioned impacts are related to the species or stock, not the habitat. The Commission again recommends that NMFS (1) adopt a clear decision-making framework that distinguishes between the species and stock component and the marine mammal habitat components of the least practicable adverse impact requirement and (2) always consider whether there are potentially adverse impacts on marine mammal habitat and whether it is practicable to minimize them.

Response: NMFS' decision-making framework for applying the least practicable adverse impact standard clearly recognizes the habitat component of the provision (see the *Mitigation Measures* section of this final rule). NMFS does consider whether there are adverse impacts on habitat and how they can be mitigated. Marine mammal habitat value is informed by marine mammal presence and use and, in some cases, there may be overlap in measures for the species or stock directly and for use of habitat. In this rule, we have required time-area mitigation measures for pinnipeds (*e.g.,* target and missile launches shall be scheduled to avoid peak pinniped pupping periods between January and July, to the maximum extent practicable on SNI). These are based on protecting specific important behaviors of marine mammal species themselves, but also reflect preferred habitat (*e.g.,* pinniped rookeries and haulout habitat on SNI). In addition to being delineated based on physical features that drive habitat function, important behaviors (*e.g.,* reproduction, feeding, resting) in these particular areas clearly indicate the presence of preferred habitat. The MMPA does not specify that effects to habitat must be mitigated in separate measures, and NMFS has clearly included measures that provide reduction of impacts to both marine mammal species or stocks and their habitat, as required by the statute.

Comment 33: The Commission comments that NMFS specified that, to determine whether a mitigation measure meets the least practicable adverse impact standard, the effectiveness of such a measure is considered (proposed rule for PMSR Study Area, 86 FR 37790; July 16, 2021). However, the Commission states, NMFS did not mention mitigation effectiveness in the preamble to the proposed rule for the PMSR Study Area; rather NMFS repeatedly mentioned mission effectiveness, which also is a consideration regarding the practicability of mitigation measure implementation. The Commission recommends that NMFS evaluate whether in fact the mitigation measures would be effective if implemented appropriately and ensure that its evaluation criteria for applying the least practicable adverse impact standard separates the factors used to determine whether a potential impact on marine mammals or their habitat is adverse and whether possible mitigation measures would be effective.

Response: NMFS' application of the least practicable adverse impact standard is described in the *Mitigation Measures* section of this final rule (and also in the *Proposed Mitigation Measures* section of the proposed rule). This final rule requires the Navy to implement extensive mitigation measures to achieve the least practicable adverse impacts on the species and stocks of marine mammals and their habitat, including measures that are specific to certain times and areas. Mitigation measures include procedural mitigation measures, such as required shutdowns and delays of activities if marine mammals are sighted within certain distances, and limitations on activities on SNI such as avoiding peak pinniped pupping periods between January and July, to the maximum extent practicable. These mitigation measures were designed to lessen the frequency and severity of impacts from the Navy's activities on marine mammals and their habitat, and to ensure that the Navy's activities have the least practicable adverse impact on species and stocks. See the *Mitigation Measures* section of this final rule for additional detail on specific mitigation measures.

In the *Mitigation Measures* section, NMFS has explained in detail our interpretation and application of the least practicable adverse impact standard, which includes consideration of the degree to which the successful implementation of the measure is expected to reduce adverse impacts on marine mammal species stock and their habitat, consideration of the nature and scale of the impacts in the absence of the proposed mitigation, the likely effectiveness of the mitigation measures, and the practicability of mitigation. The Commission asserts that NMFS erroneously neglected to discuss the effectiveness of the mitigation. NMFS includes a discussion of the expected benefits of the required mitigation in the Mitigation section. However, if a measure is practicable and is expected to reduce impacts to marine mammals, and included as a required measure, there is no need in the context of the least practicable adverse impact determination to discuss its precise anticipated effectiveness. Similarly, in the context of a potential additional recommended mitigation, the consideration of the likely reduction of impacts that will be accomplished assuming the mitigation is 100 percent effective and the practicability of the measures results in a determination that the mitigation is not warranted, then there is no reason to evaluate the likely effectiveness of the measure, as any reduction below 100 percent would make the measure further unwarranted. The likely effectiveness of a mitigation measure is considered when it is necessary to inform the least practicable adverse impacts analysis.

Monitoring and Reporting Measures (Launch Activities)

Comment 34: The Commission comments that in previous incidental harassment authorizations for launch activities at SNI, the Navy was required to use forward-looking infrared (FLIR) video cameras to maximize viewing ability in low-light conditions. That information was not specified in the preamble to the proposed rule or the proposed rule itself. The Commission recommends that, at a minimum, NMFS specify in any issued LOA that the Navy must use FLIR video cameras in low-light conditions.

Response: The Navy is using multiple methods to survey pinnipeds during target and missile launch events. Multiple surveys will occur during the year that record the species, number of animals, general behavior, presence of pups, age class, gender and reactions to launch noise or other natural or human caused disturbances, in addition to environmental conditions that may include tide, wind speed, air temperature, and swell. In addition, video and acoustic monitoring (and time-lapse photography) of up to three pinniped haulout areas and rookeries will be conducted during launch events that include missiles or targets that have not been previously monitored using video and acoustic recorders for at least three launch events. NMFS added that video monitoring cameras would be either high-definition video cameras or

Forward-Looking Infrared Radiometer (FLIR) thermal imaging cameras for night launch events to the *Required Monitoring on SNI* section of the preamble and the regulatory text of this final rule and to the LOA, as this was accidentally omitted from the proposed rule.

Comment 35: The Commission comments that the Navy's draft notification and reporting plan for injured and stranded marine mammals included provisions for reporting dead-stranded and live-stranded animals and vessel strikes to NMFS. The plan is nearly identical to other plans issued under the Phase III rulemakings, which only included taking associated with in-water sources. Thus, the possibility that SNI launch activities could cause a stampede, thereby injuring or killing a pinniped, was inadvertently omitted. The Commission recommends that NMFS ensure that the final notification and reporting plan accounts for the possibility of pinnipeds being injured or killed due to launch activities at SNI and include specific details regarding those activities in section 2 of the plan.

Response: What the Commission asserts is incorrect. The Navy's Notification and Reporting Plan for injured and stranded marine mammals takes into account live or dead stranded marine mammals within the study areas themselves or on Navy property. San Nicolas Island (SNI) is an extremely active breeding and haulout area for California sea lions and Northern elephant seals. Thousands of seals and sea lions occur on SNI every day. Seeing injured and dead animals on the beaches at SNI is not uncommon and comparable to what is observed on San Miguel Island, the other significant breeding and haulout island. On any given day there could be injured and dead pinnipeds on the beach unrelated to Navy activities. First year pup mortality, fishing gear entanglements, mating injuries and indications of disease are observed on SNI given the large number of animals present. Reporting all pinniped injuries and mortalities on SNI would be time consuming out of context with the Navy's permitted activities. However, any pinniped injury or mortality directly associated with Navy activities (such as from target and missile launches) is required to be reported. The Navy conducts visual surveys before and after the launches, and the other types of surveying (*e.g.,* video) is used to help document what is occurring during the launches and to help document if any injuries occurred. Regarding stranding and mortalities unrelated to Navy activities, NMFS added to the Notification and Reporting Plan that the Navy is exempted from reporting stranded pinnipeds on rookeries (*i.e.,* pinnipeds on SNI). Pinnipeds found injured or dead in the water or on the mainland would be handled through the existing marine mammal stranding network procedures. This is consistent with the HSTT Notification and Reporting Plan.

Changes From the Proposed Rule to the Final Rule

Estimated annual take by Level B harassment was modified for 7 dolphin species where the annual takes proposed were fewer than the species group size. In these cases, annual take by Level B harassment was increased to account for group size. These changes are also reflected in Table 21.

TABLE 8—ANNUAL TAKE CHANGES BETWEEN PROPOSED AND FINAL RULE

Species	Group size	Proposed rule (annual estimated take)	Final rule (annual estimated take)
Long-beaked common dolphins	255	119	255 (change of + 136).
Offshore stock of common bottlenose dolphins	16	11	16 (change of +5).
Striped dolphins	56	2	56 (change of +54).
Northern right whale dolphins	13.41 (14)	6	14 (change of +8).
Pacific white-sided dolphins	25.85 (26)	21	26 (change of +5).
Risso's dolphins	18.40 (19)	10	19 (change of +9).
Short-beaked common dolphins	161.62 (162)	170	170 (no change).
Total Additional Take by Level B Harassment	.....	.....	215.

Additionally, NMFS added that video monitoring cameras would be either high-definition video cameras or Forward-Looking Infrared Radiometer (FLIR) thermal imaging cameras for night launch events to the *Required Monitoring on SNI* section of the preamble and the regulatory text of this final rule and to the LOA. This was accidentally omitted from the proposed rule.

Description of Marine Mammals and Their Habitat in the Area of the Specified Activities

Marine mammal species and their associated stocks that have the potential to occur in the PMSR Study Area are presented in Table 9 along with an abundance estimate, an associated coefficient of variation value, and best and minimum abundance estimates. The Navy anticipates the take of individuals of marine mammal species by Level A harassment and Level B harassment incidental to training and testing activities from detonations of explosives occurring at or near the surface and launch activities on SNI (Table 9).

The preamble of the PMSR proposed rule included additional information about the species in this rule, all of which remains valid and applicable and is adopted by reference here and is not reprinted in the preamble of this final rule, including a subsection entitled *Marine Mammal Hearing* that described the importance of sound to marine mammals and characterized the different groups of marine mammals based on their hearing sensitivity. Therefore, we refer the reader to our proposed rule (86 FR 37790; July 16, 2021) for more information.

Information on the status, distribution, abundance, population trends, habitat, and ecology of marine mammals in the PSMR Study Area also may be found in Section 4 of the Navy's rulemaking/LOA application. NMFS reviewed this information and found it to be accurate and complete. Additional information on the general biology and ecology of marine mammals is included in the 2022 PMSR FEIS/OEIS. Table 9 incorporates data from the U.S. Pacific and the Alaska Marine Mammal Stock Assessment Reports (SARs; Carretta *et al.* 2020; Muto *et al.* 2020) and the most recent revised data in the draft SARs (see *https://www.fisheries.noaa.gov/national/marine-mammal-protection/*

draft-marine-mammal-stock-assessment-reports). Table 9 also incorporates the best available science, including monitoring data from the Navy's marine mammal research efforts. NMFS has also reviewed new scientific literature since publication of the proposed rule, and determined that none of these nor any other new information changes our determination of which species have the potential to be affected by the Navy's activities or the information pertinent to status, distribution, abundance, population trends, habitat, or ecology of the species in this final rulemaking.

Species Not Included in the Analysis

The species carried forward for analysis (and described in Table 9) are those likely to be found in the PMSR Study Area based on the most recent data available, and do not include species that may have once inhabited or transited the area but have not been sighted in recent years (*e.g.,* species which were extirpated from factors such as 19th and 20th century commercial exploitation). Several species that may be present in the northwest Pacific Ocean have a low probability of presence in the PMSR Study Area. These species are considered extralimital (not anticipated to occur in the PMSR Study Area) or rare (occur in the PMSR Study Area sporadically, but sightings are rare). Species unlikely to be present in the PMSR Study Area or that are rare include the North Pacific right whale (*Eubalaena japonica*), rough-toothed dolphin (*Steno bredanensis*), and Steller sea lion (*Eumetopias jubatus*), and these species have all been excluded from subsequent analysis for the reasons described below. There have been only four sightings, each of a single Northern Pacific right whale, in Southern California waters over approximately the last 30 years (in 1988, 1990, 1992, and 2017) (Brownell *et al.* 2001; Carretta *et al.* 1994; National Marine Fisheries Service, 2017b; WorldNow, 2017). Sightings off California are rare, and historically, even during the period of U.S. West Coast whaling through the 1800s, right whales were considered uncommon to rare off California (Reeves and Smith, 2010; Scammon, 1874). The range of the rough-toothed dolphin is known to occasionally include the Southern California coast during periods of warmer ocean temperatures, but there is no recognized stock for the U.S. West Coast (Carretta *et al.* 2019c). Several strandings were documented for this species in central and Southern California between 1977 and 2002 (Zagzebski *et al.* 2006), but this species has not been observed during seven systematic ship surveys from 1991 to 2014 off the U.S. West Coast (Barlow, 2016). During 16 quarterly ship surveys off Southern California from 2004 to 2008, there was one encounter with a group of nine rough-toothed dolphins, which was considered an extralimital occurrence (Douglas *et al.* 2014). Steller sea lions range along the north Pacific from northern Japan to California (Perrin *et al.* 2009b), with centers of abundance and distribution in the Gulf of Alaska and Aleutian Islands (Muto *et al.* 2019). San Miguel Island and Santa Rosa Island were, in the past, the southernmost rookeries and haulouts for the Steller sea lions, but their range contracted northward in the 20th century, and now Año Nuevo Island off central California is currently the southernmost rookery (Muto *et al.* 2019; NMFS, 2008; Pitcher *et al.* 2007). Steller sea lions pups were known to be born at San Miguel Island up until 1981 (NMFS, 2008; Pitcher *et al.* 2007), and so, as the population continues to increase, it is anticipated that the Steller sea lions may re-establish a breeding colony on San Miguel Island in the future. In the Channel Islands and vicinity, despite the species' general absence from the area, a consistent but small number of Steller sea lions (one to two individuals at a time) have been sighted in recent years. Aerial surveys for pinnipeds in the Channel Islands from 2011 to 2015 encountered a single Steller sea lion at SNI in 2013 (Lowry *et al.* 2017). NMFS agrees with the Navy's assessment that these species are unlikely to occur in the PMSR Study Area and they are not discussed further.

Southern sea otter (*Enhydra lutris neris*) occurs nearshore off the coast of central California, ranging from Half Moon Bay in the north to Point Conception and at SNI (Tinker *et al.* 2006; Tinker and Hatfield, 2016; U.S. Geological Survey, 2014). Southern sea otters are managed by the U.S. Fish and Wildlife Service and therefore are not discussed further.

TABLE 9—MARINE MAMMAL OCCURRENCE WITHIN THE PMSR STUDY AREA

Common name	Scientific name [1]	Stock	Status		Stock abundance (CV)/N min; most recent abundance survey [2]	PBR [3]	Annual mortalities or serious injuries (M/SI) [4]
			MMPA	Endangered Species Act (ESA)			
Blue whale	*Balaenoptera musculus*	Eastern North Pacific	Depleted	Endangered	1,898 (0.085)/1,767; 2018.	4.1	≥19.4
Bryde's whale	*Balaenoptera brydei/edeni.*	Eastern Tropical Pacific			unk; na	unk	unk
Fin whale	*Balaenoptera physalus*	California, Oregon, and Washington.	Depleted	Endangered	11,065 (0.405)/7,9700; 2018.	80	≥43.7
Gray whale	*Eschrichtius robustus*	Eastern North Pacific			26,960 (0.05)/25,849; 2016.	801	139
		Western North Pacific	Depleted	Endangered	290 (na)/271; 2016	0.12	unk
Humpback whale	*Megaptera novaeangliae.*	California, Oregon, Washington.	Depleted	Threatened/Endangered [1].	4,973 (0.048)/4,776; 2018.	28.7	≥48.6
Minke whale	*Balaenoptera acutorostrata.*	California, Oregon, and Washington.			915 (0.792)/509; 2018.	4.1	≥0.59
Sei whale	*Balaenoptera borealis*	Eastern North Pacific	Depleted	Endangered	519 (0.4)/374; 2014.	0.75	≥0.2
Baird's beaked whale	*Berardius bairdii*	California, Oregon, and Washington.			1,363 (0.533)/894; 2018.	8.9	>0.8
Common Bottlenose dolphin.	*Tursiops truncatus*	California Coastal			453 (0.06)/346; 2011.	2.7	≥2.0
		California, Oregon, and Washington Offshore.			3,477 (0.696)/2,048; 2018.	19.7	0.82
Cuvier's beaked whale	*Ziphius cavirostris*	California, Oregon, and Washington.			3,274 (0.67)/2,059; 2014.	21	<0.1
Dall's porpoise	*Phocoenoides dalli*	California, Oregon, and Washington.			16,498 (0.608)/10,286; 2018.	99	0.66

TABLE 9—MARINE MAMMAL OCCURRENCE WITHIN THE PMSR STUDY AREA—Continued

Common name	Scientific name [1]	Stock	Status		Stock abundance (CV)/N min; most recent abundance survey [2]	PBR [3]	Annual mortalities or serious injuries (M/SI) [4]
			MMPA	Endangered Species Act (ESA)			
Dwarf sperm whale	*Kogia sima*	California, Oregon, and Washington.			unk; 2014	und	0
Harbor Porpoise	*Phocoena phocoena*	Morro Bay			4,191 (0.56)/2,698; 2012.	65	0
Killer whale	*Orcinus orca*	Eastern North Pacific Offshore.			300 (0.10)/276; 2012.	2.8	0
		Eastern North Pacific Transient/West Coast Transient [5].			349 na/349; 2018	3.5	0.4
Long-beaked common dolphin.	*Delphinus capensis*	California			83,379 (0.216)/69,636; 2018.	668	≥29.7
Mesoplodont beaked whales [6].	*Mesoplodon spp*	California, Oregon, and Washington.			3,044 (0.54)/1,967; 2014.	20	0.1
Northern right whale dolphin.	*Lissodelphis borealis*	California, Oregon, and Washington.			29,285 (0.717)/17,024; 2018.	163	≥6.6
Pacific white-sided dolphin.	*Lagenorhynchus obliquidens.*	California, Oregon, and Washington.			34,999 (0.222)/29,090; 2018.	279	7
Pygmy sperm whale	*Kogia breviceps*	California, Oregon, and Washington.			4,111 (1.12)/1,924; 2014.	19	0
Risso's dolphins	*Grampus griseus*	California, Oregon, and Washington.			6,336 (0.32)/4,817; 2014.	46	≥3.7
Short-beaked common dolphin.	*Delphinus delphis*	California, Oregon, and Washington.			1,056,308 (0.207)/888,971; 2018.	8,889	≥30.5
Short-finned pilot whale	*Globicephala macrorhynchus.*	California, Oregon, and Washington.			836 (0.79)/466; 2014.	4.5	1.2
Sperm whale	*Physeter macrocephalus.*	California, Oregon, and Washington.	Depleted	Endangered	1,997 (0.57)/1,270; 2014.	2.5	0.6
Striped dolphin	*Stenella coeruleoalba*	California, Oregon, and Washington.			29,988 (0.299)/23,448; 2018.	225	≥4.0
Harbor seal	*Phoca vitulina*	California			30,968 na/27,348; 2012.	1,641	43
Northern elephant seal	*Mirounga angustirostris*	California			187,386 na/85,369; 2013.	5,122	13.7
California sea lion	*Zalophus californianus*	U.S. Stock			257,606 na/233,515; 2014.	14,011	≥321
Northern fur seal	*Callorhinus ursinus*	California			14,050 na/7,524; 2013.	451	1.8
Guadalupe fur seal	*Arctocephalus townsendi.*	Mexico to California	Depleted	Threatened	34,187 unk/31,109; 2013.	1,602	≥3.8

[1] Taxonomy follows Committee on Taxonomy (2018).
[2] CV is coefficient of variation; N min is the minimum estimate of stock abundance. The most recent abundance survey that is reflected in the abundance estimate is presented; there may be more recent surveys that have not yet been incorporated into the estimate.
[3] PBR is the Potential biological removal, defined by the MMPA as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population size (OSP).
[4] These values, found in NMFS' SARs, represent annual levels of human-caused mortality plus serious injury from all sources combined (*e.g.,* commercial fisheries, subsistence hunting, ship strike). Annual M/SI often cannot be determined precisely and is in some cases presented as a range.
[5] This stock is mentioned briefly in the Pacific SAR and referred to as the ''Eastern North Pacific Transient'' stock, however, the Alaska Stock Assessment Report contains assessments of all transient killer whale stocks in the Pacific, and the Alaska Stock Assessment Report refers to this same stock as the ''West Coast Transient'' stock (Muto *et al.* 2019).
[6] The six Mesoplodont beaked whale species off California are M. densirostris, M. carlhubbsi, M. ginkgodens, M. perrini, M. peruvianus, M. stejnegeri.
Notes: na = not available; unk = unknown; und = undetermined or not provided in the draft 2021 SAR and 2020 SAR for the Pacific (Carretta *et al.* 2021) (Carretta *et al.* 2020).

Further, after Navy completed their modeling analysis, the following species/stocks had zero calculated estimated takes: Bryde's whale (Eastern Tropical Pacific), Gray whale (Western North Pacific), Sei whale (Eastern North Pacific), Baird's beaked whale (California, Oregon, and Washington), Bottlenose dolphin (California Coastal), Cuvier's beaked whale (California, Oregon, and Washington), Harbor Porpoise (Morro Bay), Killer whale (Eastern North Pacific Offshore, Eastern North Pacific Transient or West Coast Transient), Mesoplodont spp. (California, Oregon, and Washington), Short-finned pilot whale (California, Oregon, and Washington), and Northern fur seal (California). NMFS agrees with the Navy's analysis; therefore, these species are excluded from further analysis.

Below, we include additional information about the marine mammals in the area of the specified activities that informs our analysis, such as identifying known areas of important habitat or behaviors, or where Unusual Mortality Events (UME) have been designated.

Critical Habitat

The statutory definition of occupied critical habitat refers to ''physical or biological features essential to the conservation of the species,'' but the ESA does not specifically define or further describe these features. ESA-implementing regulations at 50 CFR 424.02 (as amended, 84 FR 45020; August 27, 2019), however, define such features as follows: The features that occur in specific areas and that are essential to support the life-history needs of the species, including but not limited to, water characteristics, soil type, geological features, sites, prey, vegetation, symbiotic species, or other features. A feature may be a single habitat characteristic, or a more complex combination of habitat characteristics. Features may include habitat characteristics that support ephemeral or dynamic habitat conditions. Features may also be expressed in terms relating to principles of conservation biology, such as patch

size, distribution distances, and connectivity.

On April 21, 2021, NMFS issued a final rule to designate critical habitat in nearshore waters of the North Pacific Ocean for the endangered Central America Distinct Population Segment (DPS) and the threatened Mexico DPS of humpback whales (86 FR 21082; April 21, 2021). Critical habitat for the Central America DPS and Mexico DPS was established within the California Current Ecosystem (CCE) off the coasts of California, Oregon, and Washington, representing areas of key foraging habitat. Prey of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth is identified as an essential feature to the conservation of these whales. Because humpback whales only rarely feed on breeding grounds and during migrations, humpback whales must have access to adequate prey resources within their feeding areas to build up their fat stores and meet the nutritional and energy demands associated with individual survival, growth, reproduction, lactation, seasonal migrations, and other normal life functions. Given that each of three humpback whale DPSs very clearly rely on the feeding areas while within U.S. waters, prey has been identified as a biological feature that is essential to the conservation of the whales. The prey essential feature was specifically defined as follows: Prey species, primarily euphausiids and small pelagic schooling fishes of sufficient quality, abundance, and accessibility within humpback whale feeding areas to support feeding and population growth.

NMFS considered 19 units of habitat as critical habitat for the listed humpback whale DPSs. There is overlap between the PMSR Study Area and portions of the habitat designated Units 17 and 18 (see Figure 3.7–5 of the 2022 PMSR FEIS/OEIS) in the final critical habitat rule (86 FR 21082; April 21, 2021), which are described below.

Unit 17, referred to as the ''Central California Coast Area,'' extends from 36°00′ N to a southern boundary at 34°30′ N. The nearshore boundary is defined by the 30-m isobath, and the seaward boundary is drawn along the 3,700-m isobath. This unit includes waters off of southern Monterey County, and San Luis Obispo and Santa Barbara Counties. Unit 17 covers 6,697 nmi^2 (22,970 km^2) of marine habitat. This unit encompasses Morro Bay to Point Sal Biologically Important Area (BIA; see next section) and typically supports high density feeding aggregations of humpback whales from April to November (Calambokidis *et al.* 2015). Based on acoustic survey data collected during 2004–2009, large krill hotspots, ranging from 700 km^2 to 2,100 km^2 (204 nmi^2 to 612 nmi^2), occur off Big Sur, San Luis Obispo, and Point Sal (Santora *et al.* 2011). Hotspots with persistent, heightened abundance of krill were also reported in this unit in association with bathymetric submarine canyons (Santora *et al.* 2018). This is the northernmost portion of humpback whale critical habitat that overlaps with the PMSR Study Area.

Unit 18, referred to as the ''Channel Islands Area,'' extends from a northern boundary at 34°30′ N to a boundary line that extends from Oxnard, CA, seaward to the 3,700-m isobath, along which the offshore boundary is drawn. The 50-m isobath forms the shoreward boundary. This unit includes waters off of Santa Barbara and Ventura counties. This unit covers 9,799 nmi^2 (33,610 km^2) of marine habitat. This unit encompasses the Santa Barbara Channel-San Miguel BIA, which supports high density feeding aggregations of humpback whales during March through September (Calambokidis *et al.* 2015). Based on acoustic survey data collected during 2004–2009, a krill hotspot of about 780 km^2 (227 nmi^2) has been documented off Point Conception (Santora *et al.* 2011). Some additional krill hotspots have also been observed in this unit in association with bathymetric submarine canyons (Santora *et al.* 2018). Coastal waters managed by the Navy, as addressed within the Point Mugu Integrated Natural Resources Management Plan (INRMP) and SNI INRMP, were not included in the designation as these areas were determined by NMFS to be ineligible for designation as critical habitat under section 4(a)(3)(B)(i) of the ESA (84 FR 54354; October 9, 2019).The Navy does not anticipate national security impacts resulting from critical habitat designation in the portion of Region/Unit 18 that overlaps with the PMSR Study Area.

Biologically Important Areas

Biologically Important Areas (BIAs) include areas of known importance for reproduction, feeding, or migration, or areas where small and resident populations are known to occur (Van Parijs, 2015). Unlike ESA critical habitat, these areas are not formally designated pursuant to any statute or law, but are a compilation of the best available science intended to inform impact and mitigation analyses. An interactive map of the BIAs may be found here: *https://cetsound.noaa.gov/biologically-important-area-map*.

BIAs off the West Coast of the continental United States with the potential to overlap portions of the PMSR Study Area include the following feeding and migration areas for blue whales, gray whales, and humpback whales and are described in further detail below (Calambokidis *et al.* 2015).

Blue Whale Feeding BIAs Three blue whale feeding BIAs overlap with the PMSR Study Area (see Figure 3.7–2 of the 2022 PMSR FEIS/OEIS). The Point Conception/Arguello to Point Sal Feeding Area and Santa Barbara Channel and San Miguel Feeding Area have large portions within the PMSR Study Area, 87 and 61 percent respectively. The San Nicolas Island Feeding Area is entirely within the PMSR Study Area (Calambokidis *et al.* 2015a). Feeding by blue whales occurs from June through October in these BIAs (Calambokidis *et al.* 2015a).

Gray Whale Migration BIAs

Four gray whale migration BIAs overlap with the PMSR Study Area (see Figure 3.7–3 of the 2022 PMSR FEIS/OEIS). The northward migration of the Eastern North Pacific stock of gray whales to the feeding grounds in Arctic waters, Alaska, the Pacific Northwest, and Northern California occurs in two phases: Northbound Phase A and Northbound Phase B (Calambokidis *et al.* 2015). Northbound Phase A migration BIA consists mainly of adults and juveniles that lead the beginning of the north-bound migration from late January through July, peaking in April through July. Newly pregnant females go first to maximize feeding time, followed by adult females and males, and then juveniles (Jones and Swartz, 2009). The Northbound Phase B migration BIA consists primarily of cow-calf pairs that begin their northward migration later (March through July), as they remain on the reproductive grounds longer to allow calves to strengthen and rapidly increase in size before the northward migration (Jones and Swartz, 2009; Urban-Ramirez *et al.* 2003). The Potential presence migration BIA (January through July; October through December) and the Southbound—All migration BIA (October through March) routes pass through the waters of the PMSR Study Area.

Humpback Whale Feeding BIAs

Two humpback whale feeding areas overlap with the PMSR Study Area (Calambokidis *et al.* 2015) (see Figure 3.7–4 of the 2022 PMSR FEIS/OEIS). These BIAs include the Morro Bay to Point Sal feeding area (April through November) and the Santa Barbara

Channel–San Miguel feeding area (March through September) (Calambokidis *et al.* 2015). The majority of these BIAs overlap with the PMSR Study Area (approximately 75 percent).

National Marine Sanctuaries

Under the National Marine Sanctuaries Act (NMSA)), NOAA can establish as national marine sanctuaries (NMS), areas of the marine environment with special conservation, recreational, ecological, historical, cultural, archaeological, scientific, educational, or aesthetic qualities. Sanctuary regulations prohibit or regulate activities that could destroy, cause the loss of, or injure sanctuary resources pursuant to the regulations for that sanctuary and other applicable law (15 CFR part 922). NMSs are managed on a site-specific basis, and each sanctuary has site-specific regulations. Most, but not all, sanctuaries have site-specific regulatory exemptions from the prohibitions for certain military activities. Separately, section 304(d) of the NMSA requires Federal agencies to consult with the Office of National Marine Sanctuaries whenever their activities are likely to destroy, cause the loss of, or injure a sanctuary resource.

There are two NMSs managed by the Office of National Marine Sanctuaries within the PMSR Study Area: the Channel Islands NMS and a small portion of the Monterey Bay NMS. The Channel Islands NMS is an ecosystem-based managed sanctuary consisting of an area of 1,109 nmi^2 (3,804 km^2) around Anacapa Island, Santa Cruz Island, Santa Rosa Island, San Miguel Island, and Santa Barbara Island to the south. It encompasses sensitive habitats (*e.g.,* kelp forest habitat, deep benthic habitat) and includes various shipwrecks and maritime heritage artifacts. The Channel Islands NMS waters and its remote, isolated position at the confluence of two major ocean currents support significant biodiversity of marine mammals, fish, and invertebrates. At least 33 species of cetaceans have been reported in the Channel Islands NMFS region with common species, including: long-beaked common dolphin, short-beaked common dolphin, Bottlenose dolphin, Pacific white-sided dolphin, Northern right whale dolphin, Risso's dolphin, California gray whale, Blue whale, and Humpback whale. The three species of pinnipeds that are commonly found throughout or in part of the Channel Islands NMS include: California sea lion, Northern elephant seal, and Pacific harbor seal. About 877 nmi^2 (3,008 km^2) or 79 percent of the Channel Island NMS, occurs within the PMSR Study Area (see Chapter 6 of the 2022 PMSR FEIS/OEIS and Figure 6.1–1). The Monterey Bay NMS is an ecosystem-based managed sanctuary consisting of an area of 4,601 nmi^2 (15,781 km^2) stretching from Marin to Cambria and extending an average of 30 miles from shore. The Monterey Bay NMS contains extensive kelp forests and one of North America's largest underwater canyons and closest-to-shore deep ocean environments. Its diverse marine ecosystem also includes rugged rocky shores, wave-swept sandy beaches and tranquil estuaries. These habitats support a variety of marine life, including 36 species of marine mammals, more than 180 species of seabirds and shorebirds, at least 525 species of fishes, and an abundance of invertebrates and algae. Of the 36 species of marine mammals, six are pinnipeds with California sea lions being the most common, and the remainder are twenty-six species of cetaceans. Only 19 nmi^2 (65 km^2) or less than 1 percent of the Monterey Bay NMS, occurs within the PMSR Study Area (see Chapter 6 of the 2022 PMSR FEIS/OEIS and Figure 6.1–1).

Unusual Mortality Events (UMEs)

An UME is defined under Section 410(6) of the MMPA as a stranding that is unexpected; it involves a significant die-off of any marine mammal population, and demands immediate response. From 1991 to the present, there have been 14 formally recognized UMEs affecting marine mammals in California and involving species under NMFS' jurisdiction. Three UMEs with ongoing or recently closed investigations in the PMSR Study Area that inform our analysis are discussed below. The California sea lion and the Guadalupe fur seal UMEs are now closed. The gray whale UME along the west coast of North America are active and involve ongoing investigations.

California Sea Lion UME

From January 2013 through September 2016, a greater than expected number of young malnourished California sea lions (*Zalophus californianus*) stranded along the coast of California. Sea lions stranding from an early age (6–8 months old) through 2 years of age (hereafter referred to as juveniles) were consistently underweight without other disease processes detected. Of the 8,122 stranded juveniles attributed to the UME, 93 percent stranded alive (n=7,587, with 3,418 of these released after rehabilitation) and 7 percent (n=531) stranded dead. Several factors are hypothesized to have impacted the ability of nursing females and young sea lions to acquire adequate nutrition for successful pup rearing and juvenile growth. In late 2012, decreased anchovy and sardine recruitment (CalCOFI data, July 2013) may have led to nutritionally stressed adult females. Biotoxins were present at various times throughout the UME, and while they were not detected in the stranded juvenile sea lions (whose stomachs were empty at the time of stranding), biotoxins may have impacted the adult females' ability to support their dependent pups by affecting their cognitive function (*e.g.,* navigation, behavior towards their offspring). Therefore, the role of biotoxins in this UME, via its possible impact on adult females' ability to support their pups, is unclear. The proposed primary cause of the UME was malnutrition of sea lion pups and yearlings due to ecological factors. These factors included shifts in distribution, abundance and/or quality of sea lion prey items around the Channel Island rookeries during critical sea lion life history events (nursing by adult females, and transitioning from milk to prey by young sea lions). These prey shifts were most likely driven by unusual oceanographic conditions at the time due to the event known as the ''Warm Water Blob'' and El Niño. This investigation closed on May 6, 2020. Please refer to: *https://www.fisheries.noaa.gov/national/marine-life-distress/2013-2016-california-sea-lion-unusual-mortality-event-california* for more information on this UME.

Guadalupe Fur Seal UME

Increased strandings of Guadalupe fur seals began along the entire coast of California in January 2015 and were eight times higher than the historical average (approximately 10 seals/yr). Strandings have continued since 2015 and remained well above average through 2021. Numbers by year are as follows: 2015 (98), 2016 (76), 2017 (63), 2018 (45), 2019 (207), 2020 (139) and 2021 (92). The total number of Guadalupe fur seals stranding in California from January 1, 2015, through September 2, 2021, in the UME is 721. Strandings of Guadalupe fur seals became elevated in the spring of 2019 in Washington and Oregon, and strandings for seals in these two states subsequently (starting from January 1, 2019) have been added to the UME. The total number of strandings in Washington and Oregon is 181 seals, including 42 in 2020 and 45 in 2021. Strandings are seasonal and generally peak in April through June of each year. The Guadalupe fur seal strandings

involved the stranding of mostly weaned pups and juveniles (1–2 years old), with both live and dead strandings occurring. Current studies of this UME find that the majority of stranded animals experienced primary malnutrition with secondary bacterial and parasitic infections. The California portion of this UME was occurring in the same area where the 2013–2016 California sea lion UME occurred. This investigation is now closed. Please refer to: *https://www.fisheries.noaa.gov/national/marine-life-distress/2015-2021-guadalupe-fur-seal-and-2015-northern-fur-seal-unusual* for more information on this UME.

Gray Whale UME

Since January 1, 2019, elevated levels of gray whale strandings have occurred along the west coast of North America, from Mexico to Canada. As of April 1, 2022, there have been a total of 531 strandings along the coasts of the United States, Canada, and Mexico, with 259 of those strandings occurring along the U.S. coast. Of the strandings on the U.S. coast, 116 have occurred in Alaska, 59 in Washington, 12 in Oregon, and 72 in California. Partial necropsy examinations conducted on a subset of stranded whales have shown evidence of emaciation, killer whale predation, and human interactions. As part of the UME investigation process, NOAA has assembled an independent team of scientists to coordinate with the Working Group on Marine Mammal UMEs to review the data collected, sample stranded whales, consider possible causal linkages between the mortality event and recent ocean and ecosystem perturbations, and determine the next steps for the investigation. Please refer to: *https://www.fisheries.noaa.gov/national/marine-life-distress/2019-2022-gray-whale-unusual-mortality-event-along-west-coast-and*.

Potential Effects of Specified Activities on Marine Mammals and Their Habitat

We provided a detailed discussion of the potential effects of the specified activities on marine mammals and their habitat in the preamble of the PMSR proposed rule. In the *Potential Effects of Specified Activities on Marine Mammals and Their Habitat* section of that proposed rule, NMFS provided a description of the ways marine mammals may be affected by these activities in the form of, among other things, sensory impairment (permanent and temporary threshold shift and acoustic masking), physiological responses (particularly stress responses), behavioral disturbance, or habitat effects. All of this information remains valid and applicable and is adopted here by reference. Therefore, we have not reprinted the information in the preamble of this final rule, but refer the reader to our proposed rule (86 FR 37790; July 16, 2021).

Vessel Strike

Vessel strikes from commercial, recreational, and military vessels are known to affect large whales and have resulted in serious injury and occasional fatalities to cetaceans (Berman-Kowalewski *et al.* 2010; Calambokidis, 2012; Douglas *et al.* 2008; Laggner 2009; Lammers *et al.* 2003). Records of collisions date back to the early 17th century, and the worldwide number of collisions appears to have increased steadily during recent decades (Laist *et al.* 2001; Ritter 2012).

Numerous studies of interactions between surface vessels and marine mammals have demonstrated that free-ranging marine mammals often, but not always (*e.g.,* McKenna *et al.* 2015), engage in avoidance behavior when surface vessels move toward them. It is not clear whether these responses are caused by the physical presence of a surface vessel, the underwater noise generated by the vessel, or an interaction between the two (Amaral and Carlson, 2005; Au and Green, 2000; Bain *et al.* 2006; Bauer 1986; Bejder *et al.* 1999; Bejder and Lusseau, 2008; Bejder *et al.* 2009; Bryant *et al.* 1984; Corkeron, 1995; Erbe, 2002; Félix, 2001; Goodwin and Cotton, 2004; Lemon *et al.* 2006; Lusseau, 2003; Lusseau, 2006; Magalhaes *et al.* 2002; Nowacek *et al.* 2001; Richter *et al.* 2003; Scheidat *et al.* 2004; Simmonds, 2005; Watkins, 1986; Williams *et al.* 2002; Wursig *et al.* 1998). Several authors suggest that the noise generated during motion is probably an important factor (Blane and Jaakson, 1994; Evans *et al.* 1992; Evans *et al.* 1994). Water disturbance may also be a factor. These studies suggest that the behavioral responses of marine mammals to surface vessels are similar to their behavioral responses to predators. Avoidance behavior is expected to be even stronger in the subset of instances during which the Navy is conducting training or testing activities using explosives.

The marine mammals most vulnerable to vessel strikes are those that spend extended periods of time at the surface in order to restore oxygen levels within their tissues after deep dives (*e.g.,* sperm whales). In addition, some baleen whales seem generally unresponsive to vessel sound, making them more susceptible to vessel collisions (Nowacek *et al.* 2004). These species are primarily large, slow moving whales.

Some researchers have suggested the relative risk of a vessel strike can be assessed as a function of animal density and the magnitude of vessel traffic (*e.g.,* Fonnesbeck *et al.* 2008; Vanderlaan *et al.* 2008). Differences among vessel types also influence the probability of a vessel strike. The ability of any ship to detect a marine mammal and avoid a collision depends on a variety of factors, including environmental conditions, ship design, size, speed, and ability and number of personnel observing, as well as the behavior of the animal. Vessel speed, size, and mass are all important factors in determining if injury or death of a marine mammal is likely due to a vessel strike. For large vessels, speed and angle of approach can influence the severity of a strike. For example, Vanderlaan and Taggart (2007) found that, between vessel speeds of 8.6 and 15 knots (16 and 28 km/hour), the probability that a vessel strike is lethal increases from 0.21 to 0.79. Large whales also do not have to be at the water's surface to be struck. Silber *et al.* (2010) found when a whale is below the surface (about one to two times the vessel draft), under certain circumstances (vessel speed and location of the whale relative to the ship's centerline), there is likely to be a pronounced propeller suction effect. This suction effect may draw the whale into the hull of the ship, increasing the probability of propeller strikes.

There are some key differences between the operation of military and non-military vessels, which make the likelihood of a military vessel striking a whale lower than some other vessels (*e.g.,* commercial merchant vessels). Key differences include:

- Many military ships have their bridges positioned closer to the bow, offering better visibility ahead of the ship (compared to a commercial merchant vessel);
- There are often aircraft associated with the training or testing activity (which can serve as Lookouts), which can more readily detect cetaceans in the vicinity of a vessel or ahead of a vessel's present course before crew on the vessel will be able to detect them;
- Military ships are generally more maneuverable than commercial merchant vessels, and if cetaceans are spotted in the path of the ship, could be capable of changing course more quickly;
- The crew size on military vessels is generally larger than merchant ships, allowing for stationing more trained Lookouts on the bridge. At all times when Navy vessels are underway,

trained Lookouts and bridge navigation teams are used to detect objects on the surface of the water ahead of the ship, including cetaceans. Additional Lookouts, beyond those already stationed on the bridge and on navigation teams, are positioned as Lookouts during some testing and training events; and

- When submerged, submarines are generally slow moving (to avoid detection) and therefore marine mammals at depth with a submarine are likely able to avoid collision with the submarine. When a submarine is transiting on the surface, there are Lookouts serving the same function as they do on surface ships.

While there have been vessel strikes documented with commercial vessels, NMFS has no documented vessel strikes of marine mammals by the Navy in the PMSR Study Area since the Navy started keeping records of ship strike in 1995 and through October 2021. Predominantly aircraft are used in the PMSR Study Area rather than vessels. The only large Navy vessels homebased in the PMSR local area (Port Hueneme) are the Self Defense Test Ship and the Mobile Ship Target, which are both greater than 200 ft in length. There are smaller vessels used either as targets or for target recovery as well. The majority of Navy vessels (*e.g.,* LCS, destroyers) used during testing and training on the PMSR Study Area transit from San Diego Navy bases and typically transit further offshore and enter/exit the PMSR Study Area from the southwestern boundaries to avoid commercial vessel traffic in and out of the Ports or Los Angeles/Long Beach via the Santa Barbara Channel.

However, recently there have been four documented whale strikes in southern California, in the Navy's Hawaii-Southern California Testing and Training (HSTT) Study Area (outside of the PMSR Study Area) over three separate events in 2021. Two fin whales were killed by a foreign vessel, a 147.5 m (483.9 ft) Royal Australian Navy destroyer, the HMAS Sydney, operating in the HSTT Study Area on or about May 7, 2021. Separately, on or about June 29 and July 11, 2021, the Navy reported two unknown whale strikes (potential mortalities) in the SOCAL Range Complex from 567-ft U.S. Navy cruisers. Vessel speed was unknown at the time of the fin whale strikes by the Royal Australian Navy, but the other two unknown whale strikes by the Navy occurred at vessel speeds of 16 and 25 knots (30 and 46 km/hour).

While these four whale strikes are concerning, they did not occur in the PMSR Study Area and the activities that occur in the PMSR are far fewer than what occurs in the HSTT Study Area. Activities involving Navy vessel movement are variable in duration (*i.e.,* hours to days), will be widely dispersed throughout the action area, and occur intermittently. Average military vessel speed for the PMSR Study Area is approximately 10.6 knots (19.6 km/hour) for the types of vessels typically involved in PMSR activities (Mintz, 2016). In comparison to the SOCAL Range Complex, the estimated number of annual at-sea days in the PMSR Study Area is less than 3 percent of what occurs in the SOCAL Range Complex annually (previously discussed in the *Vessel Movement* section of this rule, Table 4). These factors that make it unlikely that vessel strike would occur in the PMSR Study Area are discussed in greater detail below.

Regarding foreign vessels, such as the HSMAS Sydney of the Royal Australian Navy, according to Mintz (2016) and Starcovic and Mintz (2021), they comprised less than 1 percent of all vessel traffic in Southern California. Foreign military sails (FMS) are approximately 5 percent of the PMSR activities, with the majority of those activities having no vessel involvement other than range support vessels (*e.g.,* Diane G and SL–120) used to recover air or surface targets and parachutes. The PMSR Study Area averages one foreign military activity annually that involves vessels. These events can last up to 10 days and typically involve only one naval vessel as the firing platform at aerial or surface targets. Foreign military activities are required to follow the same mitigations, at a minimum, as are all customers on the PMSR Study Area. When a customer does not have the capability to implement a required protective measure, the Navy will implement the required measures (*e.g.,* marine mammal surveys aboard vessels and aircraft).

The Navy transits at safer speeds and has other protective measures in place during transits, such as using Lookouts and maintaining safe distances from marine mammals (*e.g.,* 500 yd (457.2 m) for whales and 200 yd (182.88 m) around other marine mammals except bow-riding dolphins and pinnipeds hauled out on man-made navigational structures, port structures, and vessels). A DoD funded study (Mintz, 2016) on commercial and military vessel traffic in Southern California found that median vessel speed for Navy vessels in the Santa Barbara Channel and nearshore areas of the PMSR Study Area and SOCAL (part of the HSTT Study Area) was between 3 to 8 knots (6 to 15 km/hour). Speed increased as vessels transited further offshore, between 10–16 knots, with the higher value on the furthest offshore areas of the PMSR Study Area.

Commercial tankers and cargo median vessel speeds were between 8–14 knots (15 to 26 km/hour) for the same nearshore areas. Mintz (2016) indicated that Navy vessels make up only 4 percent of the overall vessel traffic off Southern California (PMSR/SOCAL). The data collected for Mintz (2016) was collected via AIS for commercial vessel data and SeaLink for military vessels (a classified Navy/Coast Guard database maintained by the Office of Naval Intelligence). The median surface speed of two of the classes of vessels used on the PMSR Study Area from 2011 through 2015 was below 12 knots (22 km/hour). This median speed includes those training and testing operations that require elevated speeds, and being slightly above 10 knots (19 km/hour), indicates that Naval vessels typically operate at speeds that would be expected to reduce the potential of vessel strike of a marine mammal.

The Navy has several standard operating procedures for vessel safety that could result in a secondary benefit to marine mammals through a reduction in the potential for vessel strike. For example, ships operated by or for the Navy have personnel assigned to stand watch at all times, day and night, when moving through the water (*i.e.,* when the vessel is underway). Watch personnel undertake extensive training in accordance with the U.S. Navy Lookout Training Handbook or civilian equivalent. A primary duty of watch personnel is to ensure safety of the ship, which includes the requirement to detect and report all objects and disturbances sighted in the water that may be indicative of a threat to the ship and its crew, such as debris, a periscope, surfaced submarine, or surface disturbance. Per safety requirements, watch personnel also report any marine mammals sighted that have the potential to be in the direct path of the ship, as a standard collision avoidance procedure. Navy vessels are required to operate in accordance with applicable navigation rules. These rules require that vessels proceed at a safer speed so proper and effective action can be taken to avoid collision and so vessels can be stopped within a distance appropriate to the prevailing circumstances and conditions. In addition to complying with navigation requirements, Navy ships transit at speeds that are optimal for fuel conservation, to maintain ship schedules, and to meet mission requirements. Vessel captains use the

totality of the circumstances to ensure the vessel is traveling at appropriate speeds in accordance with navigation. This Navy message is also consistent with a message issued by the U.S. Coast Guard for vessels operating in the 11th district (covering the waters in and around the PMSR) as a Notice to Mariners that also informs operators about the presence of populations of blue, humpback, and fin whales in the area (see U.S. Coast Guard (2019) for further details).

For more information, please see section 3.7.1.1.1 (Vessels as a Strike Stressor) in the 2022 PMSR FEIS/OEIS. Additionally, the Navy has fewer vessel transits than commercial entities in the PMSR Study Area. To put the PMSR Navy vessel operations level in perspective, Table 10 includes an estimate of annual commercial shipping activity compared with vessel use in the PMSR Study Area. These annual estimates are representative of any given year for this rule. Navy vessels account for only about nine percent of the vessel traffic within the PMSR Study Area.

TABLE 10—NAVY AND COMMERCIAL VESSEL EVENTS ON THE PMSR STUDY AREA

Vessel type	Number of events [1]
Project Ships	300.
Support Boats	198.
Small Support Boats	Up to 387 [2].
Total PMSR Navy	836.
Commercial Shipping Estimate	>7,000 [3].

[1] "Event" is defined as one trip into the Sea Range for an assigned mission.

[2] Total number of High-Speed Maneuvering Surface Targets (HSMSTs) and QST35s used as support boats.

[3] Data collected is for fiscal year (FY) 2015.

In addition, large Navy vessels (greater than 18 m (20 yd) in length) within the offshore areas of range complexes and testing ranges operate differently from commercial vessels in ways that may reduce potential for whale collisions. Surface ships operated by or for the Navy have multiple personnel assigned to stand watch at all times, when a ship or surfaced submarine is moving through the water (underway).

Between 2007 and 2009, the Navy developed and distributed additional training, mitigation, and reporting tools to Navy operators to improve marine mammal protection and to ensure compliance with LOA requirements. In 2009, the Navy implemented Marine Species Awareness Training designed to improve effectiveness of visual observation for marine resources, including marine mammals. For over a decade, the Navy has implemented the Protective Measures Assessment Protocol software tool, which provides operators with notification of the required mitigation and a visual display of the planned training or testing activity location overlaid with relevant environmental data.

The Navy does not anticipate vessel strikes and has not requested authorization to take marine mammals by serious injury or mortality within the PMSR Study Area during training and testing activities. NMFS agrees with the Navy's conclusions based on this qualitative analysis, and further NMFS considered additional information based on the four recent whale strikes in the SOCAL Range Complex. Therefore, NMFS has determined that the Navy's decision not to request take authorization for vessel strike of large whales is supported by multiple factors, including no previous instances of strikes by Navy vessels in the PMSR Study Area, relatively low at-sea days compared to other Navy training and testing study areas, fewer vessels used compared to other Navy training and testing study areas, ways in which the larger vessels operate in the PMSR Study Area, and the mitigation measures that will be in place to further minimize potential vessel strike.

In addition to the reasons listed above that make it unlikely that the Navy would hit a large whale (more maneuverable ships, larger crew, *etc.*), the following are additional reasons that vessel strike of dolphins, small whales, and pinnipeds is very unlikely. Dating back more than 20 years and for as long as it has kept records, the Navy has no records of any small whales or pinnipeds being struck by a vessel as a result of Navy activities. Over the same time period, NMFS and the Navy have only one record of a dolphin being struck by a vessel as a result of Navy activities. The dolphin was accidentally struck by a Navy small boat in fall 2021 in Saint Andrew's Pass, Florida. The smaller size and maneuverability of dolphins, small whales, and pinnipeds generally make such strikes very unlikely. Other than this one reported strike of a dolphin in 2021, NMFS has never received any reports from other LOA or Incidental Harassment Authorization holders indicating that these species have been struck by vessels. In addition, worldwide ship strike records show little evidence of strikes of these groups from the shipping sector and larger vessels, and the majority of the Navy's activities involving faster-moving vessels (that could be considered more likely to hit a marine mammal) are located in offshore areas where smaller delphinid densities are lower. Based on this information, NMFS concurs with the Navy's assessment that vessel strike is not likely to occur for either large whales or smaller marine mammals.

Estimated Take of Marine Mammals

This section indicates the number of takes that NMFS is authorizing, which is based on the amount of take that NMFS anticipates could occur or the maximum amount that is reasonably likely to occur, depending on the type of take and the methods used to estimate it, as described in detail below. NMFS coordinated closely with the Navy in the development of their incidental take application, and agrees that the methods the Navy has put forth described herein to estimate take (including the model, thresholds, and density estimates), and the resulting numbers estimated for authorization, are appropriate and based on the best available science and appropriate for authorization.

All takes are by harassment. For a military readiness activity, the MMPA defines ''harassment'' as (i) Any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild (Level A Harassment); or (ii) Any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered (Level B Harassment). No serious injury or mortality of marine mammals is expected to occur.

Authorized takes will primarily be in the form of Level B harassment. The use of explosive sources and missile launches may result, either directly or as result of TTS, in the disruption of natural behavioral patterns to a point where they are abandoned or significantly altered (as defined specifically at the beginning of this section, but referred to generally as behavioral disruption). There is also the potential for Level A harassment, in the form of auditory injury, to result from exposure to the sound sources utilized in training and testing activities.

Generally speaking, for acoustic impacts, NMFS estimates the amount and type of harassment by considering: (1) acoustic thresholds above which NMFS believes the best available science indicates marine mammals will be taken by Level B harassment or incur some degree of temporary or permanent

hearing impairment; (2) the area or volume of water that will be ensonified above these levels in a day or event; (3) the density or occurrence of marine mammals within these ensonified areas; and (4) the number of days of activities or events. Below, we describe these components in more detail and present the take estimates.

Acoustic Thresholds

Using the best available science, NMFS, in coordination with the Navy, has established acoustic thresholds that identify the most appropriate received level of underwater sound above which marine mammals exposed to these sound sources could be reasonably expected to directly experience a disruption in behavior patterns to a point where they are abandoned or significantly altered, to incur TTS (equated to Level B harassment), or to incur PTS of some degree (equated to Level A harassment). Thresholds have also been developed to identify the pressure levels above which animals may incur non-auditory injury from exposure to pressure waves from explosive detonation. Refer to the ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)'' report (U.S. Department of the Navy, 2017c) for detailed information on how the criteria and thresholds were derived.

Despite the quickly evolving science, there are still challenges in quantifying expected behavioral responses that qualify as take by Level B harassment, especially where the goal is to use one or two predictable indicators (*e.g.,* received level and distance) to predict responses that are also driven by additional factors that cannot be easily incorporated into the thresholds (*e.g.,* context). So, while the thresholds that identify Level B harassment by behavioral disturbance (referred to as ''behavioral harassment thresholds'') have been refined here to better consider the best available science (*e.g.,* incorporating both received level and distance), they also still have some built-in conservative factors to address the challenge noted. For example, while duration of observed responses in the data are now considered in the thresholds, some of the responses that are informing take thresholds are of a very short duration, such that it is possible that some of these responses might not always rise to the level of disrupting behavior patterns to a point where they are abandoned or significantly altered. We describe the application of this behavioral harassment threshold as identifying the maximum number of instances in which marine mammals could be reasonably expected to experience a disruption in behavior patterns to a point where they are abandoned or significantly altered. In summary, we believe these behavioral harassment thresholds are the most appropriate method for predicting Level B harassment by behavioral disturbance given the best available science and the associated uncertainty.

Hearing Impairment (TTS/PTS), Tissues Damage, and Mortality

NMFS' Acoustic Technical Guidance (NMFS, 2018) identifies dual criteria to assess auditory injury (Level A harassment) to five different marine mammal groups (based on hearing sensitivity) as a result of exposure to noise from two different types of sources (impulsive or non-impulsive). The Acoustic Technical Guidance also identifies criteria to predict TTS, which is not considered injury and falls into the Level B harassment category. The Navy's planned activity only includes the use of impulsive (explosives) sources. These thresholds (Table 11) were developed by compiling and synthesizing the best available science and soliciting input multiple times from both the public and peer reviewers. The references, analysis, and methodology used in the development of the thresholds are described in Acoustic Technical Guidance, which may be accessed at: *https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-acoustic-technical-guidance*.

Based on the best available science, the Navy (in coordination with NMFS) used the acoustic and pressure thresholds indicated in Table 11 to predict the onset of TTS, PTS, tissue damage, and mortality for explosives (impulsive) and other impulsive sound sources.

TABLE 11—ONSET OF TTS, PTS, TISSUE DAMAGE, AND MORTALITY THRESHOLDS FOR MARINE MAMMALS FOR EXPLOSIVES AND OTHER IMPULSIVE SOURCES

Functional hearing group	Species	Onset TTS	Onset PTS	Mean onset slight GI tract injury	Mean onset slight lung injury	Mean onset mortality
Low-frequency cetaceans.	All mysticetes	168 dB SEL (weighted) or 213 dB Peak SPL.	183 dB SEL (weighted) or 219 dB Peak SPL.	237 dB Peak SPL	Equation 1	Equation 2.
Mid-frequency cetaceans.	Most delphinids, medium and large toothed whales.	170 dB SEL (weighted) or 224 dB Peak SPL.	185 dB SEL (weighted) or 230 dB Peak SPL.	237 dB Peak SPL.		
High-frequency cetaceans.	Porpoises and Kogia spp..	140 dB SEL (weighted) or 196 dB Peak SPL.	155 dB SEL (weighted) or 202 dB Peak SPL.	237 dB Peak SPL.		

Notes:
Equation 1: $47.5M^{1/3}\ (1+[D_{Rm}/10.1])^{1/6}$ Pa-sec.
Equation 2: $103M^{1/3}\ (1+[D_{Rm}/10.1])^{1/6}$ Pa-sec.
M = mass of the animals in kg.
D_{Rm} = depth of the receiver (animal) in meters.
SPL = sound pressure level.

Refer to the ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)'' report (U.S. Department of the Navy, 2017c) for detailed information on how the criteria and thresholds were derived. Non-auditory injury (*i.e.,* other than PTS) and mortality are so unlikely as to be discountable under normal conditions and are therefore not considered further in this analysis.

The mitigation measures associated with explosives are expected to be effective in preventing non-auditory tissue damage to any potentially affected species, and when considered in combination with the modeled exposure results, no species are anticipated to incur non-auditory tissue damage during the period of this rule. Table 19 indicates the range of effects for tissue damage for different explosive types. The Navy will implement mitigation measures (described in the *Mitigation Measures* section) during explosive activities, including delaying detonations when a marine mammal is observed in the mitigation zone. Nearly all explosive events will occur during daylight hours to improve the sightability of marine mammals and thereby improve mitigation effectiveness. Observing for marine mammals during the explosive activities will include visual methods before the activity begins, in order to cover the mitigation zone (*e.g.,* 2,500 yd (2,286 m) for explosive bombs).

Behavioral Disturbance

Though significantly driven by received level, the onset of Level B harassment by direct behavioral disturbance from anthropogenic noise exposure is also informed to varying degrees by other factors related to the source (*e.g.,* frequency, predictability, duty cycle, distance), the environment (*e.g.,* bathymetry), and the receiving animals (hearing, motivation, experience, demography, behavioral context) and can be difficult to predict (Ellison *et al.* 2011; Southall *et al.* 2007). Based on what the available science indicates and the practical need to use thresholds based on a factor, or factors, that are both predictable and measurable for most activities, NMFS uses generalized acoustic thresholds based primarily on received level (and distance in some cases) to estimate the onset of Level B harassment by behavioral disturbance.

Explosives—Explosive thresholds for Level B harassment by behavioral disturbance for marine mammals are the hearing groups' TTS thresholds minus 5 dB (see Table 12 below and Table 11 for the TTS thresholds for explosives) for events that contain multiple impulses from explosives underwater. This was the same approach as taken in Phase II and Phase III for explosive analysis in other Navy training and testing study areas. See the ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)'' report (U.S. Department of the Navy, 2017c) for detailed information on how the criteria and thresholds were derived. NMFS continues to concur that this approach represents the best available science for determining behavioral disturbance of marine mammals from multiple explosives. While marine mammals may also respond to single explosive detonations, those responses are expected to more typically be in the form of startle reaction, rather than a disruption in natural behavioral patterns to the point where they are abandoned or significantly altered. On the rare occasion that a single detonation might result in a more severe behavioral response that qualifies as Level B harassment, it would be expected to be in response to a comparatively higher received level. Accordingly, NMFS considers the potential for these responses to be quantitatively accounted for through the application of the TTS threshold, which as noted above is 5dB higher than the behavioral harassment threshold for multiple explosives.

TABLE 12—THRESHOLDS FOR LEVEL B HARASSMENT BY BEHAVIORAL DISTURBANCE FOR EXPLOSIVES FOR MARINE MAMMALS

Medium	Functional hearing group	SEL (weighted)
Underwater	LF	163
Underwater	MF	165
Underwater	HF	135
Underwater	Otariids	183
Underwater	Phocids	165
In-Air	Otariids	100
In-Air	Phocids	100

Note: Weighted SEL thresholds in dB re 1 μPa^{2}s underwater. LF = low-frequency, MF = mid-frequency, HF = high-frequency.

TABLE 13—TTS/PTS THRESHOLDS FOR PINNIPEDS

[In-air]

Group	Non-impulsive		Impulsive			
	TTS threshold SEL [a] (weighted)	PTS threshold SEL [a] (weighted)	TTS threshold SEL [a] (weighted)	TTS threshold peak SPL [b] (unweighted)	PTS threshold SEL [b] (weighted)	PTS threshold peak SPL [b] (unweighted)
OA [c]	157	177	146	170	161	176
PA [d]	134	154	123	155	138	161

[a] SEL thresholds are in dB re(20μPa)^2.s.
[b] SPL thresholds in dB 20μPa in air.
[c] OA-Otariid in air (California sea lion).
[d] PA-Phocid in air (harbor seal, northern elephant seal).

Navy's Acoustic Effects Model

The Navy's Acoustic Effects Model calculates sound energy propagation from sonar and other transducers and explosives during naval activities and the sound received by animat dosimeters. Animat dosimeters are virtual representations of marine mammals distributed in the area around the modeled naval activity and each dosimeter records its individual sound ''dose.'' The model bases the distribution of animats over the PMSR Study Area on the density values in the Navy Marine Species Density Database

and distributes animats in the water column proportional to the known time that species spend at varying depths.

The model accounts for environmental variability of sound propagation in both distance and depth when computing the received sound level received by the animats. The model conducts a statistical analysis based on multiple model runs to compute the estimated effects on animals. The number of animats that exceed the thresholds for effects is tallied to provide an estimate of the number of marine mammals that could be affected.

Assumptions in the Navy model intentionally err on the side of overestimation when there are unknowns. Naval activities are modeled as though they would occur regardless of proximity to marine mammals, meaning that no mitigation is considered and without any avoidance of the activity by the animal. The final step of the quantitative analysis of acoustic effects is to consider the implementation of mitigation and the possibility that marine mammals would avoid continued or repeated sound exposures. For more information on this process, see the discussion in the *Take Estimation* subsection below. Many explosions from ordnance such as bombs and missiles actually occur upon impact with above-water targets. However, for this analysis, sources such as these were modeled as exploding underwater, which overestimates the amount of explosive and acoustic energy entering the water.

The model estimates the impacts caused by individual training and testing activities. During any individual modeled event, impacts to individual animats are considered over 24-hour periods. The animats do not represent actual animals, but rather a distribution of animals based on density and abundance data, which allows for a statistical analysis of the number of instances that marine mammals may be exposed to sound levels resulting in an effect. Therefore, the model estimates the number of instances in which an effect threshold was exceeded over the course of a year, but does not estimate the number of individual marine mammals that may be impacted over a year (*i.e.,* some marine mammals could be impacted several times, while others would not experience any impact). A detailed explanation of the Navy's Acoustic Effects Model is provided in the technical report ''Quantifying Acoustic Impacts on Marine Species: Methods and Analytical Approach for Activities at the Point Mugu Sea Range'' (U.S. Department of the Navy, 2020).

Range to Effects

The following section provides range (distance) to effects for explosives, to specific acoustic thresholds determined using the Navy Acoustic Effects Model. Marine mammals exposed within these ranges for the shown duration are predicted to experience the associated effect. Range to effects is important information in not only predicting acoustic impacts, but also in verifying the accuracy of model results against real-world situations and determining adequate mitigation ranges to avoid higher level effects, especially physiological effects to marine mammals.

Explosives

The following section provides the range (distance) over which specific physiological or behavioral effects are expected to occur based on the explosive criteria (see Section 6, Section 6.5.2.1.1 of the Navy's rulemaking/LOA application and the ''Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)'' report (U.S. Department of the Navy, 2017c)) and the explosive propagation calculations from the Navy Acoustic Effects Model (see Section 6, Section 6.5.2.1.3, Navy Acoustic Effects Model of the Navy's rulemaking/LOA application). The range to effects is shown for a range of explosive bins, from E1 (up to 0.25 lb net explosive weight) to E10 (up to 500 lb net explosive weight) (Table 14 through Table 20). Explosive bins not shown in these tables include E2, E4, E7, E11, and E12, as they are not used in the PMSR Study Area. Ranges are determined by modeling the distance that noise from an explosion would need to propagate to reach exposure level thresholds specific to a hearing group that would cause behavioral response (to the degree of Level B harassment), TTS, PTS, and non-auditory injury. Ranges are provided for a representative source depth and cluster size for each bin. For events with multiple explosions, sound from successive explosions can be expected to accumulate and increase the range to the onset of an impact based on SEL thresholds. Ranges to non-auditory injury and mortality are shown in Table 19 and Table 20, respectively. NMFS has reviewed the range distance to effect data provided by the Navy and concurs with the analysis. For additional information on how ranges to impacts from explosions were estimated, see the technical report ''Quantifying Acoustic Impacts on Marine Species: Methods and Analytical Approach for Activities at the Point Mugu Sea Range'' (U.S. Department of the Navy, 2020).

Table 14 shows the minimum, average, and maximum ranges to onset of auditory and behavioral effects that likely rise to the level of Level B harassment for high-frequency cetaceans based on the developed thresholds.

TABLE 14—SEL-BASED RANGES (METERS) TO ONSET PTS, ONSET TTS, AND LEVEL B HARASSMENT BY BEHAVIORAL DISTURBANCE FOR HIGH-FREQUENCY CETACEANS

Bin	Cluster size	PTS	TTS	Behavioral
E1	1	353 (130–825)	1,234 (290–3,025)	2,141 (340–4,775)
	25	1,188 (280–3,025)	3,752 (490–8,525)	5,196 (675–12,275)
E3	1	654 (220–1,525)	2,294 (350–4,775)	3,483 (490–7,775)
	12	1,581 (300–3,525)	4,573 (650–10,275)	6,188 (725–14,775)
E5	25	2,892 (440–6,275)	6,633 (725–16,025)	8,925 (800–22,775)
E6	1	1,017 (280–2,525)	3,550 (490–7,775)	4,908 (675–12,275)
E8	1	1,646 (775–2,525)	4,322 (1,525–9,775)	5,710 (1,525–14,275)
E9	1	2,105 (850–4,025)	4,901 (1,525–12,525)	6,700 (1,525–16,775)
E10	1	2,629 (875–5,275)	5,905 (1,525–13,775)	7,996 (1,525–20,025)

[1] Average distance in meters is depicted above the minimum and maximum distances, which are in parentheses.
Notes: SEL = Sound Exposure Level, PTS = permanent threshold shift, TTS = temporary threshold shift.

Table 15 shows the minimum, average, and maximum ranges to onset of auditory and behavioral effects that likely rise to the level of Level B harassment for mid-frequency cetaceans based on the developed thresholds.

TABLE 15—SEL-BASED RANGES (METERS) TO ONSET PTS, ONSET TTS, AND LEVEL B HARASSMENT BY BEHAVIORAL DISTURBANCE FOR MID-FREQUENCY CETACEANS

Bin	Cluster size	PTS	TTS	Behavioral
E1	1	25 (25–25)	118 (80–210)	178 (100–320)
	25	107 (75–170)	476 (150–1,275)	676 (240–1,525)
E3	1	50 (45–65)	233 (110–430)	345 (130–600)
	12	153 (90–250)	642 (220–1,525)	897 (270–2,025)
E5	25	318 (130–625)	1,138 (280–3,025)	1,556 (310–3,775)
E6	1	98 (70–170)	428 (150–800)	615 (210–1,525)
E8	1	160 (150–170)	676 (500–725)	942 (600–1,025)
E9	1	215 (200–220)	861 (575–950)	1,147 (650–1,525)
E10	1	275 (250–480)	1,015 (525–2,275)	1,424 (675–3,275)

[1] Average distance in meters to mortality is depicted above the minimum and maximum distances, which are in parentheses.
Notes: SEL = Sound Exposure Level, PTS = permanent threshold shift, TTS = temporary threshold shift.

Table 16 shows the minimum, average, and maximum ranges to onset of auditory and behavioral effects that likely rise to the level of Level B harassment for low-frequency cetaceans based on the developed thresholds.

TABLE 16—SEL-BASED RANGES (METERS) TO ONSET PTS, ONSET TTS, AND LEVEL B HARASSMENT BY BEHAVIORAL DISTURBANCE FOR LOW-FREQUENCY CETACEANS

Bin	Cluster size	PTS	TTS	Behavioral
E1	1	51 (40–70)	227 (100–320)	124 (70–160)
	25	205 (95–270)	772 (270–1,275)	476 (190–725)
E3	1	109 (65–150)	503 (190–1,000)	284 (120–430)
	12	338 (130–525)	1,122 (320–7,775)	761 (240–6,025)
E5	25	740 (220–6,025)	2,731 (460–22,275)	1,414 (350–14,275)
E6	1	250 (100–420)	963 (260–7,275)	617 (200–1,275)
E8	1	460 (170–950)	1,146 (380–7,025)	873 (280–3,025)
E9	1	616 (200–1,275)	1,560 (450–12,025)	1,014 (330–5,025)
E10	1	787 (210–2,525)	2,608 (440–18,275)	1,330 (330–9,025)

[1] Average distance in meters to mortality is depicted above the minimum and maximum distances, which are in parentheses.
Notes: SEL = Sound Exposure Level, PTS = permanent threshold shift, TTS = temporary threshold shift.

TABLE 17—SEL-BASED RANGES (METERS) TO ONSET PTS, ONSET TTS, AND LEVEL B HARASSMENT BY BEHAVIORAL DISTURBANCE FOR OTARIIDS

Bin	Cluster size	PTS	TTS	Behavioral
E1	1	7 (7–7)	34 (30–40)	56 (45–70)
	25	30 (25–35)	136 (80–180)	225 (100–320)
	10	25 (25–30)	115 (70–150)	189 (95–250)
E3	1	16 (15–19)	70 (50–95)	115 (70–150)
	12	45 (35–65)	206 (100–290)	333 (130–450)
	12	55 (50–60)	333 (280–750)	544 (440–1,025)
E5	25	98 (60–120)	418 (160–575)	626 (240–1,000)
E6	1	30 (25–35)	134 (75–180)	220 (100–320)
E8	1	50 (50–50)	235 (220–250)	385 (330–450)
E9	1	68 (65–70)	316 (280–360)	494 (390–625)
E10	1	86 (80–95)	385 (240–460)	582 (390–800)

[1] Average distance in meters to mortality is depicted above the minimum and maximum distances, which are in parentheses.
Notes: SEL = Sound Exposure Level, PTS = permanent threshold shift, TTS = temporary threshold shift.

TABLE 18—SEL-BASED RANGES (METERS) TO ONSET PTS, ONSET TTS, AND LEVEL B HARASSMENT BY BEHAVIORAL DISTURBANCE FOR PHOCIDS

Bin	Cluster size	PTS	TTS	Behavioral
E1	1	45 (40–65)	210 (100–290)	312 (130–430)
	25	190 (95–260)	798 (280–1,275)	1,050 (360–2,275)
E2	1	58 (45–75)	258 (110–360)	383 (150–550)
	10	157 (85–240)	672 (240–1,275)	934 (310–1,525)
E3	1	96 (60–120)	419 (160–625)	607 (220–900)
	12	277 (120–390)	1,040 (370–2,025)	1,509 (525–6,275)
E5	25	569 (200–850)	2,104 (725–9,275)	2,895 (825–11,025)
E6	1	182 (90–250)	767 (270–1,275)	1,011 (370–1,775)
E8	1	311 (290–330)	1,154 (625–1,275)	1,548 (725–2,275)
E9	1	416 (350–470)	1,443 (675–2,025)	1,911 (800–3,525)

TABLE 18—SEL-BASED RANGES (METERS) TO ONSET PTS, ONSET TTS, AND LEVEL B HARASSMENT BY BEHAVIORAL DISTURBANCE FOR PHOCIDS—Continued

Bin	Cluster size	PTS	TTS	Behavioral
E10	1	507 (340–675)	1,734 (725–3,525)	2,412 (800–5,025)

[1] Average distance (in meters) to PTS, TTS, and behavioral thresholds are depicted above the minimum and maximum distances, which are in parentheses. Values depict the range produced by SEL hearing threshold criteria levels.

Notes: SEL = Sound Exposure Level, PTS = permanent threshold shift, TTS = temporary threshold shift.

Table 19 shows the minimum, average, and maximum ranges due to varying propagation conditions to non-auditory injury as a function of animal mass and explosive bin (*i.e.,* net explosive weight). Ranges to gastrointestinal tract injury typically exceed ranges to slight lung injury; therefore, the maximum range to effect is not mass-dependent. Animals within these water volumes would be expected to receive minor injuries at the outer ranges, increasing to more substantial injuries, and finally mortality as an animal approaches the detonation point.

TABLE 19—RANGES TO 50 PERCENT NON-AUDITORY INJURY RISK FOR ALL MARINE MAMMAL HEARING GROUPS

Bin	Range (m) (min-max)
E1	12 (11–13)
E3	25 (25–30)
E5	40 (35–140)
E6	52 (40–120)
E8	117 (75–400)
E9	120 (90–290)
E10	174 (100–480)

Note: All ranges to non-auditory injury within this table are driven by the gastrointestinal (GI) tract injury threshold regardless of animal mass.

Ranges to mortality, based on animal mass, are shown in Table 20 below.

TABLE 20—RANGES [1] TO 50 PERCENT MORTALITY RISK FOR ALL MARINE MAMMAL HEARING GROUPS AS A FUNCTION OF ANIMAL MASS

Bin	Animal mass intervals (kg) [1]					
	10	250	1,000	5,000	25,000	72,000
E1	3 (2–3)	0 (0–3)	0 (0–0)	0 (0–0)	0 (0–0)	0 (0–0)
E3	8 (6–10)	4 (2–8)	1 (0–2)	0 (0—0)	0 (0—0)	0 (0–0)
E5	13 (11–45)	7 (4–35)	3 (3–12)	2 (0–8)	0 (0–2)	0 (0–2)
E6	18 (14–55)	10 (5–45)	5 (3–15)	3 (2–10)	0 (0–3)	0 (0–2)
E8	50 (24–110)	27 (9–55)	13 (0–20)	9 (4–13)	4 (0–6)	3 (0–5)
E9	32 (30–35)	20 (13–30)	10 (8–12)	7 (6–9)	4 (3–4)	3 (2–3)
E10	56 (40–190)	25 (16–130)	13 (11–16)	9 (7–11)	5 (4–5)	4 (3–4)

[1] Average distance (m) to mortality is depicted above the minimum and maximum distances, which are in parentheses.

Marine Mammal Density

A quantitative analysis of impacts on a species or stock requires data on their abundance and distribution that may be affected by anthropogenic activities in the potentially impacted area. The most appropriate metric for this type of analysis is density, which is the number of animals present per unit area. Marine species density estimation requires a significant amount of effort to both collect and analyze data to produce a reasonable estimate. Unlike surveys for terrestrial wildlife, many marine species spend much of their time submerged, and are not easily observed. In order to collect enough sighting data to make reasonable density estimates, multiple observations are required, often in areas that are not easily accessible (*e.g.,* far offshore). Ideally, marine mammal species sighting data would be collected for the specific area and time period *(e.g.,* season) of interest and density estimates derived accordingly. However, in many places, poor weather conditions and high sea states prohibit the completion of comprehensive visual surveys.

For most cetacean species, abundance is estimated using line-transect surveys or mark-recapture studies (*e.g.,* Barlow, 2016, 2010; Barlow and Forney, 2007; Calambokidis *et al.* 2008; Calambokidis and Barlow, 2020; Cooke, 2019; Forney *et al.* 2014; Trickey *et al.* 2020). The result provides one single density estimate value for each species across broad geographic areas. This is the general approach applied in estimating cetacean abundance in NMFS' SARs. Although the single value provides a good average estimate of abundance (total number of individuals) for a specified area, it does not provide information on the species distribution or concentrations within that area, and it does not estimate density for other timeframes or seasons that were not surveyed. More recently, spatial habitat modeling developed by NMFS' Southwest Fisheries Science Center has been used to estimate cetacean densities (Barlow *et al.* 2009, 2020; Becker *et al.* 2010, 2012a, b, c, 2014, 2016; Ferguson *et al.* 2006a; Forney *et al.* 2012, 2015; Redfern *et al.* 2006; Rockwood *et al.* 2020). These models estimate cetacean density as a continuous function of habitat variables (*e.g.,* sea surface temperature, seafloor depth, *etc.*) and thus allow predictions of cetacean densities on finer spatial scales than traditional line-transect or mark recapture analyses and for areas that have not been surveyed. Within the geographic area that was modeled, densities can be predicted wherever these habitat variables can be measured or estimated.

Ideally, density data would be available for all species throughout the study area year-round, in order to best estimate the impacts of Navy activities on marine species. However, in many places, ship availability, lack of funding, inclement weather conditions, and high

sea states prevent the completion of comprehensive year-round surveys. Even with surveys that are completed, poor conditions may result in lower sighting rates for species that would typically be sighted with greater frequency under favorable conditions. Lower sighting rates preclude having an acceptably low uncertainty in the density estimates. A high level of uncertainty, indicating a low level of confidence in the density estimate, is typical for species that are rare or difficult to sight. In areas where survey data are limited or non-existent, known or inferred associations between marine habitat features and the likely presence of specific species are sometimes used to predict densities in the absence of actual animal sightings. Consequently, there is no single source of density data for every area, species, and season because of the fiscal costs, resources, and effort involved in providing enough survey coverage to sufficiently estimate density.

To characterize marine species density for large oceanic regions, the Navy reviews, critically assesses, and prioritizes existing density estimates from multiple sources, requiring the development of a systematic method for selecting the most appropriate density estimate for each combination of species, area, and season. The selection and compilation of the best available marine species density data resulted in the Navy Marine Species Density Database (NMSDD) (U.S. Department of the Navy, 2017). The finest temporal resolution (seasonal) for the NMSDD data for the HSTT Study Area was also used for the PMSR Study Area. The Navy vetted all cetacean densities with NMFS prior to use in the Navy's acoustic analysis for this rulemaking process.

A variety of density data and density models are needed in order to develop a density database that encompasses the entirety of the PMSR Study Area. Because these data are collected using different methods with varying amounts of accuracy and uncertainty, the Navy has developed a hierarchy to ensure the most accurate data is used when available. The technical report titled ''Quantifying Acoustic Impacts on Marine Species: Methods and Analytical Approach for Activities at the Point Mugu Sea Range'' (U.S. Department of the Navy, 2020), hereafter referred to as the Density Technical Report, describes these models in detail and provides detailed explanations of the models applied to each species density estimate. The list below describes models in order of preference.

1. Spatial density models are preferred and used when available because they provide an estimate with the least amount of uncertainty by deriving estimates for divided segments of the sampling area. These models (see Becker *et al.* 2016; Forney *et al.* 2015) predict spatial variability of animal presence as a function of habitat variables (*e.g.,* sea surface temperature, seafloor depth, *etc.*). This model is developed for areas, species, and, when available, specific timeframes (months or seasons) with sufficient survey data; therefore, this model cannot be used for species with low numbers of sightings.

2. Stratified design-based density estimates use line-transect survey data with the sampling area divided (stratified) into sub-regions, and a density is predicted for each sub-region (see Barlow, 2016; Becker *et al.* 2016; Bradford *et al.* 2017; Campbell *et al.* 2014; Jefferson *et al.* 2014). While geographically stratified density estimates provide a better indication of a species' distribution within the study area, the uncertainty is typically high because each sub-region estimate is based on a smaller stratified segment of the overall survey effort.

3. Design-based density estimations use line-transect survey data from land and aerial surveys designed to cover a specific geographic area (see Carretta *et al.* 2015). These estimates use the same survey data as stratified design-based estimates, but are not segmented into sub-regions and instead provide one estimate for a large surveyed area. Although relative environmental suitability (RES) models provide estimates for areas of the oceans that have not been surveyed using information on species occurrence and inferred habitat associations and have been used in past density databases, these models were not used in the current quantitative analysis.

Below we describe how densities were determined for the species in the PMSR Study Area.

The Navy developed a protocol and database to select the best available data sources based on species, area, and time (season). The resulting Geographic Information System database, used in the NMSDD, includes seasonal density values for every marine mammal species present within the PMSR Study Area. This database is described in the ''Quantifying Acoustic Impacts on Marine Species: Methods and Analytical Approach for Activities at the Point Mugu Sea Range'' (U.S. Department of the Navy, 2020) (also referred to as the Density Technical Report in this rule).

The Navy describes some of the challenges of interpreting the results of the quantitative analysis summarized above and described in the Density Technical Report:

> It is important to consider that even the best estimate of marine species density is really a model representation of the values of concentration where these animals might occur. Each model is limited to the variables and assumptions considered by the original data source provider. No mathematical model representation of any biological population is perfect, and with regards to marine mammal density, any single model method will not completely explain the actual distribution and abundance of marine mammal species. It is expected that there would be anomalies in the results that need to be evaluated, with independent information for each case, to support if we might accept or reject a model or portions of the model (U.S. Department of the Navy, 2017a).

There was only one species, the harbor porpoise, where there was no density estimate available within the PMSR Study Area so a new density layer was developed for harbor porpoise. Forney *et al.* (2014) provided uniform density for harbor porpoise for the species as a whole in California (Figure 7–25 in the Density Technical Report). Although these density estimates may not fully describe PMSR interannual variability, fluctuations in population size, or spatial distributions, they represent the best available science due to the paucity of other data.

NMFS coordinated with the Navy in the development of its take estimates and concurs that the Navy's approach for density appropriately utilizes the best available science. Later, in the *Analysis and Negligible Impact Determination* section, we assess how the estimated take numbers compare to abundance in order to better understand the potential number of individuals impacted.

Take Estimation

The 2022 PMSR FEIS/OEIS considered all training and testing activities planned to occur in the PMSR Study Area that have the potential to result in the MMPA-defined take of marine mammals. The Navy determined that the three stressors below could result in the incidental taking of marine mammals. NMFS has reviewed the Navy's data and analysis and determined that it is complete and accurate and agrees that the following stressors from the Navy's planned activities have the potential to result in takes by harassment.

- Acoustics (weapons firing noise; Explosions at or near the water surface can introduce loud, impulsive, broadband sounds into the marine environment);

- Explosives (explosive shock wave and sound at or near the water surface (<10 m)); and
- Land-based launch noise on SNI from missiles and rocket launches.

To predict marine mammal exposures to explosives, and because there is currently no means to model impacts on marine mammals from in-air detonations, the Navy's analysis conservatively models all detonations occurring within 10 m (11 yd) above the water's surface, as a point source located 10 centimeters underwater (U.S. Department of the Navy, 2019a). The model also assumes that all acoustic energy from the detonation remains underwater with no sound transmitted into the air. Important considerations must be factored into the analysis of results with these modeling assumptions, given that the peak pressure and sound from a detonation in air significantly decreases as it is partially reflected by the water's surface and partially transmitted underwater, as detailed in the following paragraphs. The Navy performed a quantitative analysis to estimate the probability that marine mammals could be exposed to the sound and energy from explosions during Navy testing and training activities and the effects of those exposures. The effects of underwater explosions on marine mammals depend on a variety of factors including animal size and depth; charge size and depth; depth of the water column; and distance between the animal and the charge. In general, an animal near the water surface would be less susceptible to injury because the pressure wave reflected from the water surface would interfere with the direct path pressure wave, reducing positive pressure exposure.

The quantitative analysis process (used for the 2022 PMSR FEIS/OEIS and the Navy's take request in the rulemaking/LOA application) to estimate potential exposures to marine mammals resulting from acoustic and explosive stressors is detailed in the technical report titled ''Quantifying Acoustic Impacts on Marine Species: Methods and Analytical Approach for Activities at the Point Mugu Sea Range'' (U.S. Department of the Navy, 2020). The Navy Acoustic Effects Model (NAEMO) brings together scenario simulations of the Navy's activities, sound propagation modeling, and marine mammal distribution (based on density and group size) by species to model and quantify the exposure of marine mammals above identified thresholds for behavioral harassment, TTS, PTS, non-auditory injury (lung and GI), and serious injury and mortality.

NAEMO estimates acoustic and explosive effects without taking mitigation or avoidance into account; therefore, the model overestimates predicted impacts on marine mammals within mitigation zones. The NAEMO (animal movement) model overestimates the number of marine mammals that will be exposed to sound sources that could cause PTS because the model does not consider horizontal movement of animats, including avoidance of high intensity sound exposures. As a general matter, NMFS does not prescribe the methods for estimating take for any applicant, but we review and ensure that applicants use the best available science, and methodologies that are logical and technically sound. Applicants may use different methods of calculating take (especially when using models) and still get to a result that is representative of the best available science and that allows for a rigorous and accurate evaluation of the effects on the affected populations. There are multiple aspects of the Navy's take estimation methods—propagation models, animat movement models, and behavioral thresholds, for example. NMFS evaluates the acceptability of these aspects as they evolve and are used in different rules and impact analyses. Some of the aspects of the Navy's take estimation process have been used in Navy incidental take rules since 2009 and have undergone multiple public comment processes; all of them have undergone extensive internal Navy review, and all of them have undergone comprehensive review by NMFS, which has sometimes resulted in modifications to methods or models.

The Navy uses rigorous review processes (verification, validation, and accreditation processes, peer and public review) to ensure the data and methodology it uses represent the best available science. For instance, the NAEMO model is the result of a NMFS-led Center for Independent Experts (CIE) review of the components used in earlier models. The acoustic propagation component of the NAEMO model (CASS/GRAB) is accredited by the Oceanographic and Atmospheric Master Library (OAML), and many of the environmental variables used in the NAEMO model come from approved OAML databases and are based on in-situ data collection. The animal density components of the NAEMO model are base products of the NMSDD, which includes animal density components that have been validated and reviewed by a variety of scientists from NMFS Science Centers and academic institutions. Finally, the NAEMO model simulation components underwent quality assurance/quality control (QA/QC) review and validation for model parts such as the scenario builder, acoustic builder, scenario simulator, *etc.,* conducted by qualified statisticians and modelers to ensure accuracy. Other models and methodologies have gone through similar review processes.

Based on current and other recent incidental take authorizations for target and missile launch activities on SNI (see 84 FR 18809; May 2, 2019) and in light of the monitoring results from past launches (Burke, 2017; Ugoretz, 2016), the estimation of the number of harassments that will occur as a result of launch events has been based on the total take by species observed for three previous monitoring seasons (2015–2017) divided by the number of launch events over that time period. The Navy has determined that the numbers presented in Table 5–3 of the Navy's rulemaking/LOA application represent the number of pinnipeds expected to be hauled out at SNI based on surveys in the 5-year period between 2011 and 2015 (Lowry *et al.* 2017) and the average number of takes observed per launch event (Burke, 2017; Naval Air Warfare Center Weapons Division, 2018; Ugoretz, 2016).

For California sea lions, take estimates were derived from three monitoring seasons (2015 to 2017) where an average of 274.44 instances of take of sea lions by Level B harassment occurred per launch event. Therefore, 275 sea lions was then multiplied by 40 launch events, for a conservative take estimate of 11,000 instances of take by Level B harassment of California sea lions (Table 22). This estimate is conservative because the Navy has not conducted more than 25 launch events (although authorized for more) in a given year since 2001.

For harbor seals, the take estimate is a change from the proposed IHA (84 FR 18809; May 2, 2019). The take estimate was revised from 120 to 480 instances of take by Level B harassment of harbor seal. A total of 12 takes were derived from the 2016 and 2017 monitoring seasons and multiplied by 40 launch events for a total of 480 instances of take by Level B harassment (Table 22).

For northern elephant seals, take estimates were derived from three monitoring seasons (2015 to 2017) where an average of 0.61 instances of take of northern elephant seals by Level B harassment occurred per launch event. Therefore, one northern elephant seal was then multiplied by 40 launch events for a conservative take estimate of 40 instances of take by Level B

harassment of northern elephant seals (Table 22). Generally, northern elephant seals do not react to launch events other than simple alerting responses such as raising their heads or temporarily going from sleeping to being awake; however, to account for the rare instances where they have reacted, the Navy considered that some northern elephant seals could be taken during launch events.

In summary, we believe the Navy's methods, including the underlying NAEMO modeling, are the most appropriate methods for predicting non-auditory injury, PTS, TTS, and behavioral disturbance. We would describe the application of these methods as identifying the maximum number of instances in which marine mammals would be reasonably expected to be taken through PTS, TTS, or behavioral disturbance.

Summary of Estimated Take Request From Training and Testing Activities

Based on the methods discussed in the previous sections and the Navy's model, the Navy provided its take estimate and request for authorization of takes incidental to the use of explosive sources and target/missile launches for training and testing activities both annually (based on the maximum number of activities that could occur per year) and over the 7-year period covered by the Navy's rulemaking/LOA application. NMFS has reviewed the Navy's data, methodology, and analysis and determined that it is complete and accurate. NMFS agrees that the estimates for incidental takes by harassment from all sources requested for authorization are the maximum number of instances in which marine mammals are reasonably expected to be taken.

Estimated Harassment Take From Training and Testing Activities

Table 21 and Table 22 summarize the Navy's take estimate, which NMFS concurs with, and includes the maximum amount of Level A harassment and Level B harassment reasonably expected to occur by species and stock for explosives and missile launch activities on SNI expected annually and for the 7-year period.

TABLE 21—ANNUAL AND 7-YEAR TOTAL SPECIES-SPECIFIC TAKE ESTIMATES FROM EXPLOSIVES FOR ALL TRAINING AND TESTING ACTIVITIES IN THE PMSR STUDY AREA (Not Inclusive of Launch Events on SNI)

Common name	Stock/DPS	Annual take by Level A harassment and Level B harassment			7-Year total take by Level A harassment and Level B harassment**		
		Behavioral response	TTS	PTS	Behavioral response	TTS	PTS
Blue whale*	Eastern North Pacific	7	4	0	52	27	0
Bryde's whale	Eastern Tropical Pacific	0	0	0	0	0	0
Fin whale*	California, Oregon, and Washington.	14	7	1	101	46	7
Gray whale	Eastern North Pacific	9	5	0	65	37	0
	Western North Pacific†	0	0	0	0	0	0
Humpback whale*	California, Oregon, and Washington/Mexico DPS.	7	4	0	52	29	0
	California, Oregon, and Washington/Central America DPS.	1	0	0	6	0	0
Minke whale	California, Oregon, and Washington.	2	1	0	15	6	0
Sei whale*	Eastern North Pacific	0	0	0	0	0	0
Baird's beaked whale	California, Oregon, and Washington.	0	0	0	0	0	0
Bottlenose dolphin	California Coastal	0	0	0	0	0	0
	California, Oregon, and Washington Offshore.	5	5	1	37	36	4
Cuvier's beaked whale	California, Oregon, and Washington.	0	0	0	0	0	0
Dall's porpoise	California, Oregon, and Washington.	261	406	49	1,824	2,845	341
Dwarf sperm whale	California, Oregon, and Washington.	20	31	6	142	217	43
Harbor Porpoise	Morro Bay	0	0	0	0	0	0
Killer whale	Eastern North Pacific Offshore.	0	0	0	0	0	0
	Eastern North Pacific Transient or West Coast Transient[6].	0	0	0	0	0	0
Long-beaked common dolphin.	California	66	44	9	454	310	65
Mesoplodont spp	California, Oregon, and Washington.	0	0	0	0	0	0
Northern right whale dolphin.	California, Oregon, and Washington.	3	2	1	22	16	4
Pacific white-sided dolphin	California, Oregon, and Washington.	11	8	2	76	58	14
Pygmy killer whale	NSD	0	0	0	0	0	0
Pygmy sperm whale	California, Oregon, and Washington.	20	31	6	141	219	44

TABLE 21—ANNUAL AND 7-YEAR TOTAL SPECIES-SPECIFIC TAKE ESTIMATES FROM EXPLOSIVES FOR ALL TRAINING AND TESTING ACTIVITIES IN THE PMSR STUDY AREA (Not Inclusive of Launch Events on SNI)—Continued

Common name	Stock/DPS	Annual take by Level A harassment and Level B harassment			7-Year total take by Level A harassment and Level B harassment**		
		Behavioral response	TTS	PTS	Behavioral response	TTS	PTS
Risso's dolphins	California, Oregon, and Washington.	6	3	1	39	24	6
Short-beaked common dolphin.	California, Oregon, and Washington.	90	65	15	630	456	103
Short-finned pilot whale	California, Oregon, and Washington.	0	0	0	0	0	0
Sperm whale*	California, Oregon, and Washington.	1	1	0	7	8	0
Striped dolphin	California, Oregon, and Washington.	1	1	0	5	4	0
Harbor seal	California	202	120	14	1,415	842	99
Northern elephant seal	California	37	63	22	258	444	152
California sea lion	U.S. Stock	8	12	2	58	81	16
Guadalupe fur seal*	Mexico to California	1	1	0	5	7	0
Northern fur seal	California	0	0	0	0	0	0

*ESA-listed species in PMSR.
**7-Year total impacts may differ from the annual total times seven as a result of standard rounding.
†Only the indicated DPS is ESA-listed.
Note: NSD = No stock designation.

TABLE 22—ANNUAL AND 7-YEAR TOTAL SPECIES-SPECIFIC TAKE ESTIMATES FROM TARGET AND MISSILE LAUNCH ACTIVITIES ON SNI IN THE PMSR STUDY AREA

Species	Stock	Annual take by Level B harassment	7-year total take by Level B harassment
California sea lion	U.S	11,000	77,000
Harbor seal	California	480	3,360
Northern elephant seal	California	40	280

Mitigation Measures

Under section 101(a)(5)(A) of the MMPA, NMFS must set forth the permissible methods of taking pursuant to the activity, and other means of effecting the least practicable adverse impact on the species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and on the availability of the species or stocks for subsistence uses (''least practicable adverse impact''). NMFS does not have a regulatory definition for least practicable adverse impact. The 2004 NDAA amended the MMPA as it relates to military readiness activities and the incidental take authorization process such that a determination of ''least practicable adverse impact'' shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

In *Conservation Council for Hawaii* v. *National Marine Fisheries Service,* 97 F. Supp. 3d 1210, 1229 (D. Haw. 2015), the Court stated that NMFS ''appear[s] to think [it] satisf[ies] the statutory 'least practicable adverse impact' requirement with a 'negligible impact' finding.'' Expressing similar concerns in a challenge to a U.S. Navy Surveillance Towed Array Sensor System Low Frequency Active Sonar (SURTASS LFA) incidental take rule (77 FR 50290; August 20, 2012), the Ninth Circuit Court of Appeals in *Natural Resources Defense Council (NRDC)* v. *Pritzker,* 828 F.3d 1125, 1134 (9th Cir. 2016), stated, ''[c]ompliance with the 'negligible impact' requirement does not mean there [is] compliance with the 'least practicable adverse impact' standard.'' As the Ninth Circuit noted in its opinion, however, the Court was interpreting the statute without the benefit of NMFS' formal interpretation. We state here explicitly that NMFS is in full agreement that the ''negligible impact'' and ''least practicable adverse impact'' requirements are distinct, even though both statutory standards refer to species and stocks. With that in mind, we provide further explanation of our interpretation of least practicable adverse impact, and explain what distinguishes it from the negligible impact standard. This discussion is consistent with previous rules we have issued, such as the Navy's Hawaii-Southern California Training and Testing (HSTT) rule (85 FR 41780; July 10, 2020), Atlantic Fleet Training and Testing (AFTT) rule (84 FR 70712; December 23, 2019), and Mariana Islands Training and Testing (MITT) rule (85 FR 46302; July 31, 2020).

Before NMFS can issue incidental take regulations under section 101(a)(5)(A) of the MMPA, it must make a finding that the total taking will have a ''negligible impact'' on the affected ''species or stocks'' of marine mammals. NMFS' and U.S. Fish and Wildlife Service's implementing regulations for section 101(a)(5) both define ''negligible impact'' as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103 and 50 CFR 18.27(c)). Recruitment (*i.e.,* reproduction) and survival rates are used to determine

population growth rates [1] and, therefore are considered in evaluating population level impacts.

As stated in the preamble to the proposed rule for the MMPA incidental take implementing regulations, not every population-level impact violates the negligible impact requirement. The negligible impact standard does not require a finding that the anticipated take will have ''no effect'' on population numbers or growth rates: The statutory standard does not require that the same recovery rate be maintained, rather that no significant effect on annual rates of recruitment or survival occurs. The key factor is the significance of the level of impact on rates of recruitment or survival (54 FR 40338, 40341; September 29, 1989).

While some level of impact on population numbers or growth rates of a species or stock may occur and still satisfy the negligible impact requirement—even without consideration of mitigation—the least practicable adverse impact provision separately requires NMFS to prescribe means of effecting the least practicable adverse impact on the species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, 50 CFR 216.102(b), which are typically identified as mitigation measures.[2]

The negligible impact and least practicable adverse impact standards in the MMPA both call for evaluation at the level of the ''species or stock.'' The MMPA does not define the term ''species.'' However, Merriam-Webster Dictionary defines ''species'' to include ''related organisms or populations potentially capable of interbreeding.'' See *www.merriam-webster.com/dictionary/species.* Section 3(11) of the MMPA defines ''stock'' as a group of marine mammals of the same species or smaller taxa in a common spatial arrangement that interbreed when mature. The definition of ''population'' is a group of interbreeding organisms that represents the level of organization at which speciation begins (*www.merriam-webster.com/dictionary/population*). The definition of ''population'' is strikingly similar to the MMPA's definition of ''stock,'' with both involving groups of individuals that belong to the same species and located in a manner that allows for interbreeding. In fact under MMPA section 3(11), the term ''stock'' in the MMPA is interchangeable with the statutory term ''population stock.'' Both the negligible impact standard and the least practicable adverse impact standard call for evaluation at the level of the species or stock, and the terms ''species'' and ''stock'' both relate to populations; therefore, it is appropriate to view both the negligible impact standard and the least practicable adverse impact standard as having a population-level focus.

This interpretation is consistent with Congress' statutory findings for enacting the MMPA, nearly all of which are most applicable at the species or stock (*i.e.,* population) level. *See* MMPA section 2 (finding that it is species and population stocks that are or may be in danger of extinction or depletion; that it is species and population stocks that should not diminish beyond being significant functioning elements of their ecosystems; and that it is species and population stocks that should not be permitted to diminish below their optimum sustainable population level). Annual rates of recruitment (*i.e.,* reproduction) and survival are the key biological metrics used in the evaluation of population-level impacts, and accordingly these same metrics are also used in the evaluation of population level impacts for the least practicable adverse impact standard.

Recognizing this common focus of the least practicable adverse impact and negligible impact provisions on the ''species or stock'' does not mean we conflate the two standards; despite some common statutory language, we recognize the two provisions are different and have different functions. First, a negligible impact finding is required before NMFS can issue an incidental take authorization. Although it is acceptable to use the mitigation measures to reach a negligible impact finding (see 50 CFR 216.104(c)), no amount of mitigation can enable NMFS to issue an incidental take authorization for an activity that still would not meet the negligible impact standard. Moreover, even where NMFS can reach a negligible impact finding—which we emphasize does allow for the possibility of some ''negligible'' population-level impact—the agency must still prescribe measures that will effect the least practicable amount of adverse impact upon the affected species or stocks.

Section 101(a)(5)(A)(i)(II) requires NMFS to issue, in conjunction with its authorization, binding—and enforceable—restrictions (in the form of regulations) setting forth how the activity must be conducted, thus ensuring the activity has the ''least practicable adverse impact'' on the affected species or stocks. In situations where mitigation is specifically needed to reach a negligible impact determination, section 101(a)(5)(A)(i)(II) also provides a mechanism for ensuring compliance with the ''negligible impact'' requirement. Finally, the least practicable adverse impact standard also requires consideration of measures for marine mammal habitat, with particular attention to rookeries, mating grounds, and other areas of similar significance, and for subsistence impacts, whereas the negligible impact standard is concerned solely with conclusions about the impact of an activity on annual rates of recruitment and survival.[3] In *NRDC* v. *Pritzker,* the Court stated, ''[t]he statute is properly read to mean that even if population levels are not threatened *significantly,* still the agency must adopt mitigation measures aimed at protecting *marine mammals* to the greatest extent practicable in light of military readiness needs.'' Pritzker at 1134 (emphases added). This statement is consistent with our understanding stated above that even when the effects of an action satisfy the negligible impact standard (*i.e.,* in the Court's words, ''population levels are not threatened significantly''), still the agency must prescribe mitigation under the least practicable adverse impact standard. However, as the statute indicates, the focus of both standards is ultimately the impact on the affected ''species or stock,'' and not solely focused on or directed at the impact on individual marine mammals.

We have carefully reviewed and considered the Ninth Circuit's opinion in *NRDC* v. *Pritzker* in its entirety. While the Court's reference to ''marine mammals'' rather than ''marine mammal species or stocks'' in the italicized language above might be construed as holding that the least practicable adverse impact standard applies at the individual ''marine mammal'' level, *i.e.,* that NMFS must require mitigation to minimize impacts to each individual marine mammal unless impracticable, we believe such an interpretation reflects an incomplete appreciation of the Court's holding. In our view, the opinion as a whole turned on the Court's determination that NMFS had not given separate and independent meaning to the least practicable adverse impact standard apart from the negligible impact standard, and further,

[1] A growth rate can be positive, negative, or flat.

[2] Separately, NMFS also must prescribe means of effecting the least practicable adverse impact on the availability of the species or stocks for subsistence uses, when applicable. See the *Subsistence Harvest of Marine Mammals* section for separate discussion of the effects of the specified activities on Alaska Native subsistence use.

[3] Outside of the military readiness context, mitigation may also be appropriate to ensure compliance with the ''small numbers'' language in MMPA sections 101(a)(5)(A) and (D).

that the Court's use of the term ''marine mammals'' was not addressing the question of whether the standard applies to individual animals as opposed to the species or stock as a whole. We recognize that while consideration of mitigation can play a role in a negligible impact determination, consideration of mitigation measures extends beyond that analysis. In evaluating what mitigation measures are appropriate, NMFS considers the potential impacts of the specified activities, the availability of measures to minimize those potential impacts, and the practicability of implementing those measures, as we describe below.

Implementation of Least Practicable Adverse Impact Standard

Given the *NRDC* v. *Pritzker* decision, we discuss here how we determine whether a measure or set of measures meets the ''least practicable adverse impact'' standard. Our separate analysis of whether the take anticipated to result from Navy's activities meets the ''negligible impact'' standard appears in the *Analysis and Negligible Impact Determination* section below.

In evaluating how mitigation may or may not be appropriate to ensure the least practicable adverse impact on species or stocks and their habitat, as well as subsistence uses where applicable, we carefully consider two primary factors. (1) The first factor is the manner in which, and the degree to which, the successful implementation of the measure(s) is expected to reduce adverse impacts to marine mammal species or stocks, and their habitat. This analysis considers the nature of the potential adverse impact (likelihood, scope, and range). It further considers the likelihood that the measure will be effective if implemented (probability of accomplishing the mitigating result if implemented as planned), and the likelihood of effective implementation (probability implemented as planned). (2) The second factor is the practicability of the measures for applicant implementation, which may consider such things as cost, impact on operations or specific activities, and, in the case of a military readiness activity, specifically considers personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity (when evaluating measures to reduce adverse impact on the species or stocks).

Assessment of Mitigation Measures for the PMSR Study Area

Section 216.104(a)(11) of NMFS' implementing regulations requires an applicant for incidental take authorization to include in its request, among other things, ''the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their habitat, and [where applicable] on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and areas of similar significance.'' Thus NMFS' analysis of the sufficiency and appropriateness of an applicant's measures under the least practicable adverse impact standard will always begin with evaluation of the mitigation measures presented in the application.

NMFS has fully reviewed the specified activities together and the mitigation measures included in the Navy's rulemaking/LOA application and the 2022 PMSR FEIS/OEIS to determine if the mitigation measures would result in the least practicable adverse impact on marine mammals and their habitat. NMFS worked with the Navy in the development of the Navy's initially proposed measures, which were informed by years of implementation and monitoring. A complete discussion of the Navy's evaluation process used to develop, assess, and select mitigation, which was informed by input from NMFS, can be found in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS. The process described in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS robustly supported NMFS' independent evaluation of whether the mitigation measures meet the least practicable adverse impact standard. The Navy is required to implement the mitigation measures identified in this rule for the full 7 years to avoid or reduce potential impacts from explosives, launch activities, and physical disturbance and vessel strike stressors.

As a general matter, where an applicant proposes measures that are likely to reduce impacts to marine mammals, the fact that they are included in the application indicates that the measures are practicable, and it is not necessary for NMFS to conduct a detailed analysis of the measures the applicant proposed (rather, they are simply included). However, it is still necessary for NMFS to consider whether there are additional practicable measures that would meaningfully reduce the probability or severity of impacts that could affect reproductive success or survivorship.

Overall, the Navy has agreed to procedural mitigation measures that will reduce the probability and/or severity of impacts expected to result from acute exposure to explosives and launch activities, vessel strike, and impacts to marine mammal habitat. Specifically, the Navy will use a combination of delayed starts, and cease firing to avoid mortality or serious injury, minimize the likelihood or severity of PTS or other injury, and reduce instances of TTS or more severe behavioral disruption caused by explosives and launch activities.

The Navy assessed the practicability of these measures in the context of personnel safety, practicality of implementation, and their impacts on the Navy's ability to meet their Title 10 requirements and found that the measures are supportable. As described in more detail below, NMFS has independently evaluated the measures the Navy proposed in consideration of their ability to reduce adverse impacts on marine mammal species and their habitat and their practicability for implementation. We have determined that the measures will significantly and adequately reduce impacts on the affected marine mammal species and stocks and their habitat and, further, be practicable for Navy implementation. Therefore, the mitigation measures assure that the Navy's activities will have the least practicable adverse impact on the species or stocks and their habitat.

The Navy also evaluated numerous measures in the 2022 PMSR FEIS/OEIS that were not included in the Navy's rulemaking/LOA application, and NMFS independently reviewed and concurs with the Navy's analysis that their inclusion was not appropriate under the least practicable adverse impact standard based on our assessment. The Navy considered these additional potential mitigation measures in two groups. First, Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS, in the Measures Considered but Eliminated section, includes an analysis of an array of different types of mitigation that have been recommended over the years by non-governmental organizations or the public, through scoping or public comment on environmental compliance documents. As described in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS, commenters sometimes recommend that the Navy reduce explosive use, or include area restrictions. Many of these mitigation measures could potentially reduce the number of marine mammals taken, via

direct reduction of the activities or amounts. However, as described in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS, the Navy needs to train and test in the conditions in which it conducts warfare, and these types of modifications fundamentally change the activity in a manner that will not support the purpose and need for the training and testing (*i.e.,* are entirely impracticable) and therefore are not considered further. NMFS finds the Navy's explanation for why adoption of these recommendations would unacceptably undermine the purpose of the testing and training persuasive. After independent review, NMFS finds Navy's judgment on the impacts of potential mitigation measures to personnel safety, practicality of implementation, and the effectiveness of training and testing within the PMSR Study Area persuasive, and for these reasons, NMFS finds that these measures do not meet the least practicable adverse impact standard because they are not practicable.

Second, in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS, the Navy evaluated an additional potential procedural mitigation measure, the use of thermal detection. The use of thermal detection had the potential to incrementally reduce take to some degree in certain circumstances, though the degree to which this would occur is typically low or uncertain. However, as described in the Navy's analysis, the measures would have significant direct negative effects on mission effectiveness and are considered impracticable (see Chapter 5 Standard Operating Procedures and Mitigation of 2022 PMSR FEIS/OEIS). NMFS independently reviewed the Navy's evaluation and concurs with this assessment, which supports NMFS' findings that the impracticability of this additional mitigation measure would greatly outweigh any potential minor reduction in marine mammal impacts that might result; therefore, this additional mitigation measure is not warranted.

Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS also describes a comprehensive method for analyzing potential geographic mitigation that includes consideration of both a biological assessment of how the potential time/area limitation would benefit the species and its habitat (*e.g.,* is a key area of biological importance or would result in avoidance or reduction of impacts) in the context of the stressors of concern in the specific area and an operational assessment of the practicability of implementation (*e.g.,* including an assessment of the specific importance of that area for training, considering proximity to training ranges and emergency landing fields and other issues). For most of the areas that were considered in the 2022 PMSR FEIS/OEIS but not included in this rule, the Navy found that geographic mitigation was not warranted because the anticipated reduction of adverse impacts on marine mammal species and their habitat was not sufficient to offset the impracticability of implementation.

The Navy considered that moving activities farther from SNI and outside of the SNI Feeding Area would not be practicable, because the added distance would substantially limit the capabilities of ground-based telemetry systems, antennas, surveillance, and metric radar systems, as well as command transmitter systems located at Point Mugu, Laguna Peak, Santa Cruz Island, and SNI. These systems are required to measure, monitor, and control various test platforms in real time; collect transmitted data for post event analysis; and enable surveillance of the area to ensure the safety of the public. Optimal functional distance for some of the ground-based radar systems is 10–200 nmi (19–370 km) and may be limited by line-of-sight for some systems. Ground-based telemetry systems rely on using in-place fiber optic cables directly linked to remote locations or microwave to transmit signals. The ground-based command transmitter system provides safe, controlled testing of unmanned targets, platforms, and missiles, including unmanned aircraft, boat or ship targets, ballistic missiles, and other long-range vehicles, all within a 40-mi radius of the transmitter. The command transmitter system also provides flight termination capability for weapons and targets that are considered too hazardous for test flights. Relocating ground-based instrumentation to other locations would result in an extensive cost to the Navy, or potentially reduce military readiness.

NMFS has reviewed the Navy's analysis in Chapter 5 (Standard Operating Procedures and Mitigation) of the 2022 PMSR FEIS/OEIS, which considers the same factors that NMFS considers to satisfy the least practicable adverse impact standard, and concurs with the analysis and conclusions. Therefore, NMFS is not including any of the measures that the Navy ruled out in the 2022 PMSR FEIS/OEIS. Below are the mitigation measures that NMFS determined will ensure the least practicable adverse impact on all affected species and their habitat, including the specific considerations for military readiness activities. The following sections describe the mitigation measures that will be implemented in association with the training and testing activities analyzed in this document. The mitigation measures all consist of procedural mitigation.

Procedural Mitigation

Procedural mitigation is mitigation that the Navy will implement whenever and wherever an applicable training or testing activity takes place within the PMSR Study Area. Procedural mitigation generally involves: (1) the use of one or more trained Lookouts to diligently observe for specific biological resources (including marine mammals) within a mitigation zone, (2) requirements for Lookouts to immediately communicate sightings of specific biological resources to the appropriate watch station for information dissemination, and (3) requirements for the watch station to implement mitigation (*e.g.,* halt an activity) until certain recommencement conditions have been met. The first procedural mitigation (Table 23) is designed to aid Lookouts and other applicable Navy personnel with their observation, environmental compliance, and reporting responsibilities. The remainder of the procedural mitigation measures (Table 24 though Table 32) are organized by stressor type and activity category and include acoustic stressors (*i.e.,* weapons firing noise), explosive stressors (*i.e.,* medium-caliber and large-caliber projectiles, missiles and rockets, bombs), and physical disturbance and strike stressors (*i.e.,* vessel movement, small-, medium-, and large-caliber non-explosive practice munitions, non-explosive missiles, and non-explosive bombs). NMFS and the Navy took into account public comments received on the 2022 PMSR FEIS/OEIS and the 2021 PMSR proposed rule, best available science, and the practicability of implementing additional mitigation measures.

TABLE 23—MITIGATION FOR ENVIRONMENTAL AWARENESS AND EDUCATION

Mitigation description
Stressor or Activity: • All testing and training activities, as applicable. Mitigation Zone Size and Mitigation Requirements: • Appropriate personnel involved in mitigation and training or testing activity reporting under the specified activities will complete one or more modules of the U.S Navy Afloat Environmental Compliance Training Series, as identified in their career path training plan. Modules include: —Introduction to the U.S. Navy Afloat Environmental Compliance Training Series. The introductory module provides information on environmental laws (*e.g.,* ESA, MMPA) and the corresponding responsibilities relevant to Navy testing and training. The material explains why environmental compliance is important in supporting the Navy's commitment to environmental stewardship. —Marine Species Awareness Training. All bridge watch personnel, Commanding Officers, Executive Officers, maritime patrol aircraft aircrews, anti-submarine warfare and mine warfare rotary-wing aircrews, Lookouts, and equivalent civilian personnel will successfully complete the Marine Species Awareness Training prior to standing watch or serving as a Lookout. The Marine Species Awareness Training provides information on sighting cues, visual observation tools and techniques, and sighting notification procedures. Navy biologists developed Marine Species Awareness Training to improve the effectiveness of visual observations for biological resources, focusing on *marine mammals* and *sea turtles,* and including floating vegetation, jellyfish aggregations, and flocks of seabirds. —U.S. Navy Protective Measures Assessment Protocol. This module provides the necessary instruction for accessing mitigation requirements during the event planning phase using the Protective Measures Assessment Protocol software tool.

Mitigation measures for weapons firing noise as an acoustic stressor is provided below in Table 24.

TABLE 24—MITIGATION FOR WEAPONS FIRING NOISE

Mitigation description
Stressor or Activity: • Weapons firing noise associated with large-caliber gunnery activities. Number of Lookouts and Observation Platform: • 1 Lookout positioned on the ship conducting the firing. —Depending on the activity, the Lookout could be the same as the one described in Table 29 (Mitigation for Small-, Medium-, and Large-Caliber Non-Explosive Practice Munitions). Mitigation Requirements: • Mitigation zone: —30° on either side of the firing line out to 70 yd. from the muzzle of the weapon being fired. • Prior to the initial start of the activity: —Observe the mitigation zone for floating vegetation; if observed, relocate or delay the start until the mitigation zone is clear. —Observe the mitigation zone for marine mammals if observed, relocate or delay the start of weapons firing. • During the activity: —Observe the mitigation zone for floating vegetation and marine mammals; if observed, cease weapons firing. • Conditions for commencing/recommencing the activity after a marine mammal sighting before or during the activity: —The Navy will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing weapons firing) until one of the following conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the firing ship; (3) the mitigation zone has been clear from any additional sightings for 30 min.; or (4) for mobile activities, the firing ship has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting and there have been no new sightings.

The Navy will implement mitigation measures to avoid or reduce potential impacts on marine mammals from the explosive stressors occurring at or near the surface resulting in underwater noise and energy. Mitigation measures for explosive stressors are provided in Table 25 though Table 27.

TABLE 25—MITIGATION FOR EXPLOSIVE MEDIUM-CALIBER AND LARGE-CALIBER PROJECTILES

Mitigation description
Stressor or Activity: • Gunnery activities using explosive medium-caliber and large-caliber projectiles. • Activities using a maritime surface target. Number of Lookouts and Observation Platform: • 1 Lookout on the vessel or aircraft conducting the activity. —For activities using explosive large-caliber projectiles, depending on the activity, the Lookout could be the same as the one described in Table 24 (Mitigation for Weapons Firing Noise). • If additional platforms are participating in the activity, personnel positioned in those assets (*e.g.,* safety observers, evaluators) will support observing the mitigation zone for applicable biological resources while performing their regular duties. Mitigation Requirements: • Mitigation zones:

TABLE 25—MITIGATION FOR EXPLOSIVE MEDIUM-CALIBER AND LARGE-CALIBER PROJECTILES—Continued

Mitigation description
—200 yd (182.88 m) around the intended impact location for air-to-surface activities using explosive medium-caliber projectiles, or —600 yd (548.64 m) around the intended impact location for surface-to-surface activities using explosive medium-caliber projectiles, or —1,000 yd (914.4 m) around the intended impact location for surface-to-surface activities using explosive large-caliber projectiles. • Prior to the start of the activity (*e.g.,* when maneuvering on station): —Observe for floating vegetation and marine mammals; if observed, relocate or delay the start until the mitigation zone is clear. —During the activity, observe for floating vegetation and marine mammals; if resource is observed, cease firing. • Conditions for commencing/recommencing the activity after a marine mammal sighting before or during the activity: —The Navy will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing firing) until one of the following conditions has been met until one of the re-commencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended impact location; (3) the mitigation zone has been clear from any additional sightings for 10 min. for aircraft-based firing or 30 min. for vessel-based firing; or (4) for activities using mobile targets, the intended impact location has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting and there have been no new sightings . • After completion of the activity (*e.g.,* prior to maneuvering off station): —When practical (*e.g.,* when platforms are not constrained by fuel restrictions or mission-essential follow-on commitments), observe the vicinity of where detonations occurred; if any injured or dead marine mammals, follow established incident reporting procedures. If additional platforms are supporting this activity (*e.g.,* providing range clearance), these assets will assist in the visual observation of the area where detonations occurred.

TABLE 26—MITIGATION FOR EXPLOSIVE MISSILES AND ROCKETS

Mitigation description
Stressor or Activity: • Aircraft-deployed explosive missiles and rockets. • Activities using a maritime surface target at ranges up to 75 nmi (139 km). Number of Lookouts and Observation Platform: • 1 Lookout positioned in an aircraft. • If additional platforms are participating in the activity, personnel positioned in those assets (*e.g.,* safety observers, evaluators) will support observing the mitigation zone for applicable biological resources while performing their regular duties. Mitigation Requirements: • Mitigation zones: —900 yd (822.96 m) around the intended impact location for missiles or rockets with 0.6–20 lb net explosive weight. —2,000 yd (1,828.8 m) around the intended impact location for missiles with 21–500 lb net explosive weight. • Prior to the initial start of the activity (*e.g.,* during a fly-over of the mitigation zone): —Observe the mitigation zone for floating vegetation; if observed, relocate or delay the start until the mitigation zone is clear. —Observe the mitigation zone for marine mammals; if observed, relocate or delay the start of firing. • During the activity: —Observe the mitigation zone for floating vegetation and marine mammals; if observed, cease firing. • Conditions for commencing/recommencing the activity after a marine mammal sighting before or during the activity: —The Navy will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing firing) until one of the following conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended impact location; or (3) the mitigation zone has been clear from any additional sightings for 10 min. when the activity involves aircraft that have fuel constraints, or 30 min. when the activity involves aircraft that are not typically fuel constrained. • After completion of the activity (*e.g.,* prior to maneuvering off station): —When practical (*e.g.,* when platforms are not constrained by fuel restrictions or mission-essential follow-on commitments), observe the vicinity of where detonations occurred; if any injured or dead marine mammals or ESA-listed species are observed, follow established incident reporting procedures. —If additional platforms are supporting this activity (*e.g.,* providing range clearance), these assets will assist in the visual observation of the area where detonations occurred.

TABLE 27—MITIGATION FOR EXPLOSIVE BOMBS

Mitigation description
Stressor or Activity: • Explosive bombs. • Mitigation applies to activities using a maritime surface target at ranges up to 75 nmi (139 km). Number of Lookouts and Observation Platform: • 1 Lookout positioned in the aircraft conducting the activity. • If additional platforms are participating in the activity, personnel positioned in those assets (*e.g.,* safety observers, evaluators) will support observing the mitigation zone for applicable biological resources while performing their regular duties. Mitigation Requirements: • Mitigation zone: —2,500 yd (2,286 m) around the intended target. • Prior to the start of the activity (*e.g.,* when arriving on station):

TABLE 27—MITIGATION FOR EXPLOSIVE BOMBS—Continued

Mitigation description
—Observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will relocate or delay the start of bomb deployment. • During the activity (*e.g.,* during target approach): —Observe the mitigation zone for floating vegetation and marine mammals; if observed, cease bomb deployment. • Conditions for commencing/recommencing of the activity after a marine mammal sighting before or during the activity: —The Navy will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing bomb deployment) until one of the recommencement conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended target; (3) the mitigation zone has been clear from any additional sightings for 10 min.; or (4) for activities using mobile targets, the intended target has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting and there have been no new sightings. • After completion of the activity (*e.g.,* prior to maneuvering off station): —When practical (*e.g.,* when platforms are not constrained by fuel restrictions or mission-essential follow-on commitments), observe the vicinity of where detonations occurred; if any injured or dead marine mammals or ESA-listed species are observed, follow established incident reporting procedures. —If additional platforms are supporting this activity (*e.g.,* providing range clearance), these assets will assist in the visual observation of the area where detonations occurred.

Mitigation for physical disturbance and strike stressors are provided in Table 28 through Table 32.

TABLE 28—MITIGATION FOR VESSEL MOVEMENT

Mitigation description
Stressor or Activity: • Vessel movement. • The mitigation will not be required if (1) the vessel's safety is threatened, (2) the vessel is restricted in its ability to maneuver (*e.g.,* during launching and recovery of aircraft or landing craft, during towing activities, when mooring, *etc.*), (3) the vessel is operated autonomously, or (4) when impracticable based on mission requirements (*e.g.,* There are a few specific testing and training events that include requirements for certain systems where vessels will operate at higher speeds. As an example, some tests involve using the High-Speed Maneuvering Surface Target (HSMST). During these events, ships will operate across the full spectrum of capable speeds to accomplish the primary testing objectives). Number of Lookouts and Observation Platform: • 1 Lookout on the vessel that is underway. Mitigation Requirements: • Mitigation zone: —500 yd (457.2 m) around whales. —200 yd (182.88 m) around all other marine mammals (except bow-riding dolphins and pinnipeds hauled out on man-made navigational structures, port structures, and vessels). • During the activity: —When underway, observe the mitigation zone for marine mammals; if observed, maneuver to maintain distance. • Additional requirements: —If a marine mammal vessel strike occurs, the Navy will follow the established incident reporting procedures.

TABLE 29—MITIGATION FOR SMALL-, MEDIUM-, AND LARGE-CALIBER NON-EXPLOSIVE PRACTICE MUNITIONS

Mitigation description
Stressor or Activity: • Gunnery activities using small-, medium-, and large-caliber non-explosive practice munitions. • Activities using a maritime surface target. Number of Lookouts and Observation Platform: • 1 Lookout positioned on the platform conducting the activity. • Depending on the activity, the Lookout could be the same as the one described in Table 24 (Mitigation for Weapons Firing Noise). Mitigation Requirements: • Mitigation zone: —200 yd (182.88 m) around the intended impact location. • Prior to the initial start of the activity (*e.g.,* when maneuvering on station): —Observe the mitigation zone for floating vegetation; if observed, relocate or delay the start until the mitigation zone is clear. —Observe the mitigation zone for marine mammals; if observed, relocate or delay the start of firing. • During the activity: —Observe the mitigation zone for floating vegetation and marine mammals; if observed, cease firing. • Conditions for commencing/recommencing the activity after a marine mammal sighting before or during the activity:

TABLE 29—MITIGATION FOR SMALL-, MEDIUM-, AND LARGE-CALIBER NON-EXPLOSIVE PRACTICE MUNITIONS—Continued

Mitigation description
—The Navy will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing firing) until one of the following conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended impact location; (3) the mitigation zone has been clear from any additional sightings for 10 min. for aircraft-based firing or 30 min. for vessel-based firing; or (4) for activities using a mobile target, the intended impact location has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting and there have been no new sightings.

TABLE 30—MITIGATION FOR NON-EXPLOSIVE MISSILES AND ROCKETS

Mitigation description
Stressor or Activity: • Aircraft-deployed non-explosive missiles and rockets. • Activities using a maritime surface target at ranges of up to 75 nmi (139 km). Number of Lookouts and Observation Platform: • 1 Lookout positioned in an aircraft. Mitigation Requirements: • Mitigation zone: —900 yd (822.96 m) around the intended impact location. • Prior to the initial start of the activity (*e.g.,* during a fly-over of the mitigation zone): —Observe the mitigation zone for floating vegetation; if observed, relocate or delay the start until the mitigation zone is clear. —Observe the mitigation zone for marine mammals; if observed, relocate or delay the start of firing. • During the activity: —Observe the mitigation zone for floating vegetation and marine mammals; if observed, cease firing. • Conditions for commencing/recommencing the activity after a marine mammal sighting prior to or during the activity: —The Navy will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing firing) until one of the following conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended impact location; or (3) the mitigation zone has been clear from any additional sightings for 10 min. when the activity involves aircraft that have fuel constraints, or 30 min. when the activity involves aircraft that are not typically fuel constrained.

TABLE 31—MITIGATION FOR NON-EXPLOSIVE BOMBS

Mitigation description
Stressor or Activity: • Non-explosive bombs. • Mitigation applies to activities using a maritime surface target at ranges up to 75 nmi (139 km). Number of Lookouts and Observation Platform: • 1 Lookout positioned in an aircraft. Mitigation Requirements: • Mitigation zone: —900 yd (822.96 m) around the intended impact location. • Prior to the start of the activity (*e.g.,* when arriving on station): —Observe the mitigation zone for floating vegetation; if observed, relocate or delay the start of bomb deployment until the mitigation zone is clear. —Observe the mitigation zone for marine mammals; if observed, relocate or delay the start of bomb deployment. • During the activity (*e.g.,* during approach of the target): —Observe the mitigation zone for floating vegetation and marine mammals; if observed, cease bomb deployment. • Conditions for commencing/recommencing the activity after a marine mammal sighting prior to or during the activity: The Navy will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing bomb deployment or mine laying) until one of the following conditions has been met: (1) the animal is observed exiting the mitigation zone; (2) the animal is thought to have exited the mitigation zone based on a determination of its course, speed, and movement relative to the intended target or minefield location; (3) the mitigation zone has been clear from any additional sightings for 10 min.; or (4) for activities using mobile targets, the intended target has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting and there have been no new sightings.

Target and Missile Launches From SNI

Mitigation for target and missile launch activities from SNI are provided below in Table 32.

TABLE 32—MITIGATION FOR TARGET AND MISSILE LAUNCHES FROM SNI

Mitigation description
Stressor or Activity: • Target and Missile launches from SNI. Mitigation Requirements: • Navy personnel shall not enter pinniped haulouts or rookeries. Personnel may be adjacent to pinniped haulouts and rookeries prior to and following a launch for monitoring purposes. • Missiles shall not cross over pinniped haulouts at elevations less than 305 m (1,000 ft) above the haulout. • The Navy will not conduct more than 40 launch events annually. • The Navy will not conduct more than 10 launch events at night of the 40 annual launch events. • Launches shall be scheduled to avoid peak pinniped pupping periods between January and July, to the maximum extent practicable. • All manned aircraft and helicopter flight paths will maintain a minimum distance of 305 m (1,000 ft) from recognized pinniped haulouts and rookeries, except in emergencies or for real-time security incidents. • For unmanned aircraft systems (UAS), the following minimum altitudes will be maintained over pinniped haulout areas and rookeries: Class 0–2 UAS will maintain a minimum altitude of 300 ft; Class 3 UAS will maintain a minimum altitude of 500 ft; Class 4 or 5 UAS will not be flown below 1,000 ft. • If a species for which authorization has not been granted is taken, or a species for which authorization has been granted but the authorized takes are met, the Navy will consult with NMFS to determine how to proceed. • The Navy will review the launch procedure and monitoring methods, in cooperation with NMFS, if any incidents of injury or mortality of a pinniped are discovered during post-launch surveys, or if surveys indicate possible effects to the distribution, size, or productivity of the affected pinniped populations as a result of the specified activities. If necessary, appropriate changes will be made through modification to this Authorization prior to conducting the next launch of the same vehicle.

In addition, the Navy will issue awareness notification messages seasonally to alert ships and aircraft to the possible presence of concentrations of large whales in the PMSR Study Area. In order to maintain safety of navigation and to avoid interactions with large whales during transit, vessels will be instructed to remain vigilant to the presence of certain large whale species, which, especially when concentrated seasonally, may become vulnerable to vessel strikes. Lookouts will use the information from the awareness notification messages to assist their visual observations of mitigation zones and to aid in implementing mitigation. The Navy anticipates that providing Lookouts additional information about the possible presence of concentrations of large whales in certain locations seasonally will likely help the Navy further avoid interactions with these animals during vessel transits and when training and testing activities are conducted in the PMSR Study Area. The Navy will follow reporting requirements should a vessel strike occur. The Navy will issue awareness notification messages for the species and seasons indicated in Table 33.

TABLE 33—LARGE WHALE AWARENESS NOTIFICATION MESSAGES

Blue Whale Awareness Notification Message (June 1–October 31), Gray Whale Awareness Notification Message (November 1–March 31), and Fin Whale Awareness Notification Message (November 1–May 31): • The Navy will issue a seasonal awareness notification message to alert ships and aircraft operating in the area to the possible presence of concentrations of large whales, including blue whales (June 1 through October 31), gray whales (November 1 through March 31) and fin whales (November 1 through May 31). • To maintain safety of navigation and to avoid interactions with large whales during transits, the Navy will instruct vessels to remain vigilant to the presence of large whale species (including blue whales), that when concentrated seasonally, may become vulnerable to vessel strikes. • Lookouts will use the information from the awareness notification messages to assist their visual observation of applicable mitigation zones during testing and training activities and to aid in the implementation of mitigation observation of applicable mitigation zones during testing and training activities and to aid in the implementation of mitigation.

Mitigation Conclusions

NMFS has carefully evaluated the Navy's mitigation measures—many of which were developed with NMFS' input during the previous phases of Navy training and testing authorizations—and considered a broad range of other measures (*i.e.,* the measures considered but eliminated in the 2022 PMSR FEIS/OEIS, which reflect many of the comments that have arisen via NMFS or public input in past years) in the context of ensuring that NMFS prescribes the means of effecting the least practicable adverse impact on the affected marine mammal species or stocks and their habitat. Our evaluation of potential measures included consideration of the following factors in relation to one another: the manner in which, and the degree to which, the successful implementation of the mitigation measures is expected to reduce the likelihood and/or magnitude of adverse impacts to marine mammal species and their habitat; the proven or likely efficacy of the measures; and the practicability of the measures for applicant implementation, including consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

Based on our evaluation of the Navy's proposed mitigation measures, as well as other measures considered by the Navy and NMFS, NMFS has determined that the mitigation measures included in this final rule are the appropriate means of effecting the least practicable adverse impact on the marine mammal species or stocks and their habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance, and considering specifically personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity. Additionally, an adaptive management provision ensures that mitigation is regularly assessed and provides a mechanism to improve the mitigation,

based on the factors above, through modification as appropriate. Thus, NMFS concludes that the mitigation measures outlined in this final rule satisfy the statutory standard and that any adverse impacts that remain cannot be practicably further mitigated.

Monitoring

Section 101(a)(5)(A) of the MMPA states that in order to authorize incidental take for an activity, NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. The MMPA implementing regulations at 50 CFR 216.104(a)(13) indicate that requests for incidental take authorizations must include the suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species and of the level of taking or impacts on populations of marine mammals that are expected to be present.

In the PMSR, the Navy has been monitoring missile launches at SNI in accordance with the MMPA under IHAs or LOAs since 2001 (NMFS, 2014a, 2019a). Associated with those authorizations, monitoring reports submitted to NMFS in various periodic reports have included sound levels measurements from the launches and have documented the behavior of hauled out pinnipeds before, during, and after those launches by direct observation and in video recordings (Burke, 2017; Holst and Lawson, 2002; Holst and Greene Jr., 2005, 2006; Holst and Greene Jr., 2008; Holst and Greene Jr., 2010; Holst *et al.* 2011; Holst *et al.* 2003; Ugoretz and Greene Jr., 2012; Ugoretz, 2014, 2015, 2016).

In other locations where Navy testing and training activities occur, the Navy has also been conducting marine mammal research and monitoring in the Pacific Ocean for decades. A formal coordinated marine species monitoring program in support of the MMPA and ESA authorizations for the Navy Range Complexes worldwide was first implemented in 2009. This robust program has resulted in hundreds of technical reports and publications on marine mammals that have informed Navy and NMFS analyses in environmental planning documents, MMPA rules, and ESA Biological Opinions. The reports are made available to the public on the Navy's marine species monitoring website (*www.navymarinespecies monitoring.us*), and the data on the Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations (OBIS–SEAMAP) (*https://seamap.env.duke.edu/*) and the Animal Telemetry Network (*https://atn.ioos.us/*).

The Navy will continue collecting monitoring data to inform our understanding of the occurrence of, and impacts of the Navy's activities on, marine mammals on SNI in the PMSR Study Area. NMFS and the Navy will coordinate and discuss how monitoring in the PMSR Study Area could contribute to the Navy's Marine Species Monitoring Program. Taken together, mitigation and monitoring comprise the Navy's integrated approach for reducing environmental impacts from the specified activities. The Navy's overall monitoring approach seeks to leverage and build on existing research efforts whenever possible.

As agreed upon between the Navy and NMFS, the monitoring measures presented here, as well as the mitigation measures described above, focus on the protection and management of potentially affected marine mammals. A well-designed monitoring program can provide important feedback for validating assumptions made in analyses and allow for adaptive management of marine resources. Monitoring is required under the MMPA, and details of the monitoring program for the specified activities have been developed through coordination between NMFS and the Navy through the regulatory process for previous Navy at-sea training and testing activities.

Required Monitoring on SNI

In consultation with NMFS, the Navy shall implement a monitoring plan for beaches exposed to target and missile launch noise with the goal of assessing baseline pinniped distribution/abundance and potential changes in pinniped use of these beaches after launch events. Marine mammal monitoring will include:

- Multiple surveys (*e.g.,* time-lapse photography) during the year that record the species, number of animals, general behavior, presence of pups, age class, gender and reactions to launch noise or other natural or human caused disturbances, in addition to environmental conditions that may include tide, wind speed, air temperature, and swell.
- In addition, video and acoustic monitoring of up to three pinniped haulout areas and rookeries will be conducted during launch events that include missiles or targets that have not been previously monitored using video and acoustic recorders for at least three launch events. Video monitoring cameras would be either high-definition video cameras, or Forward-Looking Infrared Radiometer (FLIR) thermal imaging cameras for night launch events.

Integrated Comprehensive Monitoring Program (ICMP)

The Navy's ICMP is intended to coordinate marine species monitoring efforts across all regions and to allocate the most appropriate level and type of effort for each range complex based on a set of standardized objectives, and in acknowledgement of regional expertise and resource availability. The ICMP is designed to be flexible, scalable, and adaptable through the adaptive management and strategic planning processes to periodically assess progress and reevaluate objectives. This process includes conducting an annual adaptive management review meeting, at which the Navy and NMFS jointly consider the prior-year goals, monitoring results, and related scientific advances to determine if monitoring plan modifications are warranted to more effectively address program goals. Although the ICMP does not specify actual monitoring field work or individual projects, it does establish a matrix of goals and objectives that have been developed in coordination with NMFS. As the ICMP is implemented through the Strategic Planning Process for Marine Species Monitoring, detailed and specific studies are developed which support the Navy's and NMFS' top-level monitoring goals. In essence, the ICMP directs that monitoring activities relating to the effects of Navy training and testing activities on marine species should be designed to contribute towards one or more of the following top-level goals:

- An increase in our understanding of the likely occurrence of marine mammals and/or ESA-listed marine species in the vicinity of the action (*i.e.,* presence, abundance, distribution, and/or density of species);
- An increase in our understanding of the nature, scope, or context of the likely exposure of marine mammals and/or ESA-listed species to any of the potential stressor(s) associated with the action (*e.g.,* sound, explosive detonation, or military expended materials) through better understanding of the following: (1) the action and the environment in which it occurs (*e.g.,* sound source characterization, propagation, and ambient noise levels); (2) the affected species (*e.g.,* life history or dive patterns); (3) the likely co-occurrence of marine mammals and/or ESA-listed marine species with the action (in whole or part); and/or (4) the likely biological or behavioral context of exposure to the stressor for the marine mammal and/or ESA-listed marine

species (*e.g.,* age class of exposed animals or known pupping, calving or feeding areas);

- An increase in our understanding of how individual marine mammals or ESA-listed marine species respond (behaviorally or physiologically) to the specific stressors associated with the action (in specific contexts, where possible, *e.g.,* at what distance or received level);
- An increase in our understanding of how anticipated individual responses, to individual stressors or anticipated combinations of stressors, may impact either: (1) the long-term fitness and survival of an individual or (2) the population, species, or stock (*e.g.,* through effects on annual rates of recruitment or survival);
- An increase in our understanding of the effectiveness of mitigation and monitoring measures;
- A better understanding and record of the manner in which the Navy complies with the incidental take regulations and LOAs and the ESA Incidental Take Statement;
- An increase in the probability of detecting marine mammals (through improved technology or methods), both specifically within the mitigation zones (thus allowing for more effective implementation of the mitigation), and in general, to better achieve the above goals; and
- Ensuring that adverse impact of activities remains at the least practicable level.

Strategic Planning Process for Marine Species Monitoring

The Navy also developed the Strategic Planning Process for Marine Species Monitoring, which establishes the guidelines and processes necessary to develop, evaluate, and fund individual projects based on objective scientific study questions. The process uses an underlying framework designed around intermediate scientific objectives and a conceptual framework incorporating a progression of knowledge spanning occurrence, exposure, response, and consequence. The Strategic Planning Process for Marine Species Monitoring is used to set overarching intermediate scientific objectives; develop individual monitoring project concepts; identify potential species of interest at a regional scale; evaluate, prioritize and select specific monitoring projects to fund or continue supporting for a given fiscal year; execute and manage selected monitoring projects; and report and evaluate progress and results. This process addresses relative investments to different range complexes based on goals across all range complexes, and monitoring will leverage multiple techniques for data acquisition and analysis whenever possible. The Strategic Planning Process for Marine Species Monitoring is also available online (*https://www.navymarinespeciesmonitoring.us/*). NMFS and the Navy will coordinate and discuss how monitoring in the PMSR Study Area could contribute to the Navy's Marine Species Monitoring Program in addition to the monitoring that will be conducted on SNI.

Past and Current Monitoring in the PMSR Study Area

NMFS has received multiple years' worth of annual monitoring reports addressing launch activities on SNI within the PMSR Study Area and other Navy range complexes. The data and information contained in these reports have been considered in developing mitigation and monitoring measures for the training and testing activities on SNI within the PMSR Study Area. The Navy's annual exercise and monitoring reports may be viewed at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities* and *https://www.navymarinespeciesmonitoring.us.*

Numerous publications, dissertations, and conference presentations have resulted from research conducted under the Navy's marine species monitoring program (*https://www.navymarinespeciesmonitoring.us/reading-room/publications/*), resulting in a significant contribution to the body of marine mammal science. Publications on occurrence, distribution, and density have fed the modeling input, and publications on exposure and response have informed Navy and NMFS analyses of behavioral response and consideration of mitigation measures.

Furthermore, collaboration between the monitoring program and the Navy's research and development (*e.g.,* the Office of Naval Research) and demonstration-validation (*e.g.,* Living Marine Resources) programs has been strengthened, leading to research tools and products that have already transitioned to the monitoring program. These include Marine Mammal Monitoring on Ranges (M3R), controlled exposure experiment behavioral response studies (CEE BRS), acoustic sea glider surveys, and global positioning system-enabled satellite tags. Recent progress has been made with better integration of monitoring across all Navy at-sea study areas, including study areas in the Pacific and the Atlantic Oceans, and various testing ranges. Publications from the Living Marine Resources and the Office of Naval Research programs have also resulted in significant contributions to information on hearing ranges and acoustic criteria used in effects modeling, exposure, and response, as well as developing tools to assess biological significance (*e.g.,* population-level consequences).

NMFS and the Navy also consider data collected during mitigations as monitoring. Data are collected by shipboard personnel on hours spent training, hours of observation, and marine mammals observed within the mitigation zones when mitigations are implemented. These data are provided to NMFS in both classified and unclassified annual exercise reports, which will continue under this rule.

Research funded by the Navy that has included the PMSR Study Area includes, but is not limited to the following efforts:

- The Navy has funded a number of passive acoustic monitoring efforts in the PMSR Study Area as well as locations farther to the south in the SOCAL Range Complex. These studies have helped to characterize the soundscape resulting from general anthropogenic sound as well as the Navy testing and training sound energy contributions (Baumann-Pickering *et al.* 2013; Baumann-Pickering *et al.* 2015a; Baumann-Pickering *et al.* 2018; Curtis *et al.* 2020; Debich *et al.* 2015a; Debich *et al.* 2015b; Hildebrand *et al.* 2012; Rice *et al.* 2018a; Rice *et al.* 2017; Rice *et al.* 2018b; Sirovic *et al.* 2016; Sirovic *et al.* 2017; Sirovic *et al.* 2015b; Wiggins *et al.* 2018).
- Fieldwork involving photo-ID, biopsy, visual survey, and satellite tagging of blue, fin, and humpback whales were undertaken by Oregon State University. This research provided seasonal movement tracks, distribution, and behavior of these species in addition to biopsy samples used for sex determination and individual identifications (Mate *et al.* 2016; Mate *et al.* 2018b, 2018c; Mate *et al.* 2015b). The findings from this work have been instrumental in supplementing our understanding of the use of BIAs in the PMSR Study Area for these species.
- The Navy has been collecting abundance data and behavioral reactions of pinnipeds during target and missile launch on SNI since 2001. The marine mammals monitoring reports for SNI can be found here: *https://www.navymarinespeciesmonitoring.us/reporting/pacific/.*

Additional details on the scientific objectives for the Navy's marine species monitoring program in the Pacific (and elsewhere) can be found at *https://*

www.navymarinespeciesmonitoring.us/regions/pacific/current-projects/. Projects can be either major multi-year efforts, or 1 to 2-year special studies.

The majority of the testing and training activities Navy is proposing for the foreseeable future in the PMSR Study Area are similar if not nearly identical to activities that have been occurring in the same locations for decades. In the PMSR Study Area, there are no Major Exercises, testing and training events are, by comparison to other Navy areas, less frequent and are in general small in scope, so as a result the majority of Navy's research effort has been focused elsewhere. For this reason, the vast majority of scientific fieldwork, research, and monitoring efforts have been expended in the SOCAL Range Complex and Hawaii, where Navy training and testing activities have been more concentrated. Since 2006, the Navy has been submitting exercise reports and monitoring reports to NMFS for the Navy's range complexes in the Pacific and the Atlantic. These publicly available exercise reports, monitoring reports, and the associated research findings have been integrated into adaptive management decisions regarding the focus for subsequent research and monitoring as determined in collaborations between Navy, NMFS, Marine Mammal Commission, and other marine resource subject matter experts using an adaptive management approach. For example, see the 2019 U.S. Navy Annual Marine Species Monitoring Report for the Pacific that was made available to the public in September 2020.

Adaptive Management

The regulations governing the take of marine mammals incidental to Navy training and testing activities in the PMSR Study Area contain an adaptive management component. Our understanding of the effects of Navy training and testing activities (*e.g.,* explosive stressors) on marine mammals continues to evolve, which makes the inclusion of an adaptive management component both valuable and necessary within the context of 7-year regulations.

The reporting requirements associated with this rule are designed to provide NMFS with monitoring data from the previous year to allow NMFS to consider whether any changes to existing mitigation and monitoring requirements are appropriate. The use of adaptive management allows NMFS to consider new information from different sources to determine (with input from the Navy regarding practicability) on an annual or biennial basis if mitigation or monitoring measures should be modified (including additions or deletions). Mitigation or monitoring measures could be modified if new data suggests that such modifications will have a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring and if the measures are practicable. If the modifications to the mitigation, monitoring, or reporting measures are substantial, NMFS will publish a notice of the planned LOA in the **Federal Register** and solicit public comment.

The following are some of the possible sources of applicable data to be considered through the adaptive management process: (1) results from monitoring and activity reports, as required by MMPA authorizations; (2) compiled results of Navy funded research and development studies; (3) results from specific stranding investigations; (4) results from general marine mammal and sound research; and (5) any information which reveals that marine mammals may have been taken in a manner, extent, or number not authorized by these regulations or subsequent LOAs. The results from monitoring reports and other studies may be viewed at *https://www.navymarinespeciesmonitoring.us.*

Reporting

In order to issue incidental take authorization for an activity, section 101(a)(5)(A) of the MMPA states that NMFS must set forth requirements pertaining to the monitoring and reporting of such taking. Effective reporting is critical both to compliance as well as ensuring that the most value is obtained from the required monitoring. Reports from individual monitoring events, results of analyses, publications, and periodic progress reports for specific monitoring projects will be posted to the Navy's Marine Species Monitoring web portal: *https://www.navymarinespeciesmonitoring.us.*

Notification of Injured, Live Stranded or Dead Marine Mammals

The Navy will consult the Notification and Reporting Plan, which sets out notification, reporting, and other requirements when injured, live stranded, or dead marine mammals are detected. The Notification and Reporting Plan is available at *https://www.fisheries.noaa.gov/action/incidental-take-authorization-us-navy-testing-and-training-activities-point-mugu-sea-range.*

Annual SNI Monitoring Report

The Navy will submit an annual report to NMFS of the SNI target and missile launch activities. The draft annual monitoring report will be submitted to the Director, Office of Protected Resources, NMFS, within 3 months after the end of the reporting year. NMFS will submit comments or questions on the draft monitoring report, if any, within 3 months of receipt. The report will be considered final after the Navy has addressed NMFS' comments, or 3 months after the submission of the draft if NMFS does not provide comments on the draft report. The report will summarize the launch events conducted during the year; assess any direct impacts to pinnipeds from launch events; assess any cumulative impacts on pinnipeds from launch events; and summarize pinniped monitoring and research activities conducted on SNI and any findings related to effects of launch noise on pinniped populations.

Annual PMSR Training and Testing Activity Report

Each year the Navy will submit a detailed report (Annual PMSR Training and Testing Activity Report) to NMFS within 3 months after the one-year anniversary of the date of issuance of the LOA. NMFS will submit comments or questions on the report, if any, within 1 month of receipt. The report will be considered final after the Navy has addressed NMFS' comments, or 1 month after submission of the draft if NMFS does not provide comments on the draft report. The annual report will contain information on all explosives used, total annual number of each type of explosive activities; and total annual expended/detonated rounds (missiles, bombs *etc.*) for each explosive bin. The annual report will also specifically include information on sound sources used. The annual report will also contain the current year's explosive use data as well as the cumulative explosive use quantity from previous years' reports. Additionally, if there were any changes to the explosives allowance in the reporting year or cumulatively, the report will include a discussion of why the change was made and include analysis to support how the change did or did not affect the analysis in the 2022 PMSR FEIS/OEIS and MMPA final rule. See the regulatory text below for detail on the content of the annual report.

The final annual/close-out report at the conclusion of the authorization period (year 7) will also serve as the comprehensive close-out report, and will include both the final year annual use compared to annual authorization and a cumulative 7-year annual use compared to 7-year authorization. NMFS will submit comments on the

draft close-out report, if any, within 3 months of receipt. The report will be considered final after the Navy has addressed NMFS' comments, or 3 months after the submission of the draft if NMFS does not provide comments.

Information included in the annual reports may be used to inform future adaptive management of activities within the PMSR Study Area.

Other Reporting and Coordination

The Navy will continue to report and coordinate with NMFS for the following:

- Annual marine species monitoring technical review meetings (in-person or remote, as circumstances allow and agreed upon by NMFS and the Navy) that also include researchers and the Marine Mammal Commission (currently every 2 years a joint Pacific-Atlantic meeting is held); and
- Annual Adaptive Management meetings (in-person or remote, as circumstances allow and agreed upon by NMFS and the Navy) that also include the Marine Mammal Commission (recently modified to occur in conjunction with the annual monitoring technical review meeting).

Analysis and Negligible Impact Determination

General Negligible Impact Analysis

Introduction

NMFS has defined negligible impact as an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival (50 CFR 216.103). A negligible impact finding is based on the lack of likely adverse effects on annual rates of recruitment or survival (*i.e.,* population-level effects). An estimate of the number of takes alone is not enough information on which to base an impact determination. In considering how Level A harassment or Level B harassment factor into the negligible impact analysis, in addition to considering the number of estimated takes, NMFS considers other factors, such as the likely nature of any responses (*e.g.,* intensity, duration), the context of any responses (*e.g.,* critical reproductive time or location, migration), as well as effects on habitat, and the likely effectiveness of the mitigation. We also assess the number, intensity, and context of estimated takes by evaluating this information relative to population status. Consistent with the 1989 preamble for NMFS' implementing regulations (54 FR 40338; September 29, 1989), the impacts from other past and ongoing anthropogenic activities are incorporated into this analysis via their impacts on the baseline (*e.g.,* as reflected in the regulatory status of the species, population size and growth rate where known).

In the *Estimated Take of Marine Mammals* section, we identified the subset of potential effects that are reasonably expected to occur and rise to the level of takes both annually and over the 7-year period covered by this rule, based on the methods described. The impact that any given take will have on an individual, and ultimately the species or stock, is dependent on many case-specific factors that need to be considered in the negligible impact analysis (*e.g.,* the context of behavioral exposures such as duration or intensity of a disturbance, the health of impacted animals, the status of a species that incurs fitness-level impacts to individuals, *etc.*). For this rule, we evaluated the likely impacts of the number of harassment takes reasonably expected to occur, and are authorized, in the context of the specific circumstances surrounding these predicted takes. Last, we collectively evaluated this information, as well as other more taxa-specific information and mitigation measure effectiveness, in group-specific assessments that support our negligible impact conclusions for each species and stock. Because all of the Navy's specified activities will occur within the ranges of the marine mammal stocks identified in the rule, all negligible impact analyses and determinations are at the stock level *(i.e.,* additional species-level determinations are not needed).

As explained in the *Estimated Take of Marine Mammals* section, no take by serious injury or mortality is authorized or anticipated to occur.

The specified activities reflect maximum levels of training and testing activities. The *Description of the Specified Activity* section describes annual activities. There may be some flexibility in the exact number of detonations that may vary from year to year, but take totals will not exceed the 7-year totals indicated in Table 21 as well as take annual and 7-year totals described for missile launch activities on SNI in Table 22. We base our analysis and negligible impact determination on the maximum number of takes that are reasonably expected to occur and are authorized, although, as stated before, the number of takes are only a part of the analysis, which includes qualitative consideration of other contextual factors that influence the degree of impact of the takes on the affected individuals. To avoid repetition, we provide some general analysis in this *General Negligible Impact Analysis* section that applies to all the species and stocks listed in Table 21 and Table 22, given that some of the anticipated effects of the Navy's training and testing activities on marine mammals are expected to be relatively similar in nature. Then, in the *Group and Species-Specific Analyses* section, we subdivide into discussions of Mysticetes, Odontocetes, and Pinnipeds as there are broad life history traits that support an overarching discussion of some factors considered within the analysis for those groups (*e.g.,* high-level differences in feeding strategies). Last, we break our analysis into species (and/or stocks), or groups of species (and their associated stocks) where relevant similarities exist, to provide more specific information related to the anticipated effects on individuals of a specific stock or where there is information about the status or structure of any species or stocks that would lead to a differing assessment of the effects on the species or stock. Organizing our analysis by grouping species or stocks that share common traits or that will respond similarly to effects of the Navy's activities and then providing species- or stock-specific information allows us to avoid duplication while assuring that we have analyzed the effects of the specified activities on each affected species or stock.

The Navy's take request, which, as described above, is for harassment only, is based on its acoustic model. The model calculates sound energy propagation from explosives during naval activities; the sound or impulse received by animat dosimeters representing marine mammals distributed in the area around the modeled activity; and whether the sound or impulse energy received by a marine mammal exceeds the thresholds for effects. Assumptions in the Navy model intentionally err on the side of overestimation when there are unknowns. Naval activities are modeled as though they would occur regardless of proximity to marine mammals, meaning that no mitigation is considered and without any avoidance of the activity by the animal. NMFS provided input to, independently reviewed, and concurred with the Navy on this process and the Navy's analysis, which is described in detail in Section 6 of the Navy's rulemaking/LOA application, was used to quantify harassment takes for this rule.

Generally speaking, the Navy and NMFS anticipate more severe effects from takes resulting from exposure to

higher received levels (though this is in no way a strictly linear relationship for behavioral effects throughout species, individuals, or circumstances), and less severe effects from takes resulting from exposure to lower received levels. However, there is also growing evidence of the importance of distance in predicting marine mammal behavioral response to sound—*i.e.,* sounds of a similar level emanating from a more distant source have been shown to be less likely to evoke a response of equal magnitude (DeRuiter 2012, Falcone *et al.* 2017). The estimated number of Level A harassment and Level B harassment takes does not equate to the number of individual animals the Navy expects to harass (which is lower), but rather to the instances of take (*i.e.,* exposures above the Level A harassment and Level B harassment threshold) that are anticipated to occur annually and over the 7-year period. These instances may represent either brief exposures (seconds) or, in some cases, several exposures within a day. Most explosives detonating at or near the surface, especially those involving the larger explosive bins such as a MISSILEX, have brief exposures lasting only a few milliseconds to minutes for the entire event. Explosive events may be a single event involving one explosion (single exposure) or a series of intermittent explosives (multiple explosives) occurring over the course of a day. Gunnery events, in some cases, may have longer durations of exposure to intermittent sound. In general, gunnery events can last intermittently over 1–3 hrs in total; however the actual exposure during the event will be of a much shorter duration (seconds to minutes).

Behavioral Response

Behavioral reactions from explosive sounds are likely to be similar to reactions studied for other impulsive sounds such as those produced by air guns. Impulsive signals, particularly at close range, have a rapid rise time and higher instantaneous peak pressure than other signal types, making them more likely to cause startle responses or avoidance responses. Most data has come from seismic surveys that occur over long durations (*e.g.,* on the order of days to weeks), and typically utilize large multi-air gun arrays that fire repeatedly. While seismic air gun data provides the best available science for assessing behavioral responses to impulsive sounds (*i.e.,* sounds from explosives) by marine mammals, it is likely that these responses represent a worst-case scenario compared to most Navy explosive noise sources. There are no explosives planned to detonate underwater, only those that detonate at or near the surface of the water. For explosives detonating at or near the surface, an animal is considered exposed to a sound if the received sound level at the animal's location is above the background ambient noise level within a similar frequency band. For launches of targets and missiles from SNI, years of monitoring have demonstrated that sound levels at the nearest pinniped haulout site will produce short-term, localized changes in behavior, including temporarily vacating haulouts.

As described in the Navy's application, the Navy identified (with NMFS' input) the types of behaviors that would be considered a take (moderate behavioral responses as characterized in Southall *et al.* (2007) (*e.g.,* altered migration paths or dive profiles, interrupted nursing, breeding or feeding, or avoidance) that also would be expected to continue for the duration of an exposure). The Navy then compiled the available data indicating the received sound levels and distances from the sources when those responses have occurred to predict how many instances of Level B harassment by behavioral disturbance occur in a day. Take estimates alone do not provide information regarding the potential fitness or other biological consequences of the reactions on the affected individuals. NMFS therefore considers the available activity-specific, environmental, and species-specific information to determine the likely nature of the modeled behavioral responses and the potential fitness consequences for affected individuals.

In the range of potential behavioral effects that might be expected to be part of a response that qualifies as an instance of Level B harassment by behavioral disturbance (which by nature of the way it is modeled/counted, occurs within one day), the less severe end might include exposure to comparatively lower levels of a sound, at a detectably greater distance from the animal, for a few seconds or a minute. A less severe exposure of this nature could result in a behavioral response such as avoiding an area that an animal would otherwise have chosen to move through or feed in for some amount of time or breaking off one or a few feeding bouts. More severe effects could occur when the animal gets close enough to the source to receive a comparatively higher level, or is exposed intermittently to different sources throughout a day. Such effects might result in an animal having a more severe flight response and leaving a larger area for a day or more or potentially losing feeding opportunities for a day. However, such severe behavioral effects are expected to occur infrequently.

The majority of Level B harassment takes are expected to be in the form of milder responses (*i.e.,* lower-level exposures that still rise to the level of take) of a generally shorter duration. We anticipate more severe effects from takes when animals are exposed to higher received levels or at closer proximity to the source. However, depending on the context of an exposure (*e.g.,* depth, distance, if an animal is engaged in important behavior such as feeding), a behavioral response can vary across species and individuals within a species. Specifically, given a range of behavioral responses that may be classified as Level B harassment, to the degree that higher received levels are expected to result in more severe behavioral responses, only a smaller percentage of the anticipated Level B harassment from Navy activities would be expected to potentially result in more severe responses (see the *Group and Species-Specific Analyses* section below for more detailed information). To fully understand the likely impacts of the predicted/authorized take on an individual (*i.e.,* what is the likelihood or degree of fitness impacts), one must look closely at the available contextual information, such as the duration of likely exposures and the likely severity of the exposures (*e.g.,* whether they will occur for a longer duration over sequential days or the comparative sound level that will be received). Ellison *et al.* (2012) and Moore and Barlow (2013), among others, emphasize the importance of context (*e.g.,* behavioral state of the animals, distance from the sound source) in evaluating behavioral responses of marine mammals to acoustic sources.

Diel Cycle

Many animals perform vital functions, such as feeding, resting, traveling, and socializing on a diel cycle (24-hour cycle). Behavioral reactions to noise exposure, when taking place in a biologically important context, such as disruption of critical life functions, displacement, or avoidance of important habitat, are more likely to be significant if they last more than one diel cycle or recur on subsequent days (Southall *et al.* 2007) due to diel and lunar patterns in diving and foraging behaviors observed in many cetaceans, including beaked whales (Baird *et al.* 2008, Barlow *et al.* 2020, Henderson *et al.* 2016, Schorr *et al.* 2014). Henderson *et al.* (2016) found that ongoing smaller scale events had little to no impact on

foraging dives for Blainville's beaked whale, while multi-day training events may decrease foraging behavior for Blainville's beaked whale (Manzano-Roth *et al.* 2016). Consequently, a behavioral response lasting less than one day and not recurring on subsequent days is not considered severe unless it could directly affect reproduction or survival (Southall *et al.* 2007). There are very few multi-day training or testing events for PMSR Study Area.

Durations of Navy activities utilizing explosives vary and are fully described in Appendix A (PMSR Scenarios Descriptions) of the 2022 PMSR FEIS/OEIS. The PMSR Study Area has activity occurring daily, but tests range from just a single missile launch or multiple launches, or may only be a captive carry where no munitions are air launched but the test is to determine the aircraft's ability to function properly with a missile on board, to a single or dual target launch from SNI, or a CSSQT where the ship's capability is tested by how it performs with a multiple weapons systems against a target. Also, while some tests are planned well in advance, some portions of or the entire test may be canceled due to weather or atmospheric conditions, sea state, a particular system or support infrastructure dysfunction, or many other factors. Most explosive detonation events are scheduled to occur over a short duration (one to a few hours); however, the explosive detonation component of the activity only lasts for seconds. Although explosive detonation events may sometimes be conducted in the same general areas repeatedly, because of their short duration and the fact that they are in the open ocean and animals can easily move away, it is similarly unlikely that animals would be exposed for long, continuous amounts of time, or demonstrate sustained behavioral responses. All of these factors make it unlikely that individuals would be exposed to the event for extended periods or on consecutive days.

Assessing the Number of Individuals Taken and the Likelihood of Repeated Takes

As described previously, Navy modeling uses the best available science to predict the instances of exposure above certain acoustic thresholds, which are quantified as harassment takes. However, these numbers from the model do not identify whether and when the enumerated instances occur to the same individual marine mammal on different days, or how any such repeated takes may impact those individuals. One method that NMFS uses to help better understand the overall scope of the impacts is to compare the total instances of take against the abundance of that species (or stock if applicable). For example, if there are 100 estimated harassment takes in a population of 100, one can assume either that every individual will be exposed above acoustic thresholds in no more than one day, or that some smaller number will be exposed in one day but a few individuals will be exposed multiple days within a year and a few not exposed at all. However, in this rule the percentage of takes relative to abundance is under five percent for all species and in most cases less than one percent, meaning that it is less likely that individuals of most species will be taken multiple times, although we note that pinnipeds that haul out regularly in areas where activities are regularly conducted are more likely to be taken on multiple days.

Temporary Threshold Shift

NMFS and the Navy have estimated that some species and stocks of marine mammals may sustain some level of TTS from explosive detonations. In general, TTS can last from a few minutes to days, be of varying degree, and occur across various frequency bandwidths, all of which determine the severity of the impacts on the affected individual, which can range from minor to more severe. Explosives are generally referenced as broadband because of the various frequencies. Table 21 indicates the number of takes by TTS that may be incurred by different species and stocks from exposure to explosives. The TTS sustained by an animal is primarily classified by three characteristics:

1. Frequency—Available data (of mid-frequency hearing specialists exposed to mid- or high-frequency sounds; Southall *et al.* 2007) suggest that most TTS occurs in the frequency range of the source up to one octave higher than the source (with the maximum TTS at ½ octave above). TTS from explosives would be broadband.

2. Degree of the shift (*i.e.,* by how many dB the sensitivity of the hearing is reduced)—Generally, both the degree of TTS and the duration of TTS will be greater if the marine mammal is exposed to a higher level of energy (which would occur when the peak dB level is higher or the duration is longer). The threshold for the onset of TTS was discussed previously in this rule. An animal would have to approach closer to the source or remain in the vicinity of the sound source appreciably longer to increase the received SEL. The sound resulting from an explosive detonation is considered an impulsive sound and shares important qualities (*i.e.,* short duration and fast rise time) with other impulsive sounds such as those produced by air guns. Given the anticipated duration and levels of sound exposure, we would not expect marine mammals to incur more than relatively low levels of TTS (*i.e.,* single digits of sensitivity loss).

3. Duration of TTS (recovery time)—In the TTS laboratory studies (as discussed in the *Potential Effects of Specified Activities on Marine Mammals and their Habitat* section of the proposed rule), some using exposures of almost an hour in duration or up to 217 SEL, almost all individuals recovered within 1 day (or less, often in minutes), although in one study (Finneran *et al.* 2007) recovery took 4 days. For the same reasons discussed in the *Analysis and Negligible Impact Determination—Diel Cycle* section, and because of the short distance animals would need to be from the sound source, it is unlikely that animals would be exposed to the levels necessary to induce TTS in subsequent time periods such that their recovery is impeded.

The TTS takes would be the result of exposure to explosive detonations (broad-band). As described above, we expect the majority of these takes to be in the form of mild (single-digit), short-term (minutes to hours) TTS. This means that for one time a year, for several minutes, a taken individual will have slightly diminished hearing sensitivity (slightly more than natural variation, but nowhere near total deafness). The expected results of any one of these small number of mild TTS occurrences could be that (1) it does not overlap signals that are pertinent to that animal in the given time period, (2) it overlaps parts of signals that are important to the animal, but not in a manner that impairs interpretation, or (3) it reduces detectability of an important signal to a small degree for a short amount of time—in which case the animal may be aware and be able to compensate (but there may be slight energetic cost), or the animal may have some reduced opportunities (*e.g.,* to detect prey) or reduced capabilities to react with maximum effectiveness (*e.g.,* to detect a predator or navigate optimally). However, given the small number of times that any individual might incur TTS, the low degree of TTS and the short anticipated duration, and the low likelihood that one of these instances would occur across a time period in which the specific TTS overlapped the entirety of a critical signal, it is unlikely that TTS of the

nature expected to result from the Navy activities would result in behavioral changes or other impacts that would impact any individual's (of any hearing sensitivity) reproduction or survival.

Auditory Masking or Communication Impairment

The ultimate potential impacts of masking on an individual (if it were to occur) are similar to those discussed for TTS, but an important difference is that masking only occurs during the time of the signal, versus TTS, which continues beyond the duration of the signal. Fundamentally, masking is referred to as a chronic effect because one of the key potential harmful components of masking is its duration—the fact that an animal would have reduced ability to hear or interpret critical cues becomes much more likely to cause a problem the longer it is occurring. Also inherent in the concept of masking is the fact that the potential for the effect is only present during the times that the animal and the source are in close enough proximity for the effect to occur (and further, this time period would need to coincide with a time that the animal was utilizing sounds at the masked frequency). As our analysis has indicated, because of the sound sources primarily involved in this rule, we do not expect the exposures with the potential for masking to be of a long duration. Masking is fundamentally more of a concern at lower frequencies, because low frequency signals propagate significantly further than higher frequencies and because they are more likely to overlap both the narrower low-frequency calls of mysticetes, as well as many non-communication cues, such as sounds from fish and invertebrate prey and geologic sounds that inform navigation. Masking is also more of a concern from continuous sources (versus intermittent) where there is no quiet time between a sound source within which auditory signals can be detected and interpreted. Explosions introduce low-frequency, broadband sounds into the environment, which could momentarily mask hearing thresholds in animals that are nearby, although sounds from explosions last for only a few seconds at most. Masking due to these short duration detonations would not be significant. Activities that have multiple, repeated detonations, such as some naval gunfire activities, could result in masking for mysticetes near the target impact area over the duration of the event. Effects of masking are only present when the sound from the explosion is present, and the effect is over the moment the sound is no longer detectable. Therefore, short-term exposure to the predominantly intermittent explosions are not expected to result in a meaningful amount of masking. For the reasons described here, any limited masking that could potentially occur from explosives would be minor and short-term and intermittent. Long-term consequences from physiological stress due to the sound of explosives would not be expected. In conclusion, masking is more likely to occur in the presence of broadband, relatively continuous noise sources such as from vessels; however, the duration of temporal and spatial overlap with any individual animal and the spatially separated sources that the Navy uses would not be expected to result in more than short-term, low impact masking that would not affect reproduction or survival of individuals.

Auditory Injury (Permanent Threshold Shift)

Table 21 indicates the number of individuals of each species for which Level A harassment in the form of PTS resulting from exposure to or explosives is estimated to occur. The number of individuals to potentially incur PTS annually (from explosives) for each species ranges from 0 to 49 (49 is for Dall's porpoise), but is more typically 0 or 1. As described previously, no species are expected to incur non-auditory injury from explosives.

As discussed previously, the Navy utilizes aerial monitoring in addition to Lookouts on vessels to detect marine mammals for mitigation implementation. These Level A harassment take numbers represent the maximum number of instances in which marine mammals would be reasonably expected to incur PTS, and we have analyzed them accordingly. In relation to TTS, the likely consequences to the health of an individual that incurs PTS can range from mild to more serious depending upon the degree of PTS and the frequency band it is in. Any PTS accrued as a result of exposure to Navy activities would be expected to be of a small amount. Permanent loss of some degree of hearing is a normal occurrence for older animals, and many animals are able to compensate for the shift, both in old age or at younger ages as the result of stressor exposure (Green *et al.* 1987; Houser *et al.* 2008; Ketten 2012; Mann *et al.* 2010; McGowan *et al.* 2020). While a small loss of hearing sensitivity may include some degree of energetic costs for compensating or may mean some small loss of opportunities or detection capabilities, at the expected scale it would be unlikely to impact behaviors, opportunities, or detection capabilities to a degree that would interfere with reproductive success or survival of any individuals.

Physiological Stress Response

Some of the lower level physiological stress responses (*e.g.,* orientation or startle response, change in respiration, change in heart rate) discussed in the *Potential Effects of Specified Activities on Marine Mammals and their Habitat* would likely co-occur with the predicted harassments, although these responses are more difficult to detect and fewer data exist relating these responses to specific received levels of sound. However, we would not expect the Navy's generally short-term and intermittent activities to create conditions of long-term, continuous noise leading to long-term physiological stress responses in marine mammals that could affect reproduction or survival.

Group and Species-Specific Analyses

In this section, we build on the general analysis that applies to all marine mammals in the PMSR Study Area from the previous section, and include first information and analysis that applies to mysticetes or, separately, odontocetes, and pinnipeds and then within those three sections, more specific information that applies to smaller groups, where applicable, and the affected species or stocks. The specific authorized take numbers are discussed in Table 34 and Table 35, and here we provide some additional context and discussion regarding how we consider the authorized take numbers in those analyses. The maximum amount and type of incidental take of marine mammals reasonably likely to occur from explosive detonations and target and missile launch activities and therefore authorized during the 7-year training and testing period are shown in Table 34 and Table 35 below. The vast majority of predicted exposures are expected to be Level B harassment (TTS and behavioral disturbance) from explosive sources during training and testing activities and target and missile launch activities on SNI.

TABLE 34—ANNUAL ESTIMATED TAKES BY LEVEL A HARASSMENT AND LEVEL B HARASSMENT FOR MARINE MAMMALS IN THE PMSR STUDY AREA (EXCLUDING SNI) AND THE NUMBER INDICATING THE INSTANCES OF TOTAL TAKE AS A PERCENTAGE OF STOCK ABUNDANCE

Common name	Stock/DPS	Annual take by Level A harassment and Level B harassment			Total take	Abundance (2021 draft SARs or most recent SARs)	Percent taken by abundance
		Behavioral response	TTS	PTS			
Blue whale *	Eastern North Pacific.	7	4	0	11	1,496	0.74
Fin whale *	California, Oregon, and Washington.	14	7	1	22	9,029	0.24
Gray whale	Eastern North Pacific.	9	5	0	14	26,960	0.05
Humpback whale *	California, Oregon, and Washington/ Mexico DPS.	7	4	0	11	2,900	0.38
	California, Oregon, and Washington/ Central America DPS.	1	0	0	1	2,900	0.03
Minke whale	California, Oregon, and Washington.	2	1	0	3	636	0.47
Bottlenose dolphin	California, Oregon, and Washington Offshore.	5	5	1	[a] 16	1924	0.57
Dall's porpoise	California, Oregon, and Washington.	261	406	49	716	25,750	2.78
Dwarf sperm whale	California, Oregon, and Washington.	20	31	6	57	4,111	1.39
Long-beaked common dolphin.	California	66	44	9	255	101,305	0.12
Northern right whale dolphin.	California, Oregon, and Washington.	3	2	1	[c] 14	26,556	0.02
Pacific white-sided dolphin.	California, Oregon, and Washington.	11	8	2	[d] 26	26,814	0.08
Pygmy sperm whale.	California, Oregon, and Washington.	20	31	6	57	4,111	1.39
Risso's dolphins	California, Oregon, and Washington.	6	3	1	[e] 19	6,336	0.16
Short-beaked common dolphin.	California, Oregon, and Washington.	90	65	15	170	969,861	0.02
Sperm whale *	California, Oregon, and Washington.	1	1	0	2	1,997	0.10
Striped dolphin	California, Oregon, and Washington.	1	1	0	[f] 56	29,211	0.01
Harbor seal	California	202	120	14	336	30,968	1.08
Northern elephant seal.	California	37	63	22	122	179,000	0.07
California sea lion	U.S. Stock	8	12	2	22	257,606	0.01
Guadalupe fur seal *.	Mexico to California.	1	1	0	2	34,187	0.01

Note: Percentages taken by abundance may be less for some stocks as the abundance would be less in the PMSR Study Area depending on the range of a particular stock.

* ESA-listed species in PMSR Study Area.

[a] Total Annual Level B harassment takes for the California, Oregon, and Washington Offshore stock of Bottlenose dolphin were increased from 11 annual modeled takes to 16 annual takes to account for group size.

[b] Total Annual Level B harassment takes for the California stock of Long-beaked Common dolphin were increased from 119 annual modeled takes to 255 annual takes to account for group size.

[c] Total Annual Level B harassment takes for the California, Oregon, and Washington stock of Northern right whale dolphin were increased from 6 annual modeled takes to 14 annual takes to account for group size.

[d] Total Annual Level B harassment takes for the California, Oregon, and Washington stock of Pacific white-sided dolphin were increased from 21 annual modeled takes to 26 annual takes to account for group size.

[e] Total Annual Level B harassment takes for the California, Oregon, and Washington stock of Risso's dolphin were increased from 10 annual modeled takes to 19 annual takes to account for group size.

[f] Total Annual Level B harassment takes for the California, Oregon, and Washington stock of Striped dolphin were increased from 2 annual modeled takes to 56 annual takes to account for group size.

TABLE 35—ANNUAL ESTIMATED TAKES BY LEVEL B HARASSMENT FOR PINNIPEDS ON SNI AND INSTANCES OF TAKE AS A PERCENTAGE OF STOCK ABUNDANCE

Species	Stock	Annual take by Level B harassment	Abundance (2021 draft SARs or most recent SARs)	Percent taken by abundance	7-year total take by Level B harassment
California sea lion	U.S	11,000	257,606	4.27	77,000
Harbor seal	California	480	30,968	1.55	3,360
Northern elephant seal	California	40	179,000	0.02	280

In the discussions below, the estimated takes by Level B harassment represent instances of take, not the number of individuals taken (the much lower and less frequent takes by Level A harassment are far more likely to be associated with separate individuals). The total take numbers (by any method of taking) for species are compared to their associated abundance estimates to evaluate the magnitude of impacts across the species and to individuals. Abundance percentage comparisons are less than three percent for all species and stocks and nearly all are one percent or less and zero in many cases for explosives and less than five percent for all species on SNI from target and missile launch activities. This means that: (1) not all of the individuals will be taken, and many will not be taken at all; (2) barring specific circumstances suggesting repeated takes of individuals (such as in circumstances where all activities resulting in take are focused in one area and time where the same individual marine mammals are known to congregate, such as pinnipeds on SNI), the average or expected number of days taken for those individuals taken is one per year; and (3) we would not expect any individuals to be taken more than a few times in a year, or for those days to be sequential.

To assist in understanding what this analysis means, we clarify a few issues related to estimated takes and the analysis here. An individual that incurs PTS or TTS may sometimes, for example, also be subject to direct behavioral disturbance at the same time. As described above in this section, the degree of PTS, and the degree and duration of TTS, expected to be incurred from the Navy's activities are not expected to impact marine mammals such that their reproduction or survival could be affected. Similarly, data do not suggest that a single instance in which an animal incurs PTS or TTS and also has an additional direct behavioral response would result in impacts to reproduction or survival. Accordingly, in analyzing the numbers of takes and the likelihood of repeated and sequential takes, we consider all the types of take, so that individuals potentially experiencing both threshold shift and direct behavioral responses are appropriately considered. The number of Level A harassment takes by PTS are so low (and zero in most cases) compared to abundance numbers that it is considered highly unlikely that any individual would be taken at those levels more than once.

On the less severe end, exposure to comparatively lower levels of sound at a detectably greater distance from the animal, for a few or several minutes, could result in a behavioral response such as avoiding an area that an animal would otherwise have moved through or fed in, or breaking off one or a few feeding bouts. More severe behavioral effects could occur when an animal gets close enough to the source to receive a comparatively higher level of sound, is exposed continuously to one source for a longer time, or is exposed intermittently to different sources throughout a day. Such effects might result in an animal having a more severe flight response and leaving a larger area for a day or more, or potentially losing feeding opportunities for a day. However, such severe behavioral effects are not expected to occur.

Occasional, milder behavioral reactions are unlikely to cause long-term consequences for individual animals or populations, and even if some smaller subset of the takes are in the form of a longer (several hours or a day) and more severe responses, if they are not expected to be repeated over sequential days, impacts to individual fitness are not anticipated. Nearly all studies and experts agree that infrequent exposures of a single day or less are unlikely to impact an individual's overall energy budget (Farmer *et al.* 2018; Harris *et al.* 2017; King *et al.* 2015; NAS 2017; New *et al.* 2014; Southall *et al.* 2007; Villegas-Amtmann *et al.* 2015).

The analyses below in some cases address species and stocks collectively if they occupy the same functional hearing group (*i.e.,* low, mid, and high-frequency cetaceans and pinnipeds), share similar life history strategies, and/or are known to behaviorally respond similarly to stressors. Because some of these groups or species share characteristics that inform the impact analysis similarly, it would be duplicative to repeat the same analysis for each species. In addition, similar species typically have the same hearing capabilities and behaviorally respond in the same manner.

Thus, our analysis below considers the effects of the Navy's activities on each affected species or stock even where discussion is organized by functional hearing group and/or information is evaluated at the group level. Where there are meaningful differences between species that would further differentiate the analysis, they are either described within the section or the discussion for those species or stocks is included as a separate subsection. Specifically, below, we first give broad descriptions of the mysticete, odontocete, and pinniped groups and then differentiate into further groups as appropriate.

Mysticetes

This section builds on the broader discussion above and brings together the discussion of the different types and amounts of take that different species and stocks could potentially or will likely to incur, the applicable mitigation, and the status of the species and stocks to support the negligible impact determinations for each species or stock. We have described (above in the *General Negligible Impact Analysis* section) the unlikelihood of any masking having effects that would impact the reproduction or survival of any of the individual marine mammals affected by the Navy's activities. We also described in the *Potential Effects of Specified Activities on Marine Mammals and their Habitat* section of the proposed rule that the specified activities would not have adverse or long-term impacts on marine mammal habitat, and therefore the unlikelihood of any habitat impacts affecting the reproduction or survival of any of the individual marine mammals affected by the Navy's activities. No new information has been received that

affects this analysis and conclusion. There is no predicted non-auditory tissue damage from explosives for any species, and only one take by PTS of any mysticete (fin whale) annually. Much of the discussion below focuses on the behavioral effects and the mitigation measures that reduce the probability or severity of effects. Because there are species-specific considerations, at the end of the section we break out our findings on a species-specific basis.

In Table 34 above, we indicate for each species the total annual numbers of take by Level A harassment and Level B harassment for mysticetes, and a number indicating the instances of total take as a percentage of abundance in the PMSR Study Area. Note also that for mysticetes, the abundance within the PMSR Study Area represents only a portion of the species or stock abundance.

No Bryde's whales, gray whales (Western North Pacific stock), or sei whales would be taken by Level A harassment or Level B harassment and therefore are not discussed further. For other mysticetes, exposure to explosives will result in small numbers of take: 1–14 takes by Level B harassment by behavioral disturbance per species, and 4–7 by TTS per species. One take by PTS will result for fin whales and 0 for all other mysticetes. Based on this information, the majority of the Level B harassment by behavioral disturbance is expected to be of low severity and of shorter duration. No non-auditory tissue damage from training and testing activities is anticipated to occur or authorized for any species.

Research and observations show that if mysticetes are exposed to impulsive sounds such as those from explosives, they may react in a number of ways, which may include alerting, startling, breaking off feeding dives and surfacing, diving or swimming away, changing vocalization, or showing no response at all (DoD, 2017; Nowacek, 2007; Richardson, 1995; Southall *et al.* 2007). Overall and in consideration of the context for an exposure, mysticetes have been observed to be more reactive to acoustic disturbance when a noise source is located directly in their migration path or the source is nearby (somewhat independent of the sound level) (Dunlop *et al.* 2016; Dunlop *et al.* 2018; Ellison *et al.* 2011; Friedlaender *et al.* 2016; Henderson *et al.* 2019; Malme *et al.* 1985; Richardson *et al.* 1995; Southall *et al.* 2007a). Mysticetes have been observed to be more reactive to acoustic disturbance when a noise source is located directly on their migration route. Mysticetes disturbed while migrating could pause their migration or route around the disturbance, while males en route to breeding grounds have been shown to be less responsive to disturbances. Although some may pause temporarily, they will resume migration shortly after the exposure ends. Animals disturbed while engaged in other activities such as feeding or reproductive behaviors may be more likely to ignore or tolerate the disturbance and continue their natural behavior patterns. Because noise from most activities using explosives is short term and intermittent, and because detonations usually occur within a small area, behavioral reactions from mysticetes, if they occur at all, are likely to be short term and of little to no significance.

Noise from explosions is broadband with most energy below a few hundred Hz; therefore, any reduction in hearing sensitivity from exposure to explosive sounds is likely to be broadband with effects predominantly at lower frequencies. Mysticetes that do experience threshold shift (*i.e.,* TTS or the one instance of PTS for fin whale) from exposure to explosives may have reduced ability to detect biologically important sounds (*e.g.,* social vocalizations). For example, during the short period that a mysticete experiences TTS, social calls from conspecifics could be more difficult to detect or interpret, the ability to detect predators may be reduced, and the ability to detect and avoid sounds from approaching vessels or other stressors might be reduced. Any TTS that occurs would be of short duration.

While NMFS can make a negligible impact determination on Navy's estimated take numbers, the implementation of mitigation and the sightability of mysticetes (especially given their large size) reduces the potential for, and severity of, any threshold shift for mysticetes. When we look in ocean areas where the Navy has been intensively training and testing with explosive and other active acoustic sources for decades, there are no data suggesting any long-term consequences to reproduction or survival rates of mysticetes from explosives and other active acoustic sources. All the mysticete species discussed in this section will benefit from the mitigation measures described earlier in the *Mitigation Measures* section. Below we compile and summarize the information that supports our determination that the Navy's activities will not adversely affect any species or stock through effects on annual rates of recruitment or survival for any of the affected mysticete species.

Humpback whale—As noted in the *Description of Marine Mammals and Their Habitat in the Area of the Specified Activities* section, humpback whales in the PMSR Study Area are part of the ESA-threatened Mexico DPS and ESA-endangered Central America DPS of the California/Oregon/Washington (CA/OR/WA) stock with an increasing population trend. ESA Critical Habitat has been designated (86 FR 21082; April 21, 2021) in nearshore waters of the North Pacific Ocean for the endangered Central America DPS and the threatened Mexico DPS of humpback whales since the proposed rule with some overlap in the PMSR Study Area. There are two biologically important areas for humpback whale feeding that overlap with a portion of the PMSR Study Area—the Morro Bay to Point Sal Feeding Area (designated from April to November) and the Santa Barbara Channel-San Miguel Feeding Area (designated from March to September) (Calambokidis *et al.* 2015). Navy testing and training activities that use explosives could occur year round within the PMSR Study Area, although they generally would not occur in these relatively nearshore feeding areas, because both areas are close to the northern Channel Islands NMS, oil production platforms, and major vessel routes leading to and from the ports of Los Angeles and Long Beach. Further, even if some small number of humpback whale takes occurred in these BIAs and were to disrupt feeding behaviors, the short-term nature of the anticipated takes from these activities, combined with the likelihood that they would not occur on more than one day for any individual within a year, means that they are not expected to impact the reproduction or survival of any individuals.

NMFS has authorized 12 takes by Level B harassment (see Table 34): 7 takes by behavioral disturbance and 4 takes by TTS for Mexico DPS humpback whales and 1 take by behavioral disturbance and 0 takes by TTS for Central America DPS humpback whales (Table 34). Regarding the magnitude of takes by Level B harassment (TTS and behavioral disruption), the number of estimated total instances of take compared to the abundance is less than 1 percent (Table 34). Regarding the severity of those individual takes by Level B harassment by behavioral disruption, we have explained that the duration of any exposure is expected to be between seconds and minutes (*i.e.,* short duration) (*i.e.,* of a low level and unlikely to evoke a severe response). Regarding the severity of takes by TTS,

they are expected to be low-level, of short duration not at a level that will impact reproduction or survival.

Altogether, the CA/OR/WA stock includes the ESA-listed Mexico DPS (threatened) and Central America (endangered) DPS of humpback whales and has an increasing population trend. There is critical habitat for humpback whales in the PMSR Study Area. Our analysis suggests only a very small portion of the stock will be taken and disturbed at a low-level with those individuals disturbed on likely one day within a year. The authorized takes are not expected to result in impacts on the reproduction or survival of any individuals, let alone have impacts on annual rates of recruitment or survival. No Level A harassment, serious injury, or mortality is anticipated to occur or is authorized. This low magnitude and severity of harassment effects is not expected to result in impacts on the reproduction or survival of any individuals, let alone have impacts on annual rates of recruitment or survival. Therefore, the total take will not adversely affect this species through impacts on annual rates of recruitment or survival. For these reasons, we have determined, in consideration of all of the effects of the Navy's activities combined, that the authorized take will have a negligible impact on humpback whales.

Blue whale—Blue whales are listed as endangered under the ESA throughout their range. The Eastern North Pacific stock occurs in the PMSR Study Area with a stable population trend (NMFS 2019; Calambokidis and Barlow, 2020). There is no ESA-designated critical habitat, but there are three biologically important areas (BIAs) for feeding identified for blue whales in the PMSR Study Area. The feeding areas overlap (one wholly and two partially) with the PMSR Study Area (June through October). Navy testing and training activities that use explosives could occur year round within the PMSR Study Area. However, activities using explosives generally would not take place in the Point Conception/Arguello to Point Sal Feeding Area or the Santa Barbara Channel and San Miguel Feeding Area, because both areas are close to the northern Channel Islands NMS, oil production platforms, and major vessel routes leading to and from the ports of Los Angeles and Long Beach. The SNI feeding area overlaps a part of the PMSR Study Area that has been in high use for Navy testing and training activities for decades. Over the years, there has been very little change in Navy testing and training off SNI, and the waters within Warning Area 289, which overlap with the SNI Feeding Area, are essential for testing and training given their proximity to SNI. The area is used during activities requiring an aerial target impact area, missile launches from SNI, aerial and ship-based gunnery events, and sea surface missile launches. Even if some small number of blue whale takes occurred in these BIAs and were to disrupt feeding behaviors, the short-term nature of the anticipated takes from these activities, combined with the likelihood that they would not occur on more than one day for any individual within a year, means that they are not expected to impact the reproduction or survival of any individuals.

NMFS has authorized 11 takes by Level B harassment, 7 takes by behavioral disturbance and 4 takes by TTS for blue whales (Table 34). Regarding the magnitude of takes by Level B harassment (TTS and behavioral disruption), the number of estimated total instances of take compared to the abundance is less than 1 percent (Table 34). Regarding the severity of those individual takes by Level B harassment by behavioral disturbance, we have explained that the duration of any exposure is expected to be between seconds and minutes (*i.e.,* short duration) (*i.e.,* of a low-level). Regarding the severity of takes by TTS, they are expected to be low-level, of short duration not at a level that will impact reproduction or survival.

Altogether, blue whales are listed as endangered, though the Eastern North Pacific stock is stable, and has a very large range. Our analysis suggests that a very small portion of the stock will be taken and disturbed at a low-level, with those individuals disturbed on likely one day within a year. No Level A harassment, serious injury, or mortality is anticipated to occur or authorized. This low magnitude and severity of harassment effects is not expected to result in impacts on the reproduction or survival of any individuals, let alone have impacts on annual rates of recruitment or survival. Therefore, the total take will not adversely affect this species through impacts on annual rates of recruitment or survival. For these reasons, we have determined, in consideration of all of the effects of the Navy's activities combined, that the authorized take will have a negligible impact on blue whales.

Fin whale—Fin whales are listed as endangered under the ESA throughout their range, with no ESA designated critical habitat or known biologically important areas identified for this species in the PMSR Study Area. The population trend for the CA/OR/WA stock, found in the PMSR Study Area, is increasing (NMFS 2019).

NMFS has authorized 22 takes by Level B harassment, 14 takes by behavioral disturbance, 7 takes by TTS, and 1 take by PTS for fin whales (Table 34. Regarding the magnitude of takes by Level B harassment (TTS and behavioral disruption), the number of estimated total instances of take compared to the abundance is less than 1 percent (Table 34). Regarding the severity of those individual takes by Level B harassment by behavioral disturbance, we have explained that the duration of any exposure is expected to be between seconds and minutes (*i.e.,* short) (*i.e.,* of a low level). Regarding the severity of takes by TTS, they are expected to be low-level, of short duration not at a level that will impact reproduction or survival.

Altogether, fin whales are listed as endangered, with no designated critical habitat or biologically important areas in the PMSR Study Area, and the CA/OR/WA stock is increasing. Our analysis suggests that a very small portion of the stock will be taken and disturbed at a low level, with those individuals disturbed on likely one day within a year. No serious injury or mortality is anticipated to occur or authorized. This low magnitude and severity of harassment effects is not expected to result in impacts on the reproduction or survival of any individuals, let alone have impacts on annual rates of recruitment or survival. Therefore, the total take will not adversely affect this species through impacts on annual rates of recruitment or survival. For these reasons, we have determined, in consideration of all of the effects of the Navy's activities combined, that the authorized take will have a negligible impact on fin whales.

Gray whale (Eastern North Pacific stock)—The Gray whale (Eastern North Pacific stock) is not listed as endangered or threatened under the ESA and has an increasing population trend. There is an active UME for gray whales off the West Coast. The Eastern North Pacific population of gray whales that migrate along the West Coast has declined about 24 percent since 2016. It now stands at an estimated 20,580 whales (Stellar and Weller 2021). That is similar to previous fluctuations in the Eastern North Pacific population that has since recovered from the days of whaling. The decline coincides with the UME declared in 2019 and resembles a similar 23 percent decline documented after a UME 20 years earlier, in 1999–2000. The gray whale population rebounded following that previous UME to greater numbers than before. The continuing change in

gray whale numbers suggests that large-scale fluctuations of this nature are not rare. The observed declines in abundance appear to represent short-term events that have not resulted in any detectable longer-term impacts on the population. We do not anticipate any mortality or impacts on reproduction or survival of any individuals, and given the low magnitude and severity of effects from Level B harassment only, even with the UME, they will not result in impacts on individual reproduction or survival, much less annual rates of recruitment or survival. Therefore, population-level effects to gray whales from the Navy's activities despite the UME are not anticipated.

Four designated biologically important areas for migration for gray whales (Calambokidis *et al.* 2015) overlap with the PMSR Study Area and are active migration areas from October through July, although each individual area has its own specific date range depending on what portion of the northbound or southbound migration it is meant to cover. Gray whales will cross the PMSR Study Area twice a year during their annual southbound and northbound migrations. Navy testing and training activities that use explosives could occur year round within the PMSR Study Area, but generally they will occur farther offshore than the shallow-water, nearshore habitat generally preferred by gray whales during their migration. In an early study investigating the behavior of migrating gray whales exposed to an impulsive source in their migration path, a startle response was observed in 42 percent of the cases, but the change in behavior, when it occurred, did not persist (Malme *et al.* 1984; Malme *et al.* 1988; Richardson, 1995). If a gray whale were to react to sound from an explosion, it may pause its migration until the noise ceases or moves, or it may choose an alternate route around the location of the sound source if the source was directly in the whale's migratory path. Even if some small number of gray whale takes occurred in these BIAs in the form of disrupted feeding behaviors or traveling for migration, the short-term nature of the anticipated takes from these activities, combined with the likelihood that they would not occur on more than one day for any individual within a year, mean that they are not expected to impact the reproduction or survival of any individuals.

NMFS has authorized 14 takes by Level B harassment, 9 takes by behavioral disturbance and 5 takes by TTS for gray whales (Table 34). Regarding the magnitude of takes by Level B harassment (TTS and behavioral disruption), the number of estimated total instances of take compared to the abundance is less than 1 percent (Table 34). Regarding the severity of those individual takes by Level B harassment by behavioral disturbance, we have explained that the duration of any exposure is expected to be between minutes and hours (*i.e.,* relatively short) (*i.e.,* of a moderate or lower level, less likely to evoke a severe response). Regarding the severity of takes by TTS, they are expected to be low-level, of short duration not at a level that will impact reproduction or survival.

Altogether, gray whales (Eastern North Pacific stock) are not listed under the ESA and the population is increasing. Our analysis suggests that a very small portion of the stock will be taken and disturbed at a low level, with those individuals disturbed on likely one day within a year. No Level A harassment, serious injury, or mortality is anticipated to occur or authorized. This low magnitude and severity of harassment effects is not expected to result in impacts on the reproduction or survival of any individuals, either alone or in combination with the effects of the UME, let alone have impacts on annual rates of recruitment or survival. Therefore, the total take will not adversely affect this species through impacts on annual rates of recruitment or survival. For these reasons, we have determined, in consideration of all of the effects of the Navy's activities combined, that the authorized take will have a negligible impact on gray whales.

Minke whale—Minke whale is not listed as endangered or threatened under the ESA and there are no known biologically important areas identified for these species in the PMSR Study Area. The CA/OR/WA stock occurs in the PMSR Study Area with no known population trend.

NMFS has authorized 3 takes by Level B harassment, 2 takes by behavioral disturbance and 1 take by TTS for minke whales (Table 34). Regarding the magnitude of takes by Level B harassment (TTS and behavioral disruption), the number of estimated total instances of take compared to the abundance is less than 1 percent (Table 34). Regarding the severity of those individual takes by Level B harassment by behavioral disturbance, we have explained that the duration of any exposure is expected to be between minutes and hours (*i.e.,* relatively short) (*i.e.,* of a moderate or lower level, less likely to evoke a severe response). Regarding the severity of takes by TTS, they are expected to be low-level, of short duration not at a level that will impact reproduction or survival.

Altogether, minke whales are not listed under the ESA and with no known population trend. Our analysis suggests that a very small portion of the stock will be taken and disturbed at a low level, with those individuals disturbed likely one day within a year. No Level A harassment, serious injury, or mortality is anticipated to occur or authorized. This low magnitude and severity of harassment effects is not expected to result in impacts on the reproduction or survival of any individuals, let alone have impacts on annual rates of recruitment or survival. Therefore, the total take will not adversely affect this species through impacts on annual rates of recruitment or survival. For these reasons, we have determined, in consideration of all of the effects of the Navy's activities combined, that the authorized take will have a negligible impact on minke whales.

Odontocetes

This section builds on the broader discussion above and brings together the discussion of the different types and amounts of take that different species and stocks could potentially or will likely to incur, the applicable mitigation, and the status of the species and stock to support the negligible impact determinations for each species or stock. We have described (above in the *General Negligible Impact Analysis* section) the unlikelihood of any masking having effects that would impact the reproduction or survival of any of the individual marine mammals affected by the Navy's activities. We also described in the *Potential Effects of Specified Activities on Marine Mammals and their Habitat* section of this proposed rule that the specified activities would not have adverse or long-term impacts on marine mammals habitat, and therefore the unlikelihood of any habitat impacts having affecting the reproduction or survival of any of the individual marine mammals affected by the Navy's activities. No new information has been received that affects this analysis and conclusion. There is no predicted PTS from explosives for most odontocetes, with the exception of a few species, which is discussed below. There is no predicted non-auditory tissue damage from explosives for any species. Much of the discussion below focuses on the behavioral effects and the mitigation measures that reduce the probability or severity of effects. Here, we include information that applies to all of the odontocete species, which are then

further divided and discussed in more detail in the following subsections: Kogia whales; sperm whales; beaked whales; porpoise, and dolphins and small whales. These subsections include more specific information about the groups, as well as conclusions for each species represented.

In Table 34 above, we indicate for each species the total annual numbers of take by Level A harassment and Level B harassment for odontocetes, and a number indicating the instances of total take as a percentage of abundance in the PMSR Study Area. Note also that, for all odontocetes where estimated take is authorized their abundance within the PMSR Study Area represents only a portion of their respective species population.

No Baird's beaked whale, Cuvier's beaked whale, *Mesoplodont* spp. harbor porpoise, bottlenose dolphin (California coastal stock), killer whale, or short-finned pilot whale will be taken by Level A harassment or Level B harassment and, therefore, these species and stocks are not discussed further.

Odontocete echolocation occurs predominantly at frequencies significantly higher than 20 kHz, though there may be some small overlap at the lower part of their echolocating range for some species, which means that there is little likelihood that threshold shift, either temporary or permanent would interfere with feeding behaviors. Many of the other critical sounds that serve as cues for navigation and prey (*e.g.,* waves, fish, invertebrates) occur below a few kHz, which means that detection of these signals will not be inhibited by most threshold shift either. The low number of takes by threshold shift that might be incurred by individuals exposed to explosives will likely be lower frequency (5 kHz or less) and spanning a wider frequency range, which could slightly lower an individual's sensitivity to navigational or prey cues, or a small portion of communication calls, for several minutes to hours (if temporary) or permanently. There is no reason to think that any of the individual odontocetes taken by TTS would incur these types of takes over more than one day, and therefore they are unlikely to result in impacts on reproduction or survival. The number of PTS takes from these activities are very low (0 annually for most, 1–15 for a few species, and 49 for Dall's porpoise), and as discussed previously because of the low degree of PTS (*i.e.,* low amount of hearing sensitivity loss), it is unlikely to affect reproduction or survival of any individuals.

The range of potential behavioral effects of sound exposure on marine mammals generally, and odontocetes specifically, has been discussed in detail previously. There are behavioral patterns that differentiate the likely impacts on odontocetes as compared to mysticetes. First, odontocetes echolocate to find prey, which means that they actively send out sounds to detect their prey. While there are many strategies for hunting, one common pattern, especially for deeper diving species, is many repeated deep dives within a bout, and multiple bouts within a day, to find and catch prey. As discussed above, studies demonstrate that odontocetes may cease their foraging dives in response to sound exposure. If enough foraging interruptions occur over multiple sequential days, and the individual either does not take in the necessary food, or must exert significant effort to find necessary food elsewhere, energy budget deficits can occur that could potentially result in impacts to reproductive success, such as increased cow/calf intervals (the time between successive calving). Second, while many mysticetes rely on seasonal migratory patterns that position them in a geographic location at a specific time of the year to take advantage of ephemeral large abundances of prey (*i.e.,* invertebrates or small fish, which they eat by the thousands), odontocetes forage more homogeneously on one fish or squid at a time. Therefore, if odontocetes are interrupted while feeding, it is often possible to find more prey relatively nearby.

Dwarf Sperm Whales and Pygmy Sperm Whales (Kogia species)—This section builds on the broader odontocete discussion above and brings together the discussion of the different types and amounts of take that these two species could potentially or will likely incur, the applicable mitigation, and the status of the species and stocks to support the negligible impact determinations for each species or stock. Some Level A harassment by PTS is anticipated annually (6 takes each for dwarf and pygmy sperm whale, see Table 34).

In Table 34 above, we indicate for *Kogia* species the total annual numbers of take by Level A harassment and Level B harassment above for dwarf sperm whales and pygmy sperm whales, and a number indicating the instances of total take as a percentage of the abundance within the PMSR Study Area. Note also that, for dwarf and pygmy sperm whales (and all odontocetes), the abundance within the PMSR Study Area represents only a portion of the species abundance.

As discussed above, the majority of takes by Level B harassment by behavioral disturbance of odontocetes, and thereby dwarf and pygmy sperm whales, is expected to be in the form of low severity of a shorter duration. As discussed earlier in this section, we anticipate more severe effects from takes when animals are exposed to higher received levels or for longer durations. Occasional milder Level B harassment by behavioral disturbance, as is expected here, is unlikely to cause long-term consequences for either individual animals or populations.

We note that dwarf and pygmy sperm whales, as HF-sensitive species, have a lower PTS threshold than all other groups and therefore are generally likely to experience larger amounts of TTS and PTS. NMFS accordingly has evaluated slightly higher numbers of take for these species than most odontocetes (some of which have zero takes of TTS/PTS). Even though the number of TTS and PTS takes are higher than for other odontocetes, any TTS and PTS is expected to be at a low to moderate level and for all of the reasons described above, TTS and PTS takes are not expected to impact reproduction or survival of any individual.

Neither pygmy sperm whales nor dwarf sperm whales are listed under the ESA, and there are no known biologically important areas identified for these species in the PMSR Study Area. The CA/OR/WA stocks specified for pygmy sperm whales and dwarf sperm whales are found in the PMSR Study Area. There is no information on trends for these species within the PMSR Study Area. Both pygmy and dwarf sperm whales will benefit from the mitigation measures described earlier in the Mitigation Measures section.

Regarding the magnitude of Level B harassment takes (TTS and behavioral disruption), the number of estimated total instances of take compared to the abundance is less than 2 percent for both dwarf and pygmy sperm whales in the PMSR Study Area (Table 34). Regarding the severity of those individual Level B harassment takes by behavioral disruption, we have explained that the duration of any exposure is expected to be between seconds and minutes (*i.e.,* short duration). Regarding the severity of TTS takes, they are expected to be low to moderate level, of short duration, but any associated lost opportunities and detection capabilities are not at a level that will impact reproduction or survival. Dwarf sperm whales and pygmy sperm whales could be taken by a small amount of PTS annually, of

likely low to moderate severity as described previously. A small permanent loss of hearing sensitivity (PTS) may include some degree of energetic costs for compensating or may mean some small loss of opportunities or detection capabilities, but at the expected degree the estimated takes by Level A harassment takes by PTS for dwarf sperm whales and pygmy sperm whales are unlikely to impact behaviors, opportunities, or detection capabilities to a degree that will interfere with reproductive success or survival of any individuals, let alone affect annual rates of recruitment or survival for the species or stock.

Altogether, although dwarf and pygmy sperm whales are not listed under the ESA and there are no known population trends, our analysis suggests that a small portion of the stock in the PMSR Study Area will be taken, and disturbed at a low to moderate level, with those individuals likely not disturbed on more than one day a year. No serious injury or mortality is anticipated to occur or authorized. The low magnitude and low to moderate severity of harassment effects is not expected to result in impacts on the reproduction or survival of any individuals, let alone have impacts on annual rates of recruitment or survival. Therefore, the total take will not adversely affect this species through impacts on annual rates of recruitment or survival. Some individuals are estimated to be taken by PTS of likely low to moderate severity. A small permanent loss of hearing sensitivity (PTS) may include some degree of energetic costs for compensating or may mean some small loss of opportunities or detection capabilities, but at the expected scale the estimated takes by Level A harassment by PTS are unlikely to impact behaviors, opportunities, or detection capabilities to a degree that would interfere with reproductive success or survival of any individuals, let alone affect annual rates of recruitment or survival. For these reasons, we have determined, in consideration of all of the effects of the Navy's activities combined, that the authorized take will have a negligible impact on both dwarf and pygmy sperm whales.

Sperm whale—This section brings together the broader discussion above with the discussion of the different types and amounts of take that sperm whales could potentially incur, the applicable mitigation, and the status of the species to support the negligible impact determination.

In Table 34 above, we indicate the total annual numbers of take by Level A harassment and Level B harassment for sperm whales, and a number indicating the instances of total take as a percentage of the abundance within the PMSR Study Area. Note also that, for sperm whales, the abundance within the PMSR Study represents only a portion of the species abundance.

As discussed above, the majority of takes by Level B harassment by behavioral disturbance of odontocetes, and thereby sperm whales, is expected to be in the form of low severity of a generally shorter duration and is unlikely to cause long-term consequences for either individual animals or populations.

Sperm whales are listed as endangered under the ESA throughout their range, but there is no ESA designated critical habitat or known biologically important areas identified for this species within the PMSR Study Area. The CA/OR/WA stock occurs in the PMSR Study with a stable population trend (NMFS 2019). Sperm whales will benefit from the mitigation measures described earlier in the *Mitigation Measures* section.

Regarding the magnitude of takes by Level B harassment (TTS and behavioral disruption), the number of estimated total instances of take compared to the abundance is less than 1 percent in the PMSR Study Area (Table 34). Regarding the severity of those individual takes by Level B harassment by behavioral disturbance, we have explained that the duration of any exposure is expected to be between seconds and minutes (*i.e.,* short duration) and of a low level. Regarding the severity of TTS takes, they are expected to be low-level, of short duration, and would not be at a level that will impact reproduction or survival.

Altogether, although sperm whales are listed as endangered under the ESA and have a stable population trend, our analysis suggests that very few individuals within the PMSR Study Area will be taken and disturbed at a low level, with those individuals disturbed on likely one day within a year. No Level A harassment, serious injury, or mortality is anticipated to occur or authorized. This low magnitude and low severity of harassment effects is not expected to result in impacts on the reproduction or survival of any individuals, let alone have impacts on annual rates of recruitment or survival. Therefore, the total take will not adversely affect this species through impacts on annual rates of recruitment or survival. For these reasons, we have determined, in consideration of all of the effects of the Navy's activities combined, that the authorized take will have a negligible impact on sperm whales.

Porpoise (Dall's Porpoise)—This section builds on the broader odontocete discussion above and brings together the discussion of the different types and amounts of take that Dall's porpoise are likely to incur, the applicable mitigation, and the status of the species to support the negligible impact determinations for each species. Some Level A harassment by PTS is anticipated annually (49 takes, see Table 34).

In Table 34 above, we indicate the total annual numbers of take by Level A harassment and Level B harassment for Dall's porpoise, and a number indicating the instances of total take as a percentage of the abundance within the PMSR Study Area. Note also that, for Dall's porpoise (and all odontocetes), the abundance within the PMSR Study Area represents only a portion of the species abundance.

As discussed above, the majority of takes by Level B harassment by behavioral disturbance of odontocetes, and thereby Dall's porpoise, is expected to be in the form of low to moderate severity of a shorter duration. As discussed earlier in this section, we anticipate more severe effects from takes when animals are exposed to higher received levels or for longer durations. Occasional milder Level B harassment by behavioral disturbance, as is expected here, is unlikely to cause long-term consequences for either individual animals or populations.

We note that Dall's porpoise, as HF-sensitive species, have a lower PTS threshold than all other groups and therefore are generally likely to experience larger amounts of TTS and PTS. NMFS accordingly has evaluated slightly higher numbers of take for these species than most odontocetes (some of which have zero takes of TTS/PTS). Therefore, even though the number of TTS and PTS takes are higher than for other odontocetes, any TTS or PTS is expected to be at a low to moderate level and for all of the reasons described above, TTS and PTS takes are not expected to impact reproduction or survival of any individual.

Dall's porpoise are not listed under the ESA, and there are no known biologically important areas identified for these species in the PMSR Study Area. The CA/OR/WA stock is found in the PMSR Study Area. There is no information on trends for this species within the PMSR Study Area. Dall's porpoise will benefit from the mitigation measures described earlier in the *Mitigation Measures* section.

Regarding the magnitude of Level B harassment takes (TTS and behavioral disruption), the number of estimated total instances of take compared to the abundance is less than 3 percent for Dall's porpoise in the PMSR Study Area (Table 34). Regarding the severity of those individual Level B harassment takes by behavioral disruption, we have explained that the duration of any exposure is expected to be between seconds and minutes (*i.e.,* relatively short duration). Regarding the severity of TTS takes, they are expected to be low to moderate level, of short duration, and any associated lost opportunities and detection capabilities are not at a level that will impact reproduction or survival. Dall's porpoise could be taken by a small amount of PTS annually, of likely low to moderate severity as described previously. A small permanent loss of hearing sensitivity (PTS) may include some degree of energetic costs for compensating or may mean some small loss of opportunities or detection capabilities, but at the expected degree the estimated takes by Level A harassment takes by PTS for Dall's porpoise are unlikely to impact behaviors, opportunities, or detection capabilities to a degree that will interfere with reproductive success or survival of any individuals, let alone affect annual rates of recruitment or survival.

Altogether, although Dall's porpoise are not listed under the ESA and there are no known population trends for the CA/OR/WA stock our analysis suggests that a small portion of the stock will be taken, and disturbed at a low to moderate level, with those individuals likely not disturbed on more than one day or so a year. No serious injury or mortality is anticipated to occur or authorized. The low magnitude and low to moderate severity of harassment effects is not expected to result in impacts on the reproduction or survival of any individuals, let alone have impacts on annual rates of recruitment or survival. Therefore, the total take will not adversely affect this species through impacts on annual rates of recruitment or survival. Some individuals are estimated to be taken by PTS of likely low to moderate severity. A small permanent loss of hearing sensitivity (PTS) may include some degree of energetic costs for compensating or may mean some small loss of opportunities or detection capabilities, but at the expected scale the estimated takes by Level A harassment by PTS are unlikely to impact behaviors, opportunities, or detection capabilities to a degree that would interfere with reproductive success or survival of any individuals, let alone affect annual rates of recruitment or survival. For these reasons, we have determined, in consideration of all of the effects of the Navy's activities combined, that the authorized take will have a negligible impact on Dall's porpoise.

Small Whales and Dolphins—This section builds on the broader odontocete discussion above and brings together the discussion of the different types and amounts of take that different small whale and dolphin species are likely to incur, the applicable mitigation, and the status of the species and stocks to support the negligible impact determinations for each species or stock.

In Table 34 above, we indicate for each species the total annual numbers of take by Level A harassment and Level B harassment for dolphins and small whales, and a number indicating the instances of total take as a percentage of abundance in the PMSR Study Area. Note also that, for dolphins and small whales, the abundance within the PMSR Study Area represents only a portion of the respective species' abundance.

The majority of takes by Level B harassment are expected to be in the form of low severity of a shorter duration. Occasional milder Level B harassment by behavioral disturbance, as is expected here, is unlikely to cause long-term consequences for either individual animals or populations that have any effect on reproduction or survival. Limited Level A harassment (PTS) is anticipated to occur or authorized for six species (Long and short-beaked common dolphins, bottlenose dolphin, Risso's dolphin, Pacific white-sided dolphin, and Northern right whale dolphin).

Research and observations show that if delphinids are exposed to sounds they may react in a number of ways depending on their experience with the sound source and what activity they are engaged in at the time of the acoustic exposure. Delphinids may not react at all until the sound source is approaching within a few hundred meters, such as with a ship with hull-mounted sonar, to within a few kilometers, depending on the environmental conditions and species. Some dolphin species (the more surface-dwelling taxa—typically those with ''dolphin'' in the common name, such as bottlenose dolphins, spotted dolphins, spinner dolphins, rough-toothed dolphins, *etc.,* but not Risso's dolphins), especially those residing in more industrialized or busy areas, have demonstrated more tolerance for disturbance and loud sounds and many of these species are known to approach vessels to bow-ride. These species are often considered generally less sensitive to disturbance. Dolphins and small whales that reside in deeper waters and generally have fewer interactions with human activities are more likely to demonstrate more typical avoidance reactions and foraging interruptions as described above in the odontocete overview.

All the dolphin and small whale species discussed in this section will benefit from the mitigation measures described earlier in the *Mitigation Measures* section.

None of the small whale and dolphin species are listed as endangered or threatened species under the ESA. There are CA/OR/WA stocks for most of the small whales and dolphins found in the PMSR Study Area and most have unknown population trends, with the exception of the Short-beaked common dolphin that has a stable population trend and the Long-beaked common dolphin (California stock) that has an increasing population trend.

Regarding the magnitude of takes by Level B harassment (TTS and behavioral disturbance), the number of estimated total instances of take compared to the abundance is less than one percent for the dolphins and small whales in the PMSR Study Area (Table 34). Regarding the severity of those individual takes by Level B harassment by behavioral disturbance, we have explained the duration of any exposure is expected to be between seconds and minutes (*i.e.,* short duration). Regarding the severity of takes by TTS, they are expected to be low-level, of short duration and not at a level that will impact reproduction or survival. One to two individuals each of four species (Bottlenose dolphin, Northern right whale dolphin, Pacific white-dolphin, Risso's dolphin) are estimated to be taken by one to two PTS annually, of likely low severity as described previously. Slightly more takes by PTS for short-beaked common dolphin and long-beaked common dolphin are authorized, 15 and 9 takes, respectively. A small permanent loss of hearing sensitivity may include some degree of energetic costs for compensating or may mean some small loss of opportunities or detection capabilities, but at the expected scale the estimated takes by Level A harassment by PTS are unlikely to impact behaviors, opportunities, or detection capabilities to a degree that will interfere with reproductive success or survival of any individuals, let alone affect annual rates of recruitment or survival.

Altogether, none of the small whale or dolphin species are listed under the ESA and there are no known population trends for most species. No serious injury or mortality is anticipated to occur or authorized. Our analysis suggests that only a small portion of the individuals of any of these species in the PMSR Study Area will be taken and disturbed at a low level, with those individuals likely disturbed no more than a day a year. Some take by PTS for five dolphin species is anticipated to occur and authorized, but at the expected scale the estimated take by Level A harassment by PTS is unlikely to impact behaviors, opportunities, or detection capabilities to a degree that would interfere with reproductive success or survival of any individuals, let alone annual rates of recruitment or survival. This low magnitude and severity of harassment effects is not expected to result in impacts on the reproduction or survival of any individuals, let alone have impacts on annual rates of recruitment or survival. Therefore, the total take will not adversely affect these species through impacts on annual rates of recruitment or survival. For these reasons, we have determined, in consideration of all of the effects of the Navy's activities combined, that the authorized take will have a negligible impact on all of these species of small whales and dolphins.

Pinnipeds

This section builds on the broader discussion above and brings together the discussion of the different types and amounts of take that different species and stocks of pinnipeds will likely incur, the applicable mitigation, and the status of the species and stocks to support the negligible impact determinations for each species or stock. We have described (above in the *General Negligible Impact Analysis* section) the unlikelihood of any masking having effects that will impact the reproduction or survival of any of the individual marine mammals affected by the Navy's activities. We have also described in the *Potential Effects of Specified Activities on Marine Mammals and their Habitat* section of this proposed rule that the specified activities would not have adverse or long-term impacts on marine mammal habitat, and therefore the unlikelihood of any habitat impacts affecting the reproduction or survival of any individual marine mammals affected by the Navy's activities. For pinnipeds, no serious injury or mortality is anticipated to occur or is authorized. Here, we include information that applies to all of the pinniped species and stocks.

In Table 34 and Table 35 above, we indicate the total annual numbers of take by Level A harassment and Level B harassment for pinnipeds, and a number indicating the instances of total take as a percentage of the abundance within the PMSR Study Area by explosives and also by target and missile launch activities on SNI. Note also that, for pinniped species and stocks, the abundance within the PMSR Study Area represents only a portion of the species abundance.

The majority of take by Level B harassment by behavioral disturbance of pinnipeds, is expected to be in the form of low severity of short duration for explosives and low to moderate severity of short duration for target and missile launches on SNI and is unlikely to cause long-term consequences for either individual animals or populations.

Pinnipeds in the PMSR Study Area are not listed under the ESA with the exception of the threatened Guadalupe fur seal (Mexico stock), but there is no ESA designated critical habitat for the Guadalupe fur seal. Pupping does occur on SNI beaches, January through July. The Guadalupe fur seal has an increasing population trend. Nevertheless, there is an active UME for Guadalupe fur seal. Since 2015, there have been 724 strandings of Guadalupe fur seals (including live and dead seals). However, we do not anticipate any mortality or impacts on reproduction or survival of any individuals, and, given the low magnitude and severity of effects from Level B harassment only (2 Level B harassment takes annually), even with the UME they will not result in impacts on individual reproduction or survival, much less annual rates of recruitment or survival. Therefore, population-level effects to Guadalupe fur seal from the Navy's activities despite the UME are not anticipated. The California sea lion UME was recently closed, as elevated strandings occurred from 2013–2016. The U.S. stock of California sea lions has an increasing population trend. The California stocks of Northern Elephant seal and Northern fur seals also have an increasing population trend. The California stock of harbor seals has a stable population trend. Pinnipeds will benefit from the mitigation measures described earlier in the *Mitigation Measures* section.

Regarding the magnitude of takes by Level B harassment (TTS and behavioral disruption) for explosives, the number of estimated total instances of take compared to the abundance is approximately 1 percent or less in the PMSR Study Area (Table 34). Regarding the magnitude of takes by Level B harassment (TTS and behavioral disruption) for target and missile launches, the number of estimated total instances of take compared to the abundance is less than five percent in the PMSR Study Area (Table 35). Given this information and the ranges of these stocks (*i.e.,* large ranges, but with individuals often staying in the vicinity of haulouts), only a small portion of individuals in these stocks are likely impacted and repeated exposures of individuals are not anticipated during explosives (*i.e.,* individuals are not expected to be taken on more than a few days within a year). Regarding the severity of those individual takes by Level B harassment by behavioral disturbance for explosives, the duration of any exposure is expected to be between seconds and minutes (*i.e.,* short duration). Regarding the severity of TTS takes from explosives, they are expected to be of low-level and short duration, and any associated lost opportunities and capabilities would not be at a level that will impact reproduction or survival.

Three species of pinnipeds (harbor seals, Northern elephant seal, and California sea lions) are estimated to be taken by PTS from explosives, 14, 22, and 2 takes, respectively, of likely low severity. A small permanent loss of hearing sensitivity (PTS) may include some degree of energetic costs for compensating or may mean some small loss of opportunities or detection capabilities, but at the expected scale the estimated takes by Level A harassment by PTS are unlikely to impact behaviors, opportunities, or detection capabilities to a degree that will interfere with reproductive success or survival of any individuals, let alone affect annual rates of recruitment or survival.

For missile launch activities on SNI, the planned activities may result in take, in the form of Level B harassment only, from airborne sounds of target and missile launch activities (Table 35). A portion of individuals in these stocks are likely impacted and repeated exposures of individuals are anticipated during missile and target launches for pinnipeds hauled out on SNI (*i.e.,* individuals are expected to be taken on up to several days within a year), however, there is no reason to expect that these disturbances would occur on sequential days.

Regarding the magnitude of takes by Level B harassment, the number of estimated total instances of take compared to the abundance is less than 5 percent on SNI for all pinniped species (Table 35). Based on the best available information, including

monitoring reports from similar activities that have been authorized by NMFS, Level B harassment will likely be limited behavioral reactions such as alerting to the noise, with some animals possibly moving toward or entering the water (*i.e.,* movements of more than 10 m (11 yd) and occasional flushing into the water with return to haulouts), depending on the species and the intensity of the launch noise. Regarding the severity of those individual takes by Level B harassment, any exposure is expected to be low to moderate and of relatively short duration and are unlikely to result in hearing impairment or to significantly disrupt foraging behavior. Given the launch acceleration and flight speed of the missiles, most launch events are of extremely short duration. Strong launch sounds are typically detectable near the beaches at western SNI for no more than a few seconds per launch (Holst *et al.* 2010; Holst *et al.* 2005a; Holst *et al.* 2008; Holst *et al.* 2005b). Pinnipeds hauled out on beaches where missiles fly over when launched from the Alpha Launch Complex routinely haul out and continue to use these beaches in large numbers, but at the Building 807 Launch Complex few pinnipeds are known to haul out on the shoreline immediately adjacent to this launch site. We do not expect repeated exposures to occur on sequential days as it can take up to several weeks of planning between launch events. Responses of pinnipeds on beaches during launches are highly variable. Harbor seals can be more reactive when hauled out compared to other species, such as northern elephant seals. Northern elephant seals generally exhibit no reaction at all, except perhaps a heads-up response or some stirring. However, stronger reactions may occur if California sea lions are in the same area mingled with the northern elephant seals and the sea lions react strongly. While the reactions are variable, and can involve abrupt movements by some individuals, biological impacts of these responses appear to be limited. Even some number of repeated instances of Level B harassment (with no particular likelihood of sequential days or more sustained effect) of some small subset of an overall stock is unlikely to result in any decrease in fitness to those individuals, and thus would not result in any adverse impact to a stock as a whole. Flushing of pinnipeds into the water has the potential to result in mother-pup separation, or a stampede, either of which could potentially result in serious injury or mortality. For example, in some cases, harbor seals at SNI appear to be more responsive during the pupping/breeding season (Holst *et al.* 2005a; Holst *et al.* 2008), while in others, mothers and pups seem to react less to launches than lone individuals (Ugoretz and Greene Jr. 2012), and California sea lions seem to be consistently less responsive during the pupping season (Holst *et al.* 2010; Holst *et al.* 2005a; Holst *et al.* 2008; Holst *et al.* 2011; Holst *et al.* 2005b; Ugoretz and Greene Jr. 2012). Though pup abandonment could theoretically result from these reactions, site-specific monitoring data indicate that pup abandonment is not likely to occur as a result of the target and missile launches, as it has not been previously observed. As part of mitigation the Navy will avoid target and missile launches during the peak pinniped pupping season to the maximum extent practicable, and missiles will not cross over pinniped haulouts at elevations less than 305 m (1,000 ft). Based on the best available information, including reports from almost 20 years of marine mammal monitoring during launch events, no injury, serious injury, or mortality of marine mammals has occurred from any flushing events or is anticipated to occur or authorized.

Altogether, pinnipeds are not listed under the ESA (except for Guadalupe fur seal that are threatened) and all pinniped stocks have increasing, stable, or unknown population trends. Our analysis suggests that a small portion of the stocks will be taken and disturbed at a low-moderate level, with those individuals disturbed on likely one day within a year from explosives and some individuals on SNI likely disturbed a few days a year within a year from target and missile launches. No serious injury or mortality is anticipated to occur or is authorized. No more than 22 individuals from three pinniped stocks are estimated to be taken by PTS (resulting from the use of explosives as PTS is not likely to occur at SNI from launches), of likely low severity, annually. Additionally, no PTS is expected for Guadalupe fur seal. This low to moderate magnitude and severity of harassment effects is not expected to result in impacts on the reproduction or survival of any individuals (either alone or in combination with the effects of the UME for Guadulupe fur seal), let alone have impacts on annual rates of recruitment or survival, and therefore the total take will not adversely affect this species through impacts on annual rates of recruitment or survival. For these reasons, we have determined, in consideration of all of the effects of the Navy's activities combined, that the authorized take will have a negligible impact on pinnipeds.

Determination

Based on the analysis contained herein of the likely effects of the specified activity on marine mammals and their habitat, and taking into consideration the implementation of the monitoring and mitigation measures, NMFS finds that the total marine mammal take from the specified activities will have a negligible impact on all affected marine mammal species or stocks.

Subsistence Harvest of Marine Mammals

In order to issue an incidental take authorization, NMFS must find that the total estimated take will not have an ''unmitigable adverse impact'' on the availability of the affected marine mammal species or stocks for taking for subsistence uses by Alaskan Natives. NMFS has defined ''unmitigable adverse impact'' in 50 CFR 216.103 as an impact resulting from the specified activity: (1) That is likely to reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (i) Causing the marine mammals to abandon or avoid hunting areas; (ii) Directly displacing subsistence users; or (iii) Placing physical barriers between the marine mammals and the subsistence hunters; and (2) That cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

When applicable, NMFS must prescribe means of effecting the least practicable adverse impact on the availability of the species or stocks for subsistence uses. As discussed in the *Mitigation Measures* section, evaluation of potential mitigation measures includes consideration of two primary factors: (1) the manner in which, and the degree to which, implementation of the potential measure(s) is expected to reduce adverse impacts on the availability of species or stocks for subsistence uses, and (2) the practicability of the measure(s) for applicant implementation.

To our knowledge there are no relevant subsistence uses of the affected marine mammal stocks or species implicated by the specified activities. Therefore, NMFS has determined that the total taking of affected species or stocks will not have an unmitigable adverse impact on the availability of the species or stocks for taking for subsistence purposes.

Classification

Endangered Species Act

There are seven marine mammal species under NMFS jurisdiction that are listed as endangered or threatened under the ESA (16 U.S.C. 1531 *et seq.*) with confirmed or possible occurrence in the PMSR Study Area: blue whale, fin whale, gray whale, humpback whale (Central America DPS and Mexico DPS,) sei whale, and sperm whale), and Guadalupe fur seal. NMFS published a final rule on ESA-designated critical habitat for humpback whales (86 FR 21082; April 21, 2021).

The Navy consulted with NMFS pursuant to section 7 of the ESA for PMSR activities, and NMFS also consulted internally on the promulgation of this rule and the issuance of an LOA under section 101(a)(5)(A) of the MMPA. NMFS issued a biological opinion concluding that the promulgation of the rule and issuance of a subsequent LOA are not likely to jeopardize the continued existence of threatened and endangered species under NMFS' jurisdiction and are not likely to result in the destruction or adverse modification of designated or proposed critical habitat in the PMSR Study Area. The biological opinion is available at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities.*

National Marine Sanctuaries Act

NMFS consulted with the NOAA's Office of National Marine Sanctuaries and if an activity is not likely to destroy, cause the loss of, or injure any sanctuary resource an action agency can determine that consultation under NMSA section 304(d) is not required. NMFS and NOAA's Office of National Marine Sanctuaries agreed that consultation on the NMSA is not required because the proposed military activities are limited to air and vessel (including surface targets) transits through the sanctuary and these activities are not likely to cause the destruction of, loss of, or injury to sanctuary resources or qualities.

National Environmental Policy Act

To comply with the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321 *et seq.*) and NOAA Administrative Order (NAO) 216–6A, NMFS must evaluate our proposed actions and alternatives with respect to potential impacts on the human environment. NMFS participated as a cooperating agency on the 2022 PMSR FEIS/OEIS, which was published January 2022, and is available at *https://pmsr-eis.com/.* In accordance with 40 CFR 1506.3, NMFS independently reviewed and evaluated the 2022 PMSR FEIS/OEIS and determined that it is adequate and sufficient to meet our responsibilities under NEPA for the issuance of this rule and associated LOA. NOAA therefore, has adopted the 2022 PMSR FEIS/OEIS. NMFS has prepared a separate Record of Decision. NMFS' Record of Decision for adoption of the 2022 PMSR FEIS/OEIS and issuance of this final rule and subsequent LOA can be found at *https://www.fisheries.noaa.gov/national/marine-mammal-protection/incidental-take-authorizations-military-readiness-activities.*

Regulatory Flexibility Act

The Office of Management and Budget has determined that this rule is not significant for purposes of Executive Order 12866.

Pursuant to the Regulatory Flexibility Act (RFA; 5 U.S.C. 601 *et seq.*), the Chief Counsel for Regulation of the Department of Commerce has certified to the Chief Counsel for Advocacy of the Small Business Administration during the proposed rule stage that this action would not have a significant economic impact on a substantial number of small entities. The factual basis for the certification was published in the proposed rule and is not repeated here. No comments were received regarding this certification. As a result, a regulatory flexibility analysis was not required and none was prepared.

Waiver of Delay in Effective Date

NMFS has determined that there is good cause under the Administrative Procedure Act (APA; 5 U.S.C. 553(d)(3)) to waive the 30-day delay in the effective date of this final rule. No individual or entity other than the Navy is affected by the provisions of these regulations. The Navy has requested that this final rule take effect by mid-July, so as to not cause a disruption in training and testing activities. The waiver of the 30-day delay of the effective date of the final rule will ensure that the MMPA final rule and LOA are in place by the time the previous authorizations expire. Any delay in effectiveness of the final rule would result in either: (1) A suspension of planned naval training and testing, which would disrupt vital training and testing essential to national security; or (2) the Navy's procedural non-compliance with the MMPA (should the Navy conduct training and testing without LOA), thereby resulting in the potential for unauthorized takes of marine mammals. Moreover, the Navy is ready to implement the regulations immediately. For these reasons, NMFS finds good cause to waive the 30-day delay in the effective date. In addition, the rule authorizes incidental take of marine mammals that would otherwise be prohibited under the statute. Therefore, by granting an exception to the Navy, the rule relieves restrictions under the MMPA, which provides a separate basis for waiving the 30-day effective date for the rule under section 553(d)(1) of the APA.

List of Subjects in 50 CFR Part 218

Exports, Fish, Imports, Incidental take, Indians, Labeling, Marine mammals, Navy, Penalties, Reporting and recordkeeping requirements, Seafood, Sonar, Transportation.

Samuel D. Rauch, III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR part 218 is amended as follows:

PART 218—REGULATIONS GOVERNING THE TAKING AND IMPORTING OF MARINE MAMMALS

■ 1. The authority citation for part 218 continues to read as follows:

Authority: 16 U.S.C. 1361 *et seq.,* unless otherwise noted.

■ 2. Add subpart B to read as follows:

Subpart B—Taking and Importing Marine Mammals; U.S. Navy's Point Mugu Sea Range (PMSR) Training and Testing Study Area (PMSR Study Area)

Sec.

218.10 Specified activity and geographical region.
218.11 Effective dates.
218.12 Permissible methods of taking.
218.13 Prohibitions.
218.14 Mitigation requirements.
218.15 Requirements for monitoring and reporting.
218.16 Letters of Authorization.
218.17 Renewals and modifications of Letters of Authorization.
218.18–218.19 [Reserved]

Subpart B—Taking and Importing Marine Mammals; U.S. Navy's Point Mugu Sea Range (PMSR) Training and Testing Study Area

§ 218.10 Specified activity and geographical region.

(a) Regulations in this subpart apply only to the U.S. Navy (Navy) for the taking of marine mammals that occur in the area described in paragraph (b) of this section and that occur incidental to

the activities listed in paragraph (c) of this section.

(b) The taking of marine mammals by the Navy under this subpart may be authorized in a Letter of Authorization (LOA) only if it occurs within the PMSR Training and Testing Study Area. The PMSR Study Area is located adjacent to Los Angeles, Ventura, Santa Barbara, and San Luis Obispo Counties along the Pacific Coast of Southern California and includes a 36,000-square-mile sea range. The two primary components of the PMSR Complex are Special Use Airspace and the ocean Operating Areas.

(c) The taking of marine mammals by the Navy is only authorized if it occurs incidental to the Navy conducting training and testing activities, including:

(1) *Training.*

(i) Air warfare;

(ii) Electronic warfare; and

(iii) Surface warfare.

(2) *Testing.*

(i) Air warfare;

(ii) Electronic warfare; and

(iii) Surface warfare.

§ 218.11 Effective dates.

Regulations in this subpart are effective from July 7, 2022, through July 7, 2029.

§ 218.12 Permissible methods of taking.

(a) Under an LOA issued pursuant to §§ 216.106 of this subchapter and 218.16, the Holder of the LOA (hereinafter ''Navy'') may incidentally, but not intentionally, take marine mammals within the area described in § 218.10(b) by Level A harassment and Level B harassment associated with the use of explosives and missile launch activities, provided the activity is in compliance with all terms, conditions, and requirements of the regulations in this subpart and the applicable LOA.

(b) The incidental take of marine mammals by the activities listed in § 218.10(c) is limited to the species and stocks listed in Table 1 of this section.

TABLE 1 TO § 218.12(b)

Common name	Scientific name	Stock
Blue whale	*Balaenoptera musculus*	Eastern North Pacific.
Fin whale	*Balaenoptera physalus*	California, Oregon, and Washington.
Gray whale	*Eschrichtius robustus*	Eastern North Pacific.
Humpback whale	*Megaptera novaeangliae*	California, Oregon, Washington.
Minke whale	*Balaenoptera acutorostrata*	California, Oregon, and Washington.
Common Bottlenose dolphin	*Tursiops truncatus*	California, Oregon, and Washington Offshore.
Dall's porpoise	*Phocoenoides dalli*	California, Oregon, and Washington.
Dwarf sperm whale	*Kogia sima*	California, Oregon, and Washington.
Long-beaked common dolphin	*Delphinus capensis*	California.
Mesoplodont beaked whales	*Mesoplodon spp*	California, Oregon, and Washington.
Northern right whale dolphin	*Lissodelphis borealis*	California, Oregon, and Washington.
Pacific white-sided dolphin	*Lagenorhynchus obliquidens*	California, Oregon, and Washington.
Pygmy killer whale	*Feresa attenuata.*	
Pygmy sperm whale	*Kogia breviceps*	California, Oregon, and Washington.
Risso's dolphins	*Grampus griseus*	California, Oregon, and Washington.
Short-beaked common dolphin	*Delphinus delphis*	California, Oregon, and Washington.
Sperm whale	*Physeter macrocephalus*	California, Oregon, and Washington.
Striped dolphin	*Stenella coeruleoalba*	California, Oregon, and Washington.
Harbor seal	*Phoca vitulina*	California.
Northern elephant seal	*Mirounga angustirostris*	California.
California sea lion	*Zalophus californianus*	U.S. Stock.
Guadalupe fur seal	*Arctocephalus townsendi*	Mexico to California.

§ 218.13 Prohibitions.

Except for incidental takings contemplated in § 218.12(a) and authorized by an LOA issued under §§ 216.106 of this chapter and 218.16, it shall be unlawful for any person to do any of the following in connection with the activities listed in § 218.10(c):

(a) Violate, or fail to comply with, the terms, conditions, and requirements of this subpart or an LOA issued under §§ 216.106 of this chapter and 218.16;

(b) Take any marine mammal not specified in § 218.12(b);

(c) Take any marine mammal specified in § 218.12(b) in any manner other than as specified in the LOA issued under §§ 216.106 of this chapter and 218.16; or

(d) Take a marine mammal specified in § 218.12(b) if NMFS determines such taking is having, or may have, more than a negligible impact on the species or stock concerned.

§ 218.14 Mitigation requirements.

When conducting the activities identified in § 218.10(c), the mitigation measures contained in any LOA issued under §§ 216.106 of this chapter and 218.16 will be implemented. These mitigation measures include, but are not limited to:

(a) *Procedural mitigation.* Procedural mitigation is mitigation that the Navy will implement whenever and wherever an applicable training or testing activity takes place within the PMSR Study Area for each applicable activity category or stressor category and includes acoustic stressors (*i.e.,* weapons firing noise), explosive stressors (*i.e.,* medium-caliber and large-caliber projectiles, missiles and rockets, bombs), and physical disturbance and strike stressors (*i.e.,* vessel movement; towed in-water devices (*e.g.,* surface targets); small-, medium-, and large-caliber non-explosive practice munitions; non-explosive missiles and rockets; and non-explosive bombs).

(1) *Environmental awareness and education.* Navy personnel (including civilian personnel) involved in mitigation and training or testing reporting under the specified activities will complete one or more modules of the U.S. Navy Afloat Environmental Compliance Training Series, as identified in their career path training plan. Modules include: Introduction to the U.S. Navy Afloat Environmental Compliance Training Series, Marine Species Awareness Training, and U.S. Navy Protective Measures Assessment Protocol.

(2) *Weapons firing noise.* Weapons firing noise associated with large-caliber gunnery activities.

(i) *Number of Lookouts and observation platform.* One Lookout will be positioned on the ship conducting the firing. Depending on the activity, the

Lookout could be the same as the one provided for under paragraph (a)(7)(i) of this section.

(ii) *Mitigation zone and requirements.* The mitigation zone will be 30 degrees on either side of the firing line out to 70 yd from the muzzle of the weapon being fired.

(A) *Prior to the initial start of the activity.* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will relocate or delay the start of weapons firing.

(B) *During the activity.* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will cease weapons firing.

(C) *Commencement/recommencement conditions after a marine mammal sighting before or during the activity.* Navy personnel must allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing weapons firing) until one of the following conditions has been met:

(*1*) *Observed exiting.* The animal is observed exiting the mitigation zone;

(*2*) *Determined to have exited.* The animal is determined to have exited the mitigation zone based on its course, speed, and movement away from weapons firing noise;

(*3*) *Clear from additional sightings.* The mitigation zone has been clear from any additional sightings for 30 minutes (min); or

(*4*) *Firing ship transit.* For mobile activities, the firing ship has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

(3) *Explosive medium-caliber and large-caliber projectiles.* Gunnery activities using explosive medium-caliber and large-caliber projectiles. Mitigation applies to activities using a surface target.

(i) *Number of Lookouts and observation platform.* One Lookout will be on the vessel or aircraft conducting the activity. For activities using explosive large-caliber projectiles, depending on the activity, the Lookout could be the same as the one described in paragraph (a)(2)(i) of this section. If additional platforms are participating in the activity, Navy personnel positioned on those assets (*e.g.,* safety observers, evaluators) will support observing the relevant mitigation zone for marine mammals and other applicable biological resources while performing their regular duties.

(ii) *Mitigation zone and requirements.* The relevant mitigation zones are as follows: 200 yd (182.88 m) around the intended impact location for air-to-surface activities using explosive medium-caliber projectiles; 600 yd (548.64 m) around the intended impact location for surface-to-surface activities using explosive medium-caliber projectiles; and 1,000 yd (914.4 m) around the intended impact location for surface-to-surface activities using explosive large-caliber projectiles.

(A) *Prior to the initial start of the activity (e.g., when maneuvering on station).* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will relocate or delay the start of firing.

(B) *During the activity.* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will cease firing.

(C) *Commencement/recommencement conditions after a marine mammal sighting before or during the activity.* Navy personnel must allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing firing) until one of the following conditions has been met:

(*1*) *Observed exiting.* The animal is observed exiting the mitigation zone;

(*2*) *Determined to have exited.* The animal is determined to have exited the mitigation zone based on a its course, speed, and movement away from the intended impact location;

(*3*) *Clear from additional sightings.* The mitigation zone has been clear from any additional sightings for 10 min for aircraft-based firing or 30 min for vessel-based firing; or

(*4*) *Impact location transit.* For activities using mobile targets, the intended impact location has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

(D) *After completion of the activity (e.g., prior to maneuvering off station).* Navy personnel will, when practical (*e.g.,* when platforms are not constrained by fuel restrictions or mission-essential follow-on commitments), observe for marine mammals in the vicinity of where detonations occurred; if any injured or dead marine mammals are observed, Navy personnel will follow established incident reporting procedures. If additional platforms are supporting this activity (*e.g.,* providing range clearance), Navy personnel on these assets will assist in the visual observation of the area where detonations occurred.

(4) *Explosive missiles and rockets.* Aircraft-deployed explosive missiles and rockets. Mitigation applies to activities using a maritime surface target at ranges up to 75 nmi (139 km).

(i) *Number of Lookouts and observation platform.* One Lookout will be positioned in an aircraft. If additional platforms are participating in the activity, Navy personnel positioned on those assets (*e.g.,* safety observers, evaluators) will support observing the relevant mitigation zone for marine mammals and other applicable biological resources while performing their regular duties.

(ii) *Mitigation zone and requirements.* The relevant mitigation zones are as follows: 900 yd (822.96 m) around the intended impact location for missiles or rockets with 0.6–20 lb net explosive weight; and 2,000 yd (1,828.8 m) around the intended impact location for missiles with 21–500 lb net explosive weight.

(A) *Prior to the initial start of the activity* (*e.g.,* during a fly-over of the mitigation zone). Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will relocate or delay the start of firing.

(B) *During the activity.* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will cease firing.

(C) *Commencement/recommencement conditions after a marine mammal sighting before or during the activity.* Navy personnel will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing firing) until one of the following conditions has been met:

(*1*) *Observed exiting.* The animal is observed exiting the mitigation zone;

(*2*) *Determined to have exited.* The animal is determined to have exited the mitigation zone based on its course, speed, and movement away from the intended impact location; or

(*3*) *Clear from additional sightings.* The mitigation zone has been clear from any additional sightings for 10 min when the activity involves aircraft that have fuel constraints, or 30 min when the activity involves aircraft that are not typically fuel constrained.

(D) *After completion of the activity* (*e.g.,* prior to maneuvering off station). Navy personnel will, when practical (*e.g.,* when platforms are not constrained by fuel restrictions or mission-essential follow-on commitments), observe for marine mammals in the vicinity of where detonations occurred; if any injured or dead marine mammals are observed, Navy personnel will follow established incident reporting procedures. If additional platforms are supporting this activity (*e.g.,* providing range clearance), Navy personnel on these assets will assist in the visual observation of the area where detonations occurred.

(5) *Explosive bombs.* Mitigation applies to activities using a maritime surface target at ranges up to 75 nmi (139 km).

(i) *Number of Lookouts and observation platform.* One Lookout will be positioned in an aircraft conducting the activity. If additional platforms are participating in the activity, Navy personnel positioned on those assets (*e.g.,* safety observers, evaluators) will support observing the relevant mitigation zone for marine mammals and other applicable biological resources while performing their regular duties.

(ii) *Mitigation zone and requirements.* The relevant mitigation zones is 2,500 yd (2,286 m) around the intended target.

(A) *Prior to the initial start of the activity (e.g., when arriving on station).* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will relocate or delay the start of bomb deployment.

(B) *During the activity (e.g., during target approach).* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will cease bomb deployment.

(C) *Commencement/recommencement conditions after a marine mammal sighting before or during the activity.* Navy personnel will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing bomb deployment) until one of the following conditions has been met:

(*1*) *Observed exiting.* The animal is observed exiting the mitigation zone;

(*2*) *Determined to have exited.* The animal is determined to have exited the mitigation zone based on its course, speed, and movement away from the intended target;

(*3*) *Clear from additional sightings.* The mitigation zone has been clear from any additional sightings for 10 min; or

(*4*) *Intended target transit.* For activities using mobile targets, the intended target has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

(D) *After completion of the activity (e.g., prior to maneuvering off station).* Navy personnel will, when practical (*e.g.,* when platforms are not constrained by fuel restrictions or mission-essential follow-on commitments), observe for marine mammals in the vicinity of where detonations occurred; if any injured or dead marine mammals are observed, Navy personnel will follow established incident reporting procedures. If additional platforms are supporting this activity (*e.g.,* providing range clearance), Navy personnel on these assets will assist in the visual observation of the area where detonations occurred.

(6) *Vessel movement.* The mitigation will not be required if: the vessel's safety is threatened; the vessel is restricted in its ability to maneuver (*e.g.,* during launching and recovery of aircraft or landing craft, during towing activities, when mooring); the vessel is submerged or operated autonomously; or if impracticable based on mission requirements (*e.g.,* during Amphibious Assault and Amphibious Raid exercises).

(i) *Number of Lookouts and observation platform.* One Lookout will be on the vessel that is underway.

(ii) *Mitigation zone and requirements.* The relevant mitigation zones are as follows: 500 yd (457.2 m) around whales; and 200 yd (182.88 m) around all other marine mammals (except bow-riding dolphins and pinnipeds hauled out on man-made navigational structures, port structures, and vessels).

(A) *During the activity.* When underway Navy personnel will observe the mitigation zone for marine mammals; if marine mammals are observed, Navy personnel will maneuver to maintain distance.

(B) [Reserved]

(iii) *Reporting.* If a marine mammal vessel strike occurs, Navy personnel will follow the established incident reporting procedures.

(7) *Small-, medium-, and large-caliber non-explosive practice munitions.* Mitigation applies to activities using a surface target.

(i) *Number of Lookouts and observation platform.* One Lookout will be positioned on the platform conducting the activity. Depending on the activity, the Lookout could be the same as the one described in paragraph (a)(2)(i) of this section.

(ii) *Mitigation zone and requirements.* The relevant mitigation zone is 200 yd (182.88 m) around the intended impact location.

(A) *Prior to the initial start of the activity (e.g., when maneuvering on station).* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will relocate or delay the start of firing.

(B) *During the activity.* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will cease firing.

(C) *Commencement/recommencement conditions after a marine mammal sighting before or during the activity.* Navy personnel will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing firing) until one of the following conditions has been met:

(*1*) *Observed exiting.* The animal is observed exiting the mitigation zone;

(*2*) *Determined to have exited.* The animal is determined to have exited the mitigation zone based on its course, speed, and movement away from the intended impact location;

(*3*) *Clear of additional sightings.* The mitigation zone has been clear from any additional sightings for 10 min for aircraft-based firing or 30 min for vessel-based firing;

(4) *Impact location transit.* For activities using a mobile target, the intended impact location has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

(8) *Non-explosive missiles and rockets.* Aircraft-deployed non-explosive missiles and rockets. Mitigation applies to activities using a maritime surface target at ranges of up to 75 nmi (139 km).

(i) *Number of Lookouts and observation platform.* One Lookout will be positioned in an aircraft.

(ii) *Mitigation zone and requirements.* The relevant mitigation zone is 900 yd (822.96 m) around the intended impact location.

(A) *Prior to the initial start of the activity (e.g., during a fly-over of the mitigation zone).* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will relocate or delay the start of firing.

(B) *During the activity.* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will cease firing.

(C) *Commencement/recommencement conditions after a marine mammal sighting prior to or during the activity.* Navy personnel will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing firing) until one of the following conditions has been met:

(*1*) *Observed exiting.* The animal is observed exiting the mitigation zone;

(*2*) *Determined to have exited.* The animal is determined to have exited the mitigation zone based on its course, speed, and movement away from the intended impact location; or

(*3*) *Clear of additional sightings.* The mitigation zone has been clear from any additional sightings for 10 min when the activity involves aircraft that have fuel constraints, or 30 min when the activity involves aircraft that are not typically fuel constrained.

(9) *Non-explosive bombs.* Mitigation applies to activities using a maritime surface target at ranges up to 75 nmi (139 km).

(i) *Number of Lookouts and observation platform.* One Lookout will be positioned in an aircraft.

(ii) *Mitigation zone and requirements.* The relevant mitigation zone is 900 yd (822.96 m) around the intended target.

(A) *Prior to the initial start of the activity (e.g., when arriving on station).* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals; if floating vegetation or marine mammals are observed, Navy personnel will relocate or delay the start of bomb deployment.

(B) *During the activity (e.g., during approach of the target or intended minefield location).* Navy personnel will observe the mitigation zone for floating vegetation and marine mammals and, if floating vegetation or marine mammals are observed, Navy personnel will cease bomb deployment.

(C) *Commencement/recommencement conditions after a marine mammal sighting prior to or during the activity.* Navy personnel will allow a sighted marine mammal to leave the mitigation zone prior to the initial start of the activity (by delaying the start) or during the activity (by not recommencing bomb deployment) until one of the following conditions has been met:

(*1*) *Observed exiting.* The animal is observed exiting the mitigation zone;

(*2*) *Determined to have exited.* The animal is determined to have exited the mitigation zone based its course, speed, and movement away from the intended target or minefield location;

(*3*) *Clear of additional sightings.* The mitigation zone has been clear from any additional sightings for 10 min; or

(*4*) *Intended target transit.* For activities using mobile targets, the intended target has transited a distance equal to double that of the mitigation zone size beyond the location of the last sighting.

(10) *Target and missile launches from San Nicolas Islands (SNI).* Target and missile launch activities from SNI.

(i) *Mitigation zone and requirements.* 305 m (1,000 ft) over pinniped haulouts. Missiles will not cross over pinniped haulouts at elevations less than 305 m (1,000 ft) above the haulout. All manned aircraft and helicopter flight paths will maintain a minimum distance of 305 m (1,000 ft) from recognized seal haulouts and rookeries, except in emergencies or for real-time security incidents. For unmanned aircraft systems (UAS), the following minimum altitudes will be maintained over pinniped haulout areas and rookeries: Class 0–2 UAS will maintain a minimum altitude of 300 ft; Class 3 UAS will maintain a minimum altitude of 500 ft; Class 4 or 5 UAS will not be flown below 1,000 ft.

(A) *Pinniped haulouts.* Navy personnel will not enter pinniped haulouts or rookeries. Personnel may be adjacent to pinniped haulouts and rookeries prior to and following a launch for monitoring purposes.

(B) *Number of launch events.* Navy will not conduct more than 40 launch events annually. Up to 10 launch events of the 40 annual launch events may occur at night.

(C) *Launches during the peak pinniped pupping season.* Launches will be scheduled to avoid peak pinniped pupping periods between January and July, to the maximum extent practicable.

(D) *Unauthorized species.* If a species for which authorization has not been granted is taken, or a species for which authorization has been granted but the authorized takes are met, the Navy will consult with NMFS to determine how to proceed.

(E) *Review of launch procedures.* The Navy will review the launch procedure and monitoring methods, in cooperation with NMFS, if any incidents of injury or mortality of a pinniped are discovered during post-launch surveys, or if surveys indicate possible effects to the distribution, size, or productivity of the affected pinniped populations as a result of the specified activities. If necessary, appropriate changes will be made through modification to the LOA prior to conducting the next launch of the same vehicle.

(ii) [Reserved]

(b) *Seasonal awareness messages.* In addition to procedural mitigation, Navy personnel will implement seasonal awareness notification messages throughout the PMSR Study Area to avoid interaction with large whales during transit.

(1) *Blue whale awareness notification message.* (i) Navy personnel will issue a seasonal awareness notification message to alert Navy ships and aircraft operating throughout the PMSR Study Area to the possible presence of increased concentrations of blue whales June 1 through October 31.

(ii) To maintain safety of navigation and to avoid interactions with large whales during transits, Navy personnel will instruct vessels to remain vigilant to the presence of blue whales that, when concentrated seasonally, may become vulnerable to vessel strikes.

(iii) Navy personnel will use the information from the awareness notification message to assist their visual observation of applicable mitigation zones during training and testing activities and to aid in the implementation of procedural mitigation.

(2) *Gray whale awareness notification message.* (i) Navy personnel will issue a seasonal awareness notification message to alert Navy ships and aircraft operating through the PMSR Study Area to the possible presence of increased concentrations of gray whales November 1 through March 31.

(ii) To maintain safety of navigation and to avoid interactions with large whales during transits, Navy personnel will instruct vessels to remain vigilant to the presence of gray whales that, when concentrated seasonally, may become vulnerable to vessel strikes.

(iii) Navy personnel will use the information from the awareness notification message to assist their visual observation of applicable mitigation zones during training and testing activities and to aid in the implementation of procedural mitigation.

(3) *Fin whale awareness notification message.* (i) Navy personnel will issue a seasonal awareness notification message to alert Navy ships and aircraft operating throughout the PMSR Study Area to the possible presence of increased concentrations of fin whales November 1 through May 31.

(ii) To maintain safety of navigation and to avoid interactions with large whales during transits, Navy personnel

will instruct vessels to remain vigilant to the presence of fin whales that, when concentrated seasonally, may become vulnerable to vessel strikes.

(iii) Navy personnel will use the information from the awareness notification message to assist their visual observation of applicable mitigation zones during training and testing activities and to aid in the implementation of procedural mitigation.

§ 218.15 Requirements for monitoring and reporting.

(a) *Unauthorized take.* Navy personnel will notify NMFS immediately (or as soon as operational security considerations allow) if the specified activity identified in § 218.10 is thought to have resulted in the serious injury or mortality of any marine mammals, or in any Level A harassment or Level B harassment of marine mammals not identified in this subpart.

(b) *Monitoring and reporting under the LOA.* The Navy will conduct all monitoring and reporting required under the LOA. The Navy will coordinate and discuss with NMFS how monitoring in the PMSR Study Area could contribute to the Navy's Marine Species Monitoring Program.

(c) *Notification of injured, live stranded, or dead marine mammals.* Navy personnel will consult the Notification and Reporting Plan, which sets out notification, reporting, and other requirements when dead, injured, or live stranded marine mammals are detected. The Notification and Reporting Plan is available at *https://www.fisheries.noaa.gov/action/incidental-take-authorization-us-navy-testing-and-training-activities-point-mugu-sea-range.*

(d) *Pinniped monitoring plan on SNI.* In consultation with NMFS, the Navy will implement a monitoring plan for beaches exposed to missile launch noise with the goal of assessing baseline pinniped distribution/abundance and potential changes in pinniped use of these beaches after launch events. Marine mammal monitoring shall include multiple surveys (*e.g.,* time-lapse photography) during the year that record the species, number of animals, general behavior, presence of pups, age class, gender and reactions to launch noise or other natural or human caused disturbances, in addition to environmental conditions that may include tide, wind speed, air temperature, and swell. In addition, video and acoustic monitoring of up to three pinniped haulout areas and rookeries will be conducted during launch events that include missiles or targets that have not been previously monitored using video and acoustic recorders for at least three launch events. Video monitoring cameras would be either high-definition video cameras, or Forward-Looking Infrared Radiometer (FLIR) thermal imaging cameras for night launch events.

(e) *Annual pinniped monitoring report on SNI.* The Navy will submit an annual report to NMFS of the SNI rocket and missile launch activities. The draft annual monitoring report will be submitted to the Director, Office of Protected Resources, NMFS, within 3 months after the end of the reporting year. NMFS will submit comments or questions on the draft monitoring report, if any, within 3 months of receipt. The report will be considered final after the Navy has addressed NMFS' comments, or 3 months after the submission of the draft if NMFS does not provide comments on the draft report. The report will summarize the launch events conducted during the year; assess any direct impacts to pinnipeds from launch events; assess any cumulative impacts on pinnipeds from launch events; and, summarize pinniped monitoring and research activities conducted on SNI and any findings related to effects of launch noise on pinniped populations.

(f) *Annual PMSR Study Area Training and Testing Activity Report.* Each year, the Navy will submit a detailed report PMSR (Annual Training and Testing Activity Report) to the Director, Office of Protected Resources, NMFS, within 3 months after the one-year anniversary of the date of issuance of the LOA. NMFS will submit comments or questions on the report, if any, within 1 month of receipt. The report will be considered final after the Navy has addressed NMFS' comments, or 1 month after submission of the draft if NMFS does not provide comments on the draft report. The annual report will contain information on all sound sources used (total hours or quantity of each bin; total annual number of each type of explosive events; and total annual expended/detonated rounds (missiles, bombs, *etc.*) for each explosive bin). The annual report will also contain both the current year's data as well as explosive use quantity from previous years' reports. Additionally, if there were any changes to the explosive allowance in a given year, or cumulatively, the report will include a discussion of why the change was made and include analysis to support how the change did or did not affect the analysis in the 2022 PMSR Final Environment Impact Statement/Overseas Environmental Impact Statement (''FEIS/OEIS''; available at *https://pmsr-eis.com/*) and the analysis in the Marine Mammal Protection Act (MMPA) final rule (87 FR [INSERT FR PAGE NUMBER], July 8, 2022). The annual report will also include the details regarding specific requirements associated with monitoring on SNI. The final annual/close-out report at the conclusion of the authorization period (year 7) will serve as the comprehensive close-out report and include both the final year annual use compared to annual authorization as well as a cumulative 7-year annual use compared to 7-year authorization. The detailed reports will contain the information identified in paragraphs (f)(1) and (2) of this section.

(1) *Explosives.* This section of the report will include the following information for explosive activities completed that year.

(i) Activity information gathered for each explosive event.

(A) Location by Special Use Airspace (*e.g.,* Warning Area).

(B) Date and time exercise began and ended.

(C) Total hours of observation by Lookouts before, during, and after exercise.

(D) Total annual expended/detonated ordnance (*i.e.,* missile, bombs *etc.*) number and types of explosive source bins detonated.

(E) Wave height in feet (high, low, and average) during exercise.

(F) Narrative description of sensors and platforms utilized for marine mammal detection and timeline illustrating how marine mammal detection was conducted.

(ii) Individual marine mammal observation (by Navy Lookouts) information for each sighting where mitigation was implemented.

(A) Date/time/location of sighting.

(B) Species (if not possible, indicate whale or dolphin).

(C) Number of individuals.

(D) Initial detection sensor (*e.g.,* sonar or Lookout).

(E) Length of time observers maintained visual contact with marine mammal.

(F) Sea state.

(G) Visibility.

(H) Whether sighting was before, during, or after detonations/exercise, and how many minutes before or after.

(I) Distance of marine mammal from actual detonations (or target spot if not yet detonated): Less than 200 yd (183 m), 200 to 500 yd (183 m to 457 m), 500 to 1,000 yd (457 m to 914 m), 1,000 to 2,000 yd (914 m to 1,829 m), or greater than 2,000 yd (1,829 m).

(J) Lookouts will report, in plain language and without trying to

categorize in any way, the observed behavior of the animal(s) (such as animal closing to bow ride, paralleling course/speed, floating on surface and not swimming *etc.*), including speed and direction and if any calves were present.

(K) The report will indicate whether explosive detonations were delayed, ceased, modified, or not modified due to marine mammal presence and for how long.

(L) If observation occurred while explosives were detonating in the water, indicate munition type in use at time of marine mammal detection.

(2) *Summary of sources used.* This section of the report will include the following information summarized from the authorized sound sources used in all training and testing events:

(i) Total annual quantity (per the LOA) of each explosive bin; and

(ii) Total annual expended/detonated ordnance (missiles, bombs, *etc.*) for each explosive bin.

(g) *Final close-out report.* The final (year 7) draft annual/close-out report will be submitted within 3 months after the expiration of this subpart to the Director, Office of Protected Resources, NMFS. NMFS will submit comments on the draft close-out report, if any, within 3 months of receipt. The report will be considered final after the Navy has addressed NMFS' comments, or 3 months after the submittal of the draft if NMFS does not provide comments.

§ 218.16 Letters of Authorization.

(a) To incidentally take marine mammals pursuant to the regulations in this subpart, the Navy will apply for and obtain an LOA in accordance with § 216.106 of this chapter.

(b) An LOA, unless suspended or revoked, may be effective for a period of time not to exceed between October 31, 2021, and October 30, 2028.

(c) If an LOA expires prior to October 30, 2028, the Navy may apply for and obtain a renewal of the LOA.

(d) In the event of projected changes to the activity or to mitigation, monitoring, or reporting (excluding changes made pursuant to the adaptive management provision of § 218.17(c)(1)) required by an LOA issued under this subpart, the Navy will apply for and obtain a modification of the LOA as described in § 218.17.

(e) Each LOA will set forth:

(1) Permissible methods of incidental taking;

(2) Geographic areas for incidental taking;

(3) Means of effecting the least practicable adverse impact (*i.e.,* mitigation) on the species or stocks of marine mammals and their habitat; and

(4) Requirements for monitoring and reporting.

(f) Issuance of the LOA(s) will be based on a determination that the level of taking is consistent with the findings made for the total taking allowable under the regulations in this subpart.

(g) Notice of issuance or denial of the LOA(s) will be published in the **Federal Register** within 30 days of a determination.

§ 218.17 Renewals and modifications of Letters of Authorization.

(a) An LOA issued under §§ 216.106 of this chapter and 218.16 for the activity identified in § 218.10(c) may be renewed or modified upon request by the applicant, provided that:

(1) The specified activity and mitigation, monitoring, and reporting measures, as well as the anticipated impacts, are the same as those described and analyzed for the regulations in this subpart (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section); and

(2) NMFS determines that the mitigation, monitoring, and reporting measures required by the previous LOA(s) were implemented.

(b) For LOA modification or renewal requests by the applicant that include changes to the activity or to the mitigation, monitoring, or reporting measures (excluding changes made pursuant to the adaptive management provision in paragraph (c)(1) of this section) that do not change the findings made for the regulations in this subpart or result in no more than a minor change in the total estimated number of takes (or distribution by species or years), NMFS may publish a notice of LOA in the **Federal Register**, including the associated analysis of the change, and solicit public comment before issuing the LOA.

(c) An LOA issued under §§ 216.106 of this chapter and 218.16 may be modified by NMFS under the following circumstances:

(1) *Adaptive management.* After consulting with the Navy regarding the practicability of the modifications, NMFS may modify (including adding or removing measures) the existing mitigation, monitoring, or reporting measures if doing so creates a reasonable likelihood of more effectively accomplishing the goals of the mitigation and monitoring.

(i) Possible sources of data that could contribute to the decision to modify the mitigation, monitoring, or reporting measures in an LOA include:

(A) Results from the Navy's annual monitoring report and annual exercise report from the previous year(s);

(B) Results from other marine mammal and/or sound research or studies;

(C) Results from specific stranding investigations; or

(D) Any information that reveals marine mammals may have been taken in a manner, extent, or number not authorized by the regulations in this subpart or subsequent LOAs.

(ii) If, through adaptive management, the modifications to the mitigation, monitoring, or reporting measures are substantial, NMFS will publish a notice of a new LOA in the **Federal Register** and solicit public comment.

(2) *Emergencies.* If NMFS determines that an emergency exists that poses a significant risk to the well-being of the species of marine mammals specified in LOAs issued pursuant to §§ 216.106 of this chapter and 218.16, an LOA may be modified without prior notice or opportunity for public comment. Notice will be published in the **Federal Register** within 30 days of the action.

§§ 218.18–218.19 [Reserved]

[FR Doc. 2022–14307 Filed 7–7–22; 8:45 am]

BILLING CODE 3510–22–P

APPENDIX B:

Acoustic Measurements of SNI Missile Launches: July 2023-July 2024
Greeneridge Sciences , Inc.
GSI Technical Memorandum 546-2

GREENERIDGE SCIENCES, INC.
5142 HOLLISTER AVE, STE 283 • SANTA BARBARA, CA 93111 • T 805-967-7720 • F 805-683-8577

TECHNICAL MEMORANDUM

To: Elizabeth Seacord, NAVAIR Sustainability Office
From: Katherine H. Kim, Robert G. Norman
Date: 2 October 2024
Re: Acoustic Measurements of SNI Missile Launches: July 2023 – April 2024
[GSI Technical Memorandum 546-5]

Introduction

The material in this technical memorandum (TM) is provided for inclusion in the report stipulated by NAVAIR's Letter of Authorization under the Marine Mammal Protection Act. This TM presents the results of sound measurements of missile launch events over pinniped haul-outs on San Nicolas Island on 24 July 2024 (two events), 14 September 2023, 22 March 2024, and 6 April 2024.

Methods

Various federal, state, and other organizations recommend specific acoustic thresholds for the onset of temporary threshold shift (TTS) and permanent threshold shift (PTS) in marine mammals. The thresholds cited in the *Results* section below are for impulsive noise (noise with high peak sound pressure, short duration, fast rise-time, and broad frequency content) from the U.S. Navy technical report by J. Finneran, E. Henderson, D. Houser, K. Jenkins, S. Kotecki, and J. Mulsow, *Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III)*, published by the Space and Naval Warfare Systems Center Pacific, San Diego, CA in June 2017.

As with Navy Phase II criteria (Finneran & Jenkins, 2012), auditory weighting functions were applied to acoustic data, prior to the calculation of acoustic metrics such as sound exposure level (SEL) and sound pressure level (SPL), to account for various species' frequency-dependent hearing sensitivity. However, unlike Navy auditory weighting functions for Phase II which were based on "M-weighting" curves for "functional hearing groups", Navy Phase III weighting functions are defined by a generic band-pass filter whose shape is determined by parameters specific to a slightly different classification of nine "marine species hearing groups".

In addition to differences in auditory weighting functions, TTS and PTS thresholds differ between Navy Phase II and Phase III. In Navy Phases II and III, pinnipeds were classified into two hearing groups based upon pinnipeds' two scientific families: Otariidae (eared seals: sea lions and fur seals) and Phocidae (earless seals, or true seals). However, in Navy Phase II, TTS thresholds were the same for both Otariids and Phocids in air, as were PTS thresholds. In Navy

Phase III, different TTS and PTS thresholds are defined for Otariids in air (OA) and Phocids in air (PA). The Navy Phase III thresholds for pinnipeds in air are summarized in the table below:

TABLE 1. Navy Phase III TTS and PTS thresholds for pinnipeds in air.

Group	Non-impulsive		Impulsive			
			TTS Threshold		PTS threshold	
	TTS threshold SEL[a] (weighted)	PTS threshold SEL[a] (weighted)	SEL[a] (weighted)	Peak SPL[b] (unweighted)	SEL[b] (weighted)	Peak SPL[b] (unweighted)
OA[c]	157	177	146	170	161	176
PA[d]	134	154	123	155	138	161

[a] SEL thresholds are in dB re (20 µPa)^2·s in air
[b] SPL thresholds in dB re 20 µPa in air
[c] OA-Otariid in air (includes California sea lion)
[d] PA-Phocid in air (includes Pacific harbor seal)

The TTS and PTS thresholds relevant to the missile launch presented herein are those listed under "Impulsive" in Table 1.

Received sound levels at each monitoring site were determined from the sound recording of an Autonomous Terrestrial Acoustic Recorder (ATAR) by Greeneridge Sciences, Inc. A variety of acoustic metrics were calculated, including peak SPL, unweighted SEL, and weighted SEL, where the latter incorporated Navy Phase III auditory weighting functions for Otariids and Phocids.

Results

*Measured missile sounds exceeding the level considered sufficient to cause **temporary threshold shift (TTS) in Otariids in air**, specifically, weighted SEL of 146 dB re 20 µPa^2-s or unweighted peak SPL of 170 dB re 20 µPa:*

No measured sound levels exceeded the weighted SEL threshold nor unweighted peak SPL threshold for TTS for Otariids in air.

*Measured missile sounds exceeding the level considered sufficient to cause **permanent threshold shift (PTS) in Otariids in air**, specifically, weighted SEL of 161 dB re 20 µPa^2-s or unweighted peak SPL of 176 dB re 20 µPa:*

Similarly, no measured sound levels exceeded the weighted SEL threshold nor unweighted peak SPL threshold for PTS for Otariids in air.

*Measured missile sounds exceeding the level considered sufficient to cause **TTS in Phocids in air**, specifically, weighted SEL of 123 dB re 20 µPa^2-s or unweighted peak SPL of 155 dB re 20 µPa:*

Three measured sound levels, associated with launches on 22 March and 6 April 2024, exceeded the weighted SEL threshold for TTS for Phocids in air.

On 22 March 2024, the weighted (for Phocids in air) SEL at two monitoring sites exceeded the 123 dB re 20 µPa^2-s TTS threshold. A weighted SEL of 124.8 dB re 20 µPa^2-s was measured at the Dos Coves monitoring site, and a weighted SEL of 124.6 dB re 20 µPa^2-s was measured at the Building 807/Rock Crusher monitoring/launch site. While the small differential between these two measurements may seem counterintuitive given that the latter was measured (and indeed had slightly lower SEL) at the launch site, their similar SELs are explained by the fact that SEL estimates increase with time and critically depend on the time window over which it is computed. The SEL metric is useful for short duration, transient sounds (e.g., pulses from explosions, pile driving, seismic surveys) and is computed over the duration of the pulse. In the results presented herein, we adopt the common practice of computing SEL over the 90% energy signal duration, i.e., the time during which 90% of the sound exposure occurs, from the 5% to the 95% points on the cumulative squared-pressure curve. The 90% energy signal duration of the missile launch event was only 1.1 s at the Building 807/Rock Crusher site, compared to 4.8 s at the Dos Coves site. Thus, while peak and SPL estimates were much higher at the launch site as expected, SEL estimates were quite similar between the aforementioned two monitoring sites.

On 6 April 2024, a weighted SEL of 126.1 dB re 20 µPa^2-s was again measured at the launch site, at the Building 807/Rock Crusher site.

No measured sound levels exceeded the unweighted peak SPL threshold for TTS for Phocids in air.

*Measured missile sounds exceeding the level considered sufficient to cause **PTS in Phocids in air**, specifically, weighted SEL of 138 dB re 20 µPa^2-s or unweighted peak SPL of 161 dB re 20 µPa:*

Similarly, no measured sound levels exceeded the weighted SEL threshold nor unweighted peak SPL threshold for PTS for Phocids in air.

The highest levels measured for the missile launch:

The **highest measured, unweighted (flat weighting), peak SPL** was 152.6 dB re 20 µPa and was measured at the Redeye West monitoring site on 24 July 2023, the first of a quad launch that day. The **highest measured, weighted, SEL** was 121.6 dB re 20 µPa^2-s for Otariids and 126.1 dB re 20 µPa^2-s for Phocids, both recorded at the Building 807/Rock Crusher launch site on 6 April 2024.

Atypical processing of missile flights:

For all launch dates, neither launch times nor launch types (i.e., number of launches) were reported on the audio log sheet. Consequently, all times reported herein are estimates derived from the date/time stamp in the ATARs' WAV audio files, visual and aural inspection of the recordings' acoustic pressure time series and spectrograms, and the time offset from the presumed beginning of audio file.

On 24 July 2023, four missiles were launched from between two pads at the Alpha Complex launch site. Based upon the audio recordings, these four launches occurred within a span of 20 s, with gaps of approximately 3, 13, and 2–3 s, respectively, between subsequent launches. Due to the lengthy (>3 s) gap between the 2nd and 3rd launches, these four launches are classified herein as two dual launch events, rather than a single quad launch event. The sounds from these two

dual launch events were recorded at four monitoring sites: Alpha Complex (which also served as the launch site), Phoca Reef, Dos Coves, and Redeye West. For the latter three monitoring sites, all four missile flights were successfully detected in their acoustic records, and their acoustic data were processed accordingly. However, for the Alpha Complex site, only two of the four missile flights were detected on the left or so-called "event" channel of the recorder. These two flights were detected 16 s apart on the Alpha Complex ATAR, at 10:31:32 and 10:31:48 PDT (based upon the date/time stamp in the WAV audio file and the time offset from the beginning of the file). Thus, given their separation in time, the two flights detected at the Alpha Complex site correspond to either: (1) the first and third launches or (2) the second and fourth launches that occurred on 24 July. Stated in terms of launch "events", the two flights detected at the Alpha Complex site correspond to either: (1) the first launch of both dual launch events or (2) the second launch of both dual launch events. Confusing matters further, the launch times associated with the Phoca Reef and Dos Coves ATARs were estimated to occur *before* those of the Alpha Complex ATAR, an impossibility considering that Alpha Complex was the launch site and taking into account missile flight time. Consequently, one must conclude that the internal clocks of the ATARs were not precisely time-aligned (a user-defined setting), and, therefore, times reported herein are very rough estimates. Regardless, all detected missile sounds from the 24 July launches—the two missile flights detected on the Alpha Complex ATAR's audio file and the remaining 12 detected missile flights (= 4 flights × 3 remaining ATARs)—were processed in the same manner.

On 14 September 2023 at approximately 09:00 PDT, a missile was launched from the Building 807/Rock Crusher site. The sound from this missile flight was recorded on four ATARs located at the launch site, Dos Coves, Redeye West, and Phoca Reef. NAVAIR provided one audio file for each of the Building 807/Rock Crusher, Dos Coves, and Redeye West monitoring sites, as well as three audio files for the Phoca Reef monitoring site. All audio files for this launch date were 41:48 minutes in duration. However, no missile event was discernable in any of the three Phoca Reef recordings, so none of the Phoca Reef recordings were analyzed further.

Summary Tables & Figures

Tables 2 and 3 below specify the calculated values for several sound metrics at each of the acoustic monitoring sites. In addition, Table 3 introduces the missile descriptor "Vehicle Sound Class". In previous years' reports, "Vehicle Class" was used to differentiate various vehicle types, albeit not in a clearly deterministic manner. A new vehicle classification methodology was implemented in September 2024 which classified vehicles based upon acoustic measures, specifically, the peak sound level (unweighted, broadband) measured at the launch site. The parameters for these new Vehicle Sound Classes are listed in Table 4.

Table formatting is consistent with previous technical memoranda submitted to NAVAIR in order to facilitate inclusion in U.S. Navy reports submitted to the National Marine Fisheries Service (NMFS), which oversees incidental take authorizations for marine mammals as required by the Marine Mammal Protection Act.

Figures 1–25 illustrate the acoustic pressure time series (i.e., waveform) and third-octave band sound levels measured at each of the four monitoring sites.

TABLE 2. Pulse parameters for unweighted, OA-weighted, and PA-weighted sound from SNI missile launches, July 2023 – April 2024. [CPA data to be provided by NAVAIR.]

Launch Date & Monitoring Site	CPA (km)	Unweighted sound				OA-weighted sound			PA-weighted sound		
		Pk	SPL	SEL	Dur	SPL	SEL	Dur	SPL	SEL	Dur
24 July 2023 (1 of 4)											
Phoca Reef		99.5	83.1	86.3	2.1	55.0	52.5	0.6	53.7	57.6	2.5
Dos Coves		144.7	136.5	120.5	0.0	104.8	98.7	0.2	108.5	102.8	0.3
Redeye West		152.6	130.3	129.1	0.7	110.3	109.6	0.8	114.5	113.7	0.8
Alpha Complex		133.2	118.6	124.4	3.7	93.3	98.6	3.4	99.2	104.2	3.2
24 July 2023 (2 of 4)											
Phoca Reef		97.7	83.0	86.5	2.3	52.8	54.5	1.5	55.2	58.9	2.3
Dos Coves		142.6	132.7	119.1	0.0	107.6	97.0	0.1	109.7	101.0	0.1
Redeye West		146.9	128.8	125.0	0.4	98.5	98.7	1.03	102.9	103.0	1.0
Alpha Complex		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
24 July 2023 (3 of 4)											
Phoca Reef		100.4	83.7	87.1	2.2	51.8	54.9	2.1	55.3	59.0	2.3
Dos Coves		143.8	136.4	120.4	0.0	102.3	96.4	0.3	106.6	100.9	0.3
Redeye West		148.7	127.8	126.9	0.8	104.8	105.0	1.0	109.2	109.2	1.0
Alpha Complex		133.4	118.7	124.4	3.7	94.6	99.1	2.8	100.3	104.7	2.7
24 July 2023 (4 of 4)											
Phoca Reef		98.8	83.3	86.7	2.1	51.5	53.5	1.6	55.0	58.8	2.4
Dos Coves		143.2	133.5	119.1	0.0	105.5	96.5	0.1	108.4	100.8	0.2
Redeye West		149.5	133.5	126.8	0.2	104.3	103.3	0.8	108.5	107.5	0.8
Alpha Complex		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
14 September 2023											
Dos Coves		121.5	107.0	116.1	8.2	94.6	103.2	7.3	99.1	107.7	7.2
Redeye West		92.0	78.7	87.9	8.3	52.2	61.7	8.9	57.6	67.0	8.8
Phoca Reef		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
B807/Rock Crusher		149.3	123.8	129.2	3.4	113.1	117.5	2.7	116.0	120.9	3.1
22 March 2024											
Dos Coves		140.1	122.2	130.8	7.3	113.1	119.7	4.5	118.0	124.8	4.8
Redeye West		112.8	96.5	105.3	7.5	79.1	85.8	4.7	84.8	91.7	4.9
Phoca Reef		100.9	84.6	93.2	7.2	55.9	64.6	7.4	61.9	70.2	6.8
B807/Rock Crusher		150.4	131.9	134.4	1.8	121.3	120.1	0.8	124.3	124.6	1.1
6 April 2024											
Phoca Reef		118.0	103.1	112.0	7.7	72.2	81.1	7.8	77.1	86.0	7.8
Redeye West		115.1	97.8	106.0	6.6	79.5	86.0	4.5	85.2	91.8	4.6
Dos Coves		135.4	119.3	126.3	4.9	106.2	112.8	4.5	109.9	116.9	5.0
B807/Rock Crusher		151.8	134.8	136.4	1.4	122.5	121.6	0.8	126.8	126.1	0.9

Note: Peak levels (Pk) and SPLs are in dB relative to 20 µPa. SELs or energy levels are in dB re 20 $\mu Pa^2 \cdot s$. Durations (Dur) are in seconds. N/A = data not available. "B807" is an abbreviation for "Building 807". Durations shown as "0.0" are a result of roundoff error for values < 0.05 s. Pulse parameters shown as "N/A" for the second and fourth missile flights on 24 July 2023 may, in fact, be associated with the first and third flights that day; see text for details.

TABLE 3. Ambient broadband (10–20,000 Hz) sound levels (in dB re 20 µPa) as recorded before launches.

Date	Vehicle Sound Class	Site	Unweighted	OA-weighted	PA-weighted
24 July 2023 (1 of 4)	1	Phoca Reef	42.6	26.1	29.2
		Dos Coves	58.2	43.7	50.6
		Redeye West	52.5	35.6	42.7
		Alpha Complex	42.9	19.9	19.6
24 July 2023 (2 of 4)	1	Phoca Reef	42.7	26.0	29.0
		Dos Coves	57.3	42.6	49.5
		Redeye West	52.6	35.6	42.7
		Alpha Complex	N/A	N/A	N/A
24 July 2023 (3 of 4)	1	Phoca Reef	42.9	26.1	29.1
		Dos Coves	58.2	43.8	50.8
		Redeye West	52.7	35.7	42.8
		Alpha Complex	43.0	19.9	19.6
24 July 2023 (4 of 4)	1	Phoca Reef	42.6	26.0	28.9
		Dos Coves	58.3	43.8	50.7
		Redeye West	52.6	35.7	42.8
		Alpha Complex	N/A	N/A	N/A
14 September 2023	2	Dos Coves	58.5	38.0	44.2
		Redeye West	55.4	32.6	39.2
		Phoca Reef	N/A	N/A	N/A
		B807/Rock Crusher	64.0	43.2	46.9
22 March 2024	3	Dos Coves	61.4	39.4	45.2
		Redeye West	57.9	33.9	40.3
		Phoca Reef	64.4	37.8	42.4
		B807/Rock Crusher	60.1	37.2	41.3
6 April 2024	3	Phoca Reef	68.2	37.7	41.9
		Redeye West	70.0	39.3	44.2
		Dos Coves	75.4	46.1	50.8
		B807/Rock Crusher	70.4	39.6	43.8

N/A = data not available. Ambient sound levels shown as "N/A" for the second and fourth missile flights on 24 July 2023 may, in fact, be associated with the first and third flights that day; see text for details.

TABLE 4. Vehicle Sound Classes based upon unweighted (flat), broadband (10–20,000 Hz), peak sound levels (in dB re 20 µPa).

Vehicle Sound Class	Unweighted Broadband Peak Sound Level
1	130-139
2	140–149
3	150–159

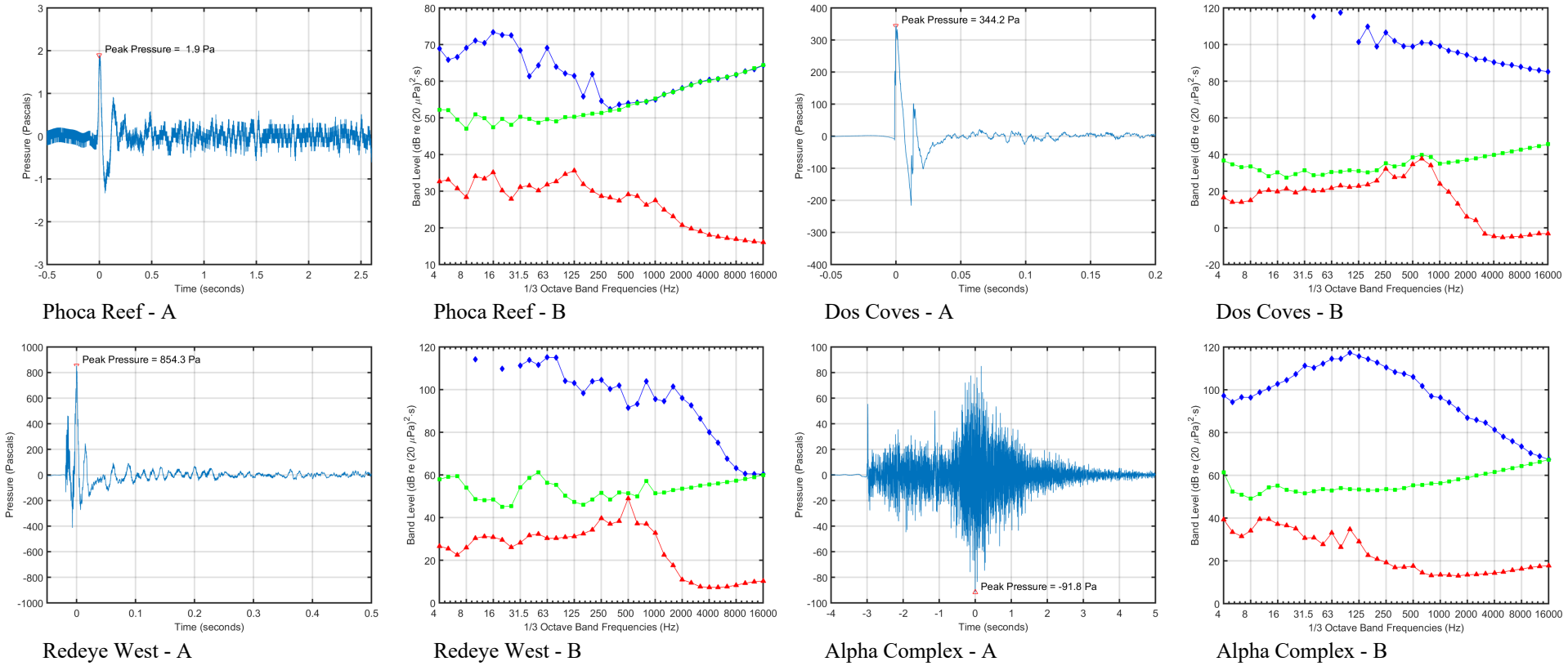
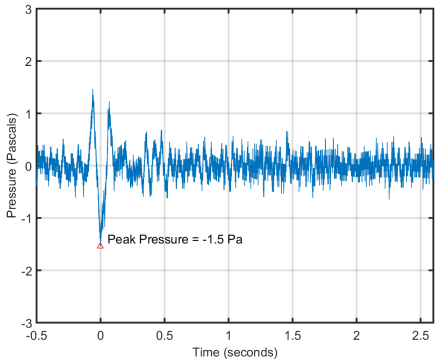
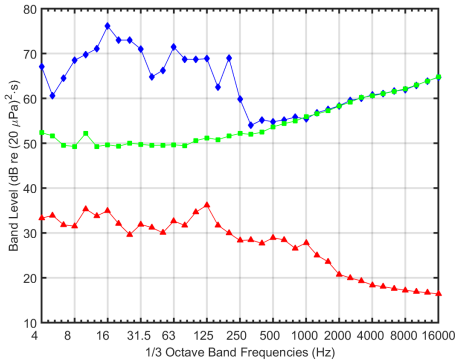


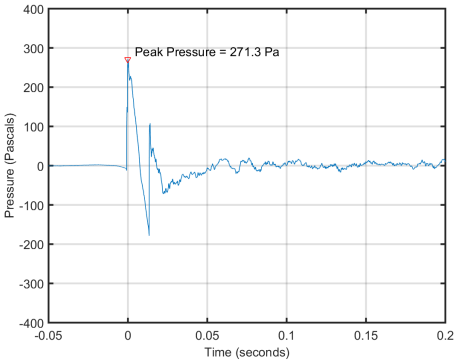
FIGURE 1. (A) Pressure waveform and (B) one-third octave band levels for a missile flight at 10:30:17 Local Time on 24 July 2023.
In (B), ◊ = missile sound energy; □ = instrumentation noise energy; Δ = ambient noise power. Band frequencies in Hertz (Hz).



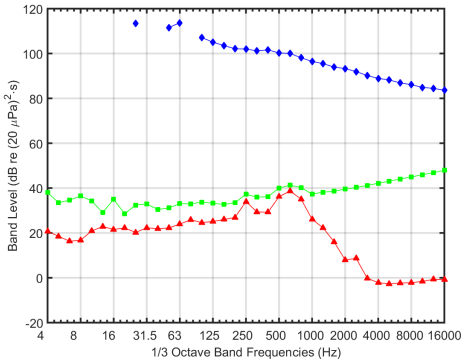
Phoca Reef - A



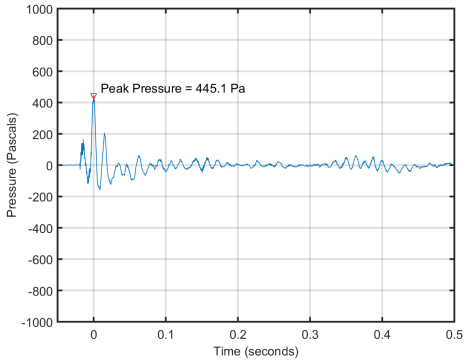
Phoca Reef - B



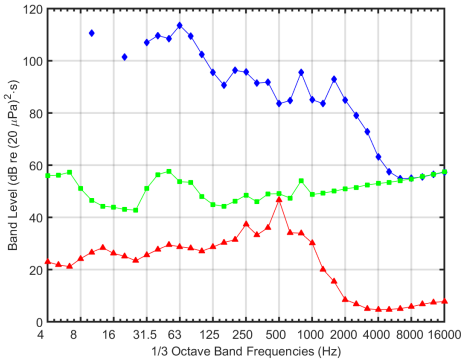
Dos Coves - A



Dos Coves - B



Redeye West - A



Redeye West - B

FIGURE 2. (A) Pressure waveform and (B) one-third octave band levels for a missile flight at 10:30:20 Local Time on 24 July 2023.
In (B), ◊ = missile sound energy; □ = instrumentation noise energy; Δ = ambient noise power. Band frequencies in Hertz (Hz).

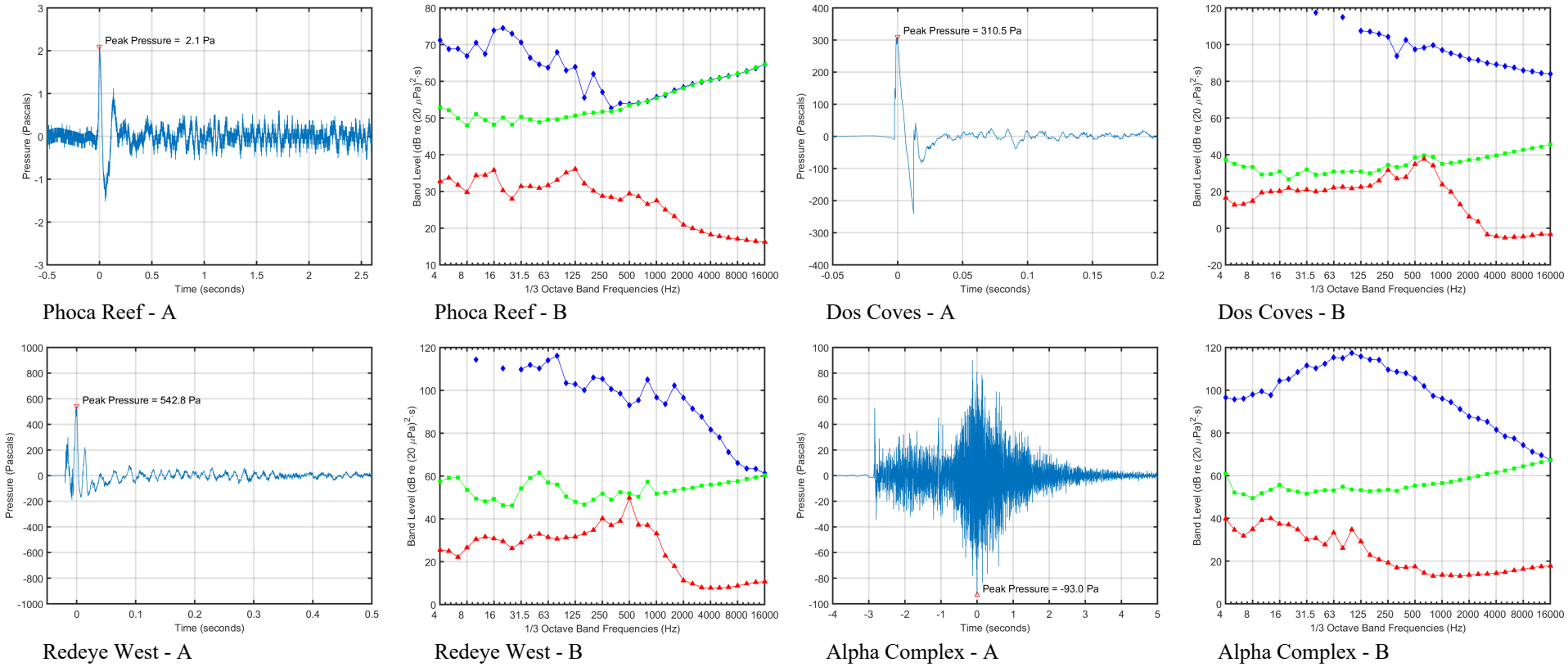
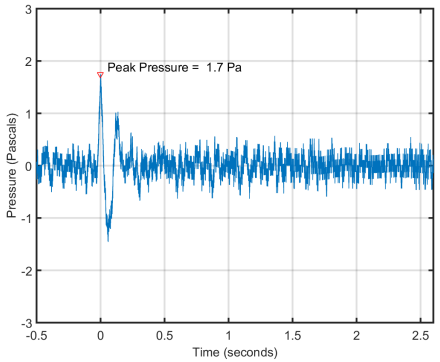
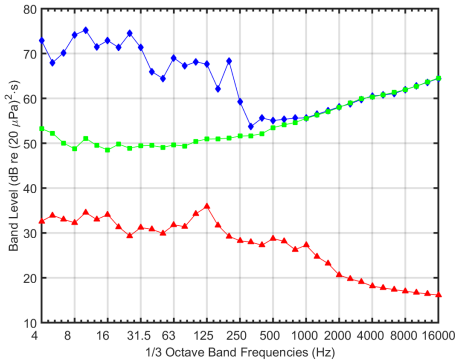


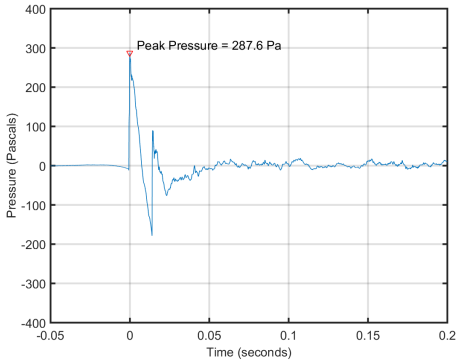
FIGURE 3. (A) Pressure waveform and (B) one-third octave band levels for a missile flight at 10:30:33 Local Time on 24 July 2023.
In (B), ◊ = missile sound energy; □ = instrumentation noise energy; Δ = ambient noise power. Band frequencies in Hertz (Hz).



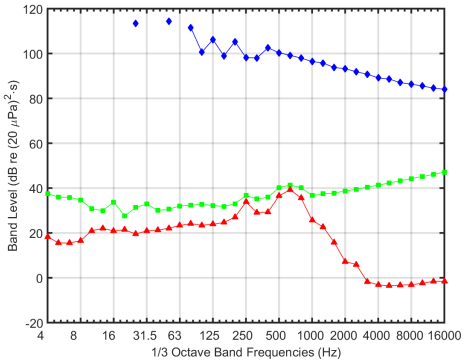
Phoca Reef - A



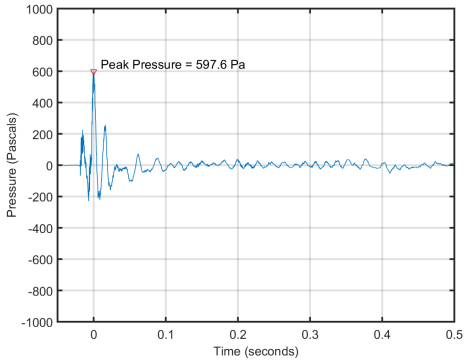
Phoca Reef - B



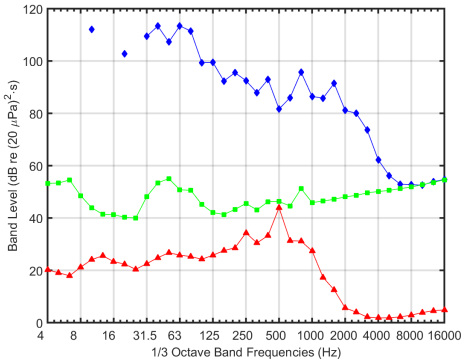
Dos Coves - A



Dos Coves - B

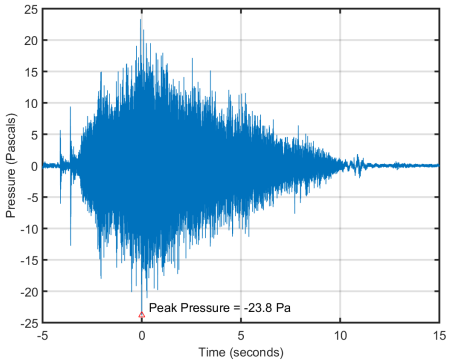


Redeye West - A

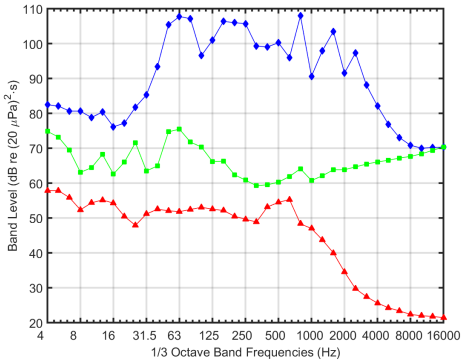


Redeye West - B

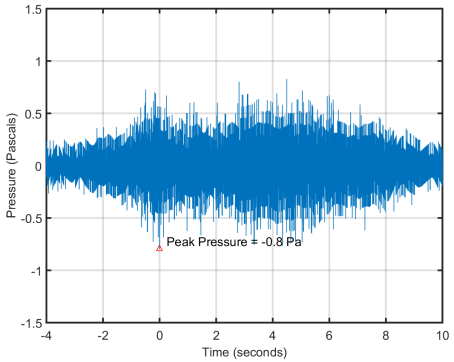
FIGURE 4. (A) Pressure waveform and (B) one-third octave band levels for a missile flight at 10:30:35 Local Time on 24 July 2023.
In (B), ◊ = missile sound energy; □ = instrumentation noise energy; Δ = ambient noise power. Band frequencies in Hertz (Hz).



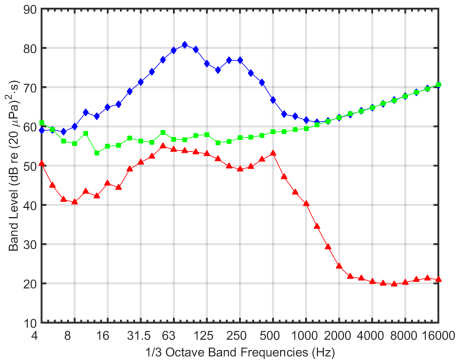
Dos Coves - A



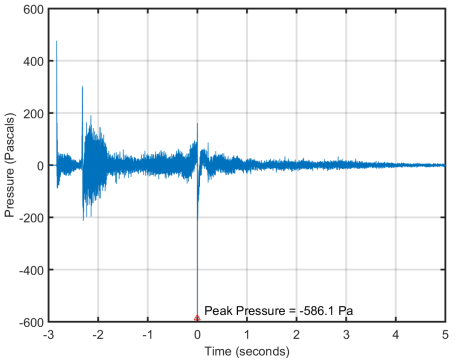
Dos Coves - B



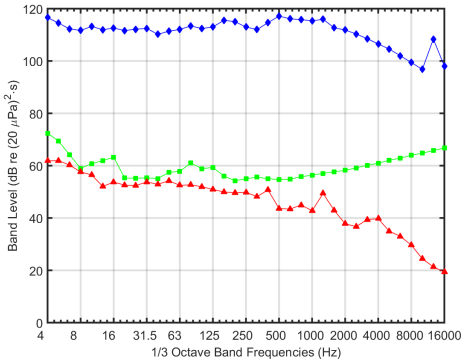
Redeye West - A



Redeye West - B



Building 807/Rock Crusher - A



Building 807/Rock Crusher - B

FIGURE 5. (A) Pressure waveform and (B) one-third octave band levels for a missile flight at 09:00:00 Local Time on 14 September 2023. In (B), ◊ = missile sound energy; □ = instrumentation noise energy; Δ = ambient noise power. Band frequencies in Hertz (Hz).

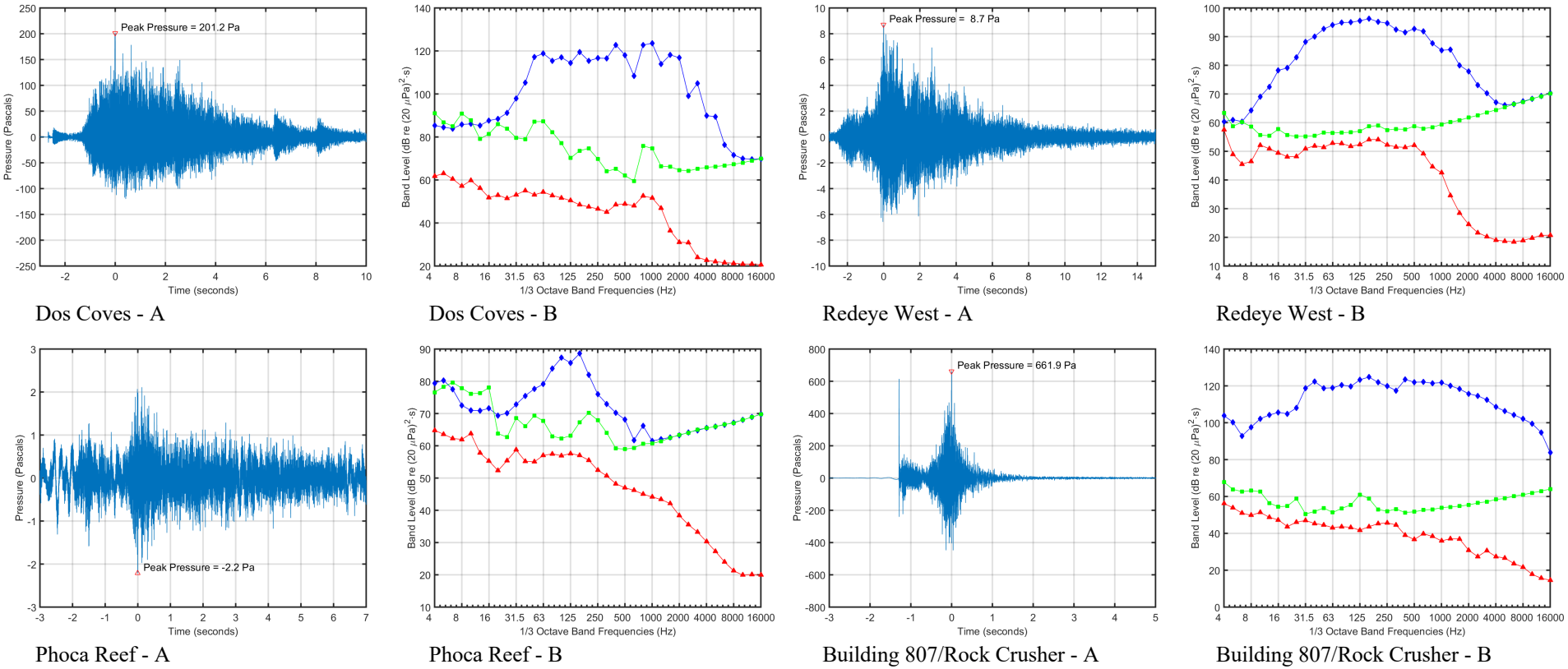


FIGURE 6. (A) Pressure waveform and (B) one-third octave band levels for a missile flight at 13:00:00 Local Time on 22 March 2024.
In (B), ◊ = missile sound energy; □ = instrumentation noise energy; Δ = ambient noise power. Band frequencies in Hertz (Hz).

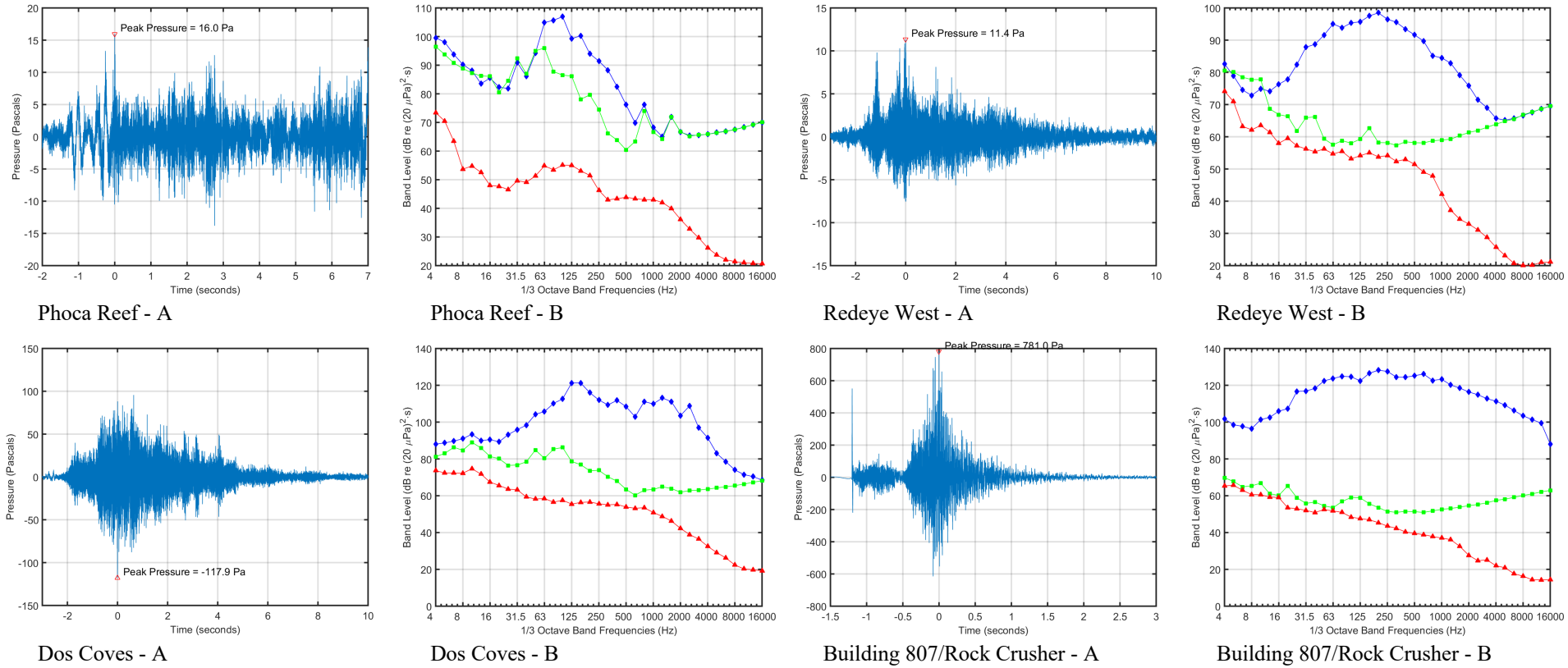


FIGURE 7. (A) Pressure waveform and (B) one-third octave band levels for a missile flight at 10:45:00 Local Time on 6 April 2024.
In (B), ◊ = missile sound energy; □ = instrumentation noise energy; Δ = ambient noise power. Band frequencies in Hertz (Hz).