# Environmental Assessment of Mitigation Alternatives for Issuance of Incidental Take Regulations to U.S. Navy for Training, Maintenance, and Research, Development, Testing, and Evaluation (RDT&E) Activities in the Southern California (SOCAL) Range Complex

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National Marine Fisheries Service
National Oceanic and Atmospheric Administration
January 2009

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CHAPTER 1 – PURPOSE AND NEED FOR THE ACTION

## 1.1 **Introduction**

The Marine Mammal Protection Act (MMPA) (16 U.S.C. 1361 et seq.) prohibits the take of marine mammals except under limited circumstances. Individuals seeking to obtain take coverage for marine mammals under the jurisdiction of the National Marine Fisheries Service (NMFS) are required to submit a request to NMFS for 5-year regulations or annual authorizations. *See* 16 U.S.C. §§ 101(a)(5)(A) & (D). In April 2008 the U.S. Navy (Navy) submitted an application to NMFS for 5-year regulations and Letters of Authorization (LOA) for military readiness activities in the area referred to by the Navy as the Southern California (SOCAL) Range Complex. NMFS' promulgation of regulations, issuance of a 2009 LOA, and

issuance of subsequent LOAs as appropriate are therefore required to authorize the Navy to take marine mammals incidental to military readiness activities in the SOCAL Range Complex. As described in more detail below and in Section 1.2, this "Environmental Assessment of Mitigation Alternatives for Issuance of Incidental Take Regulations to U.S. Navy for Training, Maintenance, and Research, Development, Testing, and Evaluation (RDT&E) Activities in the Southern California (SOCAL) Range Complex" (Mitigation EA) provides additional analysis of mitigation measures under consideration by NMFS as part of the MMPA rulemaking process.

Sections 101(a)(5)(A) and (D) of the MMPA direct the Secretary of Commerce (Secretary) 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 during periods of not more than five consecutive years each if certain findings are made and regulations are issued or, if the taking is limited to harassment and of no more than 1 year, the Secretary shall issue a notice of proposed authorization for public review.

Authorization shall be granted if NMFS finds that the taking will have a negligible impact on the species or stock(s), will not have an unmitigable adverse impact on the availability of the species or stock(s) for subsistence uses, and if the permissible methods of taking and requirements pertaining to the mitigation, monitoring and reporting of such taking are set forth. In regard to mitigation, NMFS must set forth the 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.

On April 1, 2008, NMFS received an application from the Navy requesting authorization for the take of individuals of 36 species of marine mammals incidental to upcoming Navy training, maintenance, and research, development, testing, and evaluation (RDT&E) activities to be conducted within the SOCAL Range Complex, which extends south and southwest off the southern California coast, for the period of January 2009 through January 2014. These activities are classified as military readiness activities, which have the potential to incidentally take marine mammals present within the SOCAL Range Complex by exposing them to sound from mid-frequency or high frequency active sonar (MFAS/HFAS) or to underwater detonations at levels that NMFS associates with the take of marine mammals. Subsequent to the initial application, Navy updated specific aspects of the request and submitted these clarifications to NMFS in May 2008.

The issuance of MMPA incidental take regulations and associated LOAs to the Navy is a Federal action, thereby requiring NMFS to analyze the effects of the action on the human environment pursuant to the National Environmental Policy Act (NEPA). The Navy developed an Environmental Impact Statement (EIS) that analyzed the environmental effects of conducting military training, maintenance, and RDT&E in the SOCAL Range Complex. In accordance with the NEPA implementing regulations (40 CFR 1500-1508), NMFS participated as a cooperating agency in the development of the SOCAL Range Complex EIS (e.g., providing information in NMFS' area of expertise and assisting in the environmental effects analysis of naval exercises on endangered species, marine mammals, and other marine resources). NMFS also participated as a cooperating agency in accordance with the NEPA regulations to ensure that the SOCAL Range

Complex EIS contained adequate information and analysis to allow NMFS to adopt the SOCAL Range Complex EIS for the corresponding issuance of the MMPA 5-year incidental take regulations, the 2009 LOA, and future LOAs as appropriate. Notice of availability of the SOCAL Range Complex Final EIS was published on December 5, 2008 (73 FR 74170).

Based on NMFS' preliminary determinations reached in the development of the proposed rule associated with SOCAL Range Complex as well as our analysis of the comments received during the public comment period on the proposed rule, NMFS has determined that the Navy's EIS adequately analyzes the training, maintenance, and RDT&E activities in the SOCAL Range Complex and NMFS has adopted the SOCAL Range Complex EIS to support the proposed issuance of the MMPA incidental take regulations, the 2009 LOA, and future LOAs as appropriate. As mentioned above, NMFS must also prescribe regulations that set forth the means of effecting the least practicable adverse impact on affected species or stocks and their habitat (i.e., mitigation measures). The Navy's EIS includes a suite of proposed mitigation measures, a discussion of mitigation measures that were considered by the Navy, but eliminated, and an indication that additional mitigation measures (either not discussed in the EIS or measures considered but eliminated in the EIS) may be required by NMFS pursuant to the MMPA process. Note that comments received by the Navy on the Final EIS repeat a concern that the EIS does not evaluate an alternative that includes the addition of mitigation measures. However, as indicated in the EIS, all alternatives include implementation of mitigation measures, and the analysis of mitigation alternatives is specifically presented in Chapter 5 of the Final EIS. The consideration of mitigation measures and alternative mitigation measures in Chapter 5 provides the foundation for the alternatives analysis for this tiered EA.

## 1.2 **Purpose and Need for Action**

NMFS' proposed action, as analyzed in this Mitigation EA is the additional analysis of mitigation measures (i.e., consideration of benefits to affected species or stocks and their habitat and effectiveness of such measures based on a practicability standard) and a determination of whether such measures will be included in the MMPA final rule for the SOCAL Range Complex. In making a determination of "least practicable adverse impact", NMFS considers the needs of the affected species or stocks and their habitat, as well as the personnel safety, practicality of implementation, and the impact on the effectiveness of the military readiness activity. See 16 U.S.C. 1371(a)(5)(A)(ii). Mitigation measures need only be set forth if regulations are issued authorizing incidental take – if NMFS were to deny the Navy's request for an authorization, an analysis of mitigation would not be necessary – therefore, this Mitigation EA assumes that an authorization will be issued. NMFS has not yet made a final decision regarding the issuance of an authorization, but assumes issuance here as the basis for this analysis. As mentioned previously, NMFS adopted the SOCAL Range Complex Final EIS in January 2009 and will rely on that document to support our decision whether or not to issue incidental take regulations, the 2009 LOA, and future LOAs as appropriate. This Mitigation EA is tiered off of the SOCAL Range Complex Final EIS and will serve the specific purpose of providing additional analysis of a reasonable range of mitigation alternatives that may be required if an MMPA authorization is issued. If the appropriate findings under the MMPA can be made, the need for this action arises from NMFS' requirement to set forth in any associated regulations and LOAs the requirements pertaining to mitigation.

As described, mitigation is a very important component of the MMPA process and additional analysis of reasonable mitigation measures in this Mitigation EA will further support NMFS' choice of what should be required in regulations, the 2009 LOA, and subsequent LOAs as appropriate, if issued. Additionally, this Mitigation EA allows NMFS to include an analysis of any mitigation options that may have arisen during the MMPA public comment period, which ended on November 14, 2008.

Many of the mitigation measures analyzed in this document are general measures that could apply to any Navy training action involving sound in the water. NMFS may reference the analysis included in this document for consideration in other Navy actions.

## 1.3 Description of Action and Alternatives Analyzed in the Mitigation EA

In order to issue incidental take regulations under Section 101(a)(5)(A) of the MMPA, NMFS must set forth the "permissible methods of taking pursuant to such activity, and other means of effecting the least practicable adverse impact on such species or stock and its habitat, paying particular attention to rookeries, mating grounds, and areas of similar significance." The National Defense Authorization Act of 2004 (NDAA) (Public Law 108-136) amended the MMPA (Section 3(18)(B)) as it relates to "military-readiness activities" and the incidental take authorization process by: removing the "small numbers" and "specified geographical region" limitations; amending the definition of "harassment"; and (most applicable here) indicating that "least practicable adverse impact" shall include consideration of personnel safety, practicality of implementation, and impact on the effectiveness of the military readiness activity.

The Navy's training activities in the SOCAL Range Complex are considered military readiness activities. It is incumbent upon NMFS to include in the incidental take regulations, adequate means to achieve the least practicable adverse effect. This means carefully considering the Navy's proposed mitigation, as well as other potential measures, and assessing the benefit of the considered measures to the affected species or stocks of marine mammals and their habitat, while also considering personnel safety, practicality of implementation, and impact on the "military-readiness activity". If NMFS determines that the activity, as proposed (and including the Navy's proposed mitigation), does not include adequate means to achieve the least practicable adverse effect, then NMFS will identify, and discuss with the Navy, additional practicable mitigation measures to further lessen adverse effects. Any mitigation measure prescribed by NMFS should be known to accomplish, have a reasonable likelihood of accomplishing (based on current science), or contribute to the accomplishment of one or more of the general goals listed below:

a) avoidance or minimization of marine mammal injury or death wherever possible (goals b,c, and d may contribute to this goal).

b) a reduction in the numbers of marine mammals (total number or number at biologically important time or location) exposed to received levels of active sonar, underwater detonations, or other activities expected to result in the take of marine mammals (this goal may contribute to a, above, or to reducing harassment takes only).

c) a reduction in the number of times (total number or number at biologically important time or location) individuals would be exposed to received levels of active sonar, underwater detonations, or other activities expected to result in the take of marine mammals (this goal may contribute to a, above, or to reducing harassment takes only).

d) a reduction in the intensity of exposures (either total number or number at biologically important time or location) to received levels of active sonar, underwater detonations, or other activities expected to result in the take of marine mammals (this goal may contribute to a, above, or to reducing the severity of harassment takes only).

e) a reduction in adverse effects to marine mammal habitat, paying special attention to the food base, activities that block or limit passage to or from biologically important areas, permanent destruction of habitat, or temporary destruction/disturbance of habitat during a biologically important time.

f) for monitoring directly related to mitigation - an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation (shut-down zone, etc.)

This document contains an assessment of the mitigation alternatives being considered by NMFS for the issuance of incidental take regulations, the 2009 LOA, and future LOAs, as appropriate, to the Navy for its training exercises in the SOCAL Range Complex. Following are the three alternatives (Note these are appropriately different than the alternatives evaluated in the Navy's FEIS, so the numbering and range of alternatives are not intended to mirror those presented in that Final EIS):

- No Action Alternative: Navy Mitigation Measures – For this decision, the no action alternative consists of NMFS issuing regulations, a 2009 LOA, and future LOAs as appropriate, for the SOCAL Range Complex that requires the mitigation measures proposed in the Navy's application for incidental take regulations and LOA with no changes or additions.

- Alternative 1 (Preferred Alternative) – NMFS and the Navy worked together to develop a proposed Stranding Response Plan. Alternative 1 is the issuance of regulations, a 2009 LOA, and future LOAs as appropriate to the Navy for the SOCAL Range Complex that requires all of the mitigation measures included in the no action alternative plus this additional measure. This alternative addresses the mitigation measures as presented by Navy in their preferred alternative in the Final EIS for the SOCAL Range Complex.

- Alternative 2 – NMFS considered a variety of reasonable potential mitigation measures that have been recommended in public comments in the past or discussed internally. Alternative 2 is the issuance of regulations, a 2009 LOA, and future LOAs as appropriate, to the Navy that requires all of the mitigation measures listed in Alternative 1, but with the addition of some subset of the additional suite of

mitigation measures considered in Alternative 2. These additional mitigation measures were developed internally by NMFS, provided in the comments received on the MMPA Notice of receipt or proposed rule, or considered and analyzed by the Navy in the SOCAL Range Complex EIS but not proposed as part of the Navy's preferred alternative.

In order to analyze the mitigation alternatives it is necessary to understand the underlying training activities for which incidental take would be authorized. As noted, the SOCAL Range Complex Final EIS contains a complete description of these activities. NMFS has adopted the SOCAL Range Complex Final EIS prior to reaching a finding on this Mitigation EA and this EA is tiered off of the SOCAL Range Complex Final EIS. Additionally, and more specifically, NMFS' proposed rule establishing the framework upon which incidental take authorizations may be issued to the Navy for its SOCAL Range Complex training activities contain: a description of the Navy activities; a description of the marine mammals that will likely be taken by the Navy activities; an analysis of the permissible methods of take and their impacts to marine mammals; and a finding of negligible impact. These provisions, as appropriately updated via the MMPA process, are a required part of any final rule issued for this action. Applicable portions of the proposed rule are incorporated by reference herein and may be viewed at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications. A summary of the major components of NMFS' proposed authorization is included in the next section.

## 1.4 Background - Summary of NMFS' Proposed Authorization for SOCAL Range Complex

As noted above, in order to analyze the mitigation alternatives it is necessary to briefly describe the underlying training and RDT&E activities for which incidental take would be authorized (full analysis is available in the SOCAL Range Complex Final EIS). The activities, thresholds, estimate take numbers and other issues addressed in this section are provided as background for context in this Mitigation EA, and are not part of the scope of action being analyzed in this EA.

### 1.4.1 Specified Activities Covered by the Proposed Authorization

NMFS has proposed regulations to authorize the take of marine mammals incidental to a subset of the Navy's military readiness training activities in the SOCAL Range Complex that include the use of mid-frequency active sonar (MFAS), high frequency active sonar (HFAS), and underwater explosive detonations. A complete narrative description of the Navy's specified activities may be found both in the SOCAL Range Complex FEIS and the Description of the Action in NMFS' proposed rule, which is incorporated herein by reference. The following tables summarize the specified activities and describe: the active sonar sources utilized in the SOCAL Range Complex; the underwater explosive types used in the SOCAL Range Complex; the type and number of exercises that utilize active sonar and underwater explosives in the SOCAL Range Complex annually; and the specific number of sonar hours associated with each exercise type.

| Sonar Sources | Frequency (kHz) | Source Level (dB) re 1 µPa @ 1 m | Emission Spacing (m)* | Vertical Directivity | Horizontal Directivity | Associated Platform | System Description |
|---|---|---|---|---|---|---|---|
| AN/SQS-53C | 3.5 | 235 | 154 | Omni | 240° forward-looking | Cruiser (CG) and Destroyer (DDG) hull mounted sonar | ASW search, detection, & localization (approximately 2 pings per minute) |
| AN/SQS-53C Kingfisher Mode | 3.5 | 236 | 4.6 | 20° width 42° D/E | 120° forward | Same as above | Mine object detection (approximately 2 pings per minute) |
| AN/SQS-56C | 7.5 | 225 | 129 | 13° | 30° | Frigate (FFG) hullmounted sonar | ASW search, detection, & localization (approximately 2 pings per minute) |
| AN/AQS-22 (or AN/AQS-13F**) | 4.1 | 217 | 15 | Omni | Omni | Helicopter (SH-60, MH-60R) dipping sonar | ASW sonar lowered from hovering helicopter (approximately 10 pings/dip, 30 seconds between pings) |
| AN/BQQ-10 | Classifed (MF) | Classified | n/a | Omni | Omni | Submarine (SSN) hullmounted sonar | ASW search and attack (approximately two pings per hour when in use) |
| AN/BQQ-15 | Classifed (MF) | Classified | | | | Submarine (SSN) hullmounted sonar | Submarine navigational sonar |
| AN/SSQ-62 DICASS (sonobuoy, tonal) | 8 | 201 | 450 | Omni | Omni | Helicopter and maritime patrol aircraft (P3 and P8 MPA) dropped sonobuoy | Remotely commanded expendable sonar-equipped buoy (approximately 12 pings per use, 30 secs between pings) |
| MK-48 torpedo sonar | Classified (>10) | Classified | 144 | Omni | Omni | Submarine (SSN) launched torpedo | Recoverable and non-explosive exercise torpedo; sonar is active approximately 15 min per torpedo run |
| ***MK-46 or 54 torpedo sonar | Classified (HF) | Classified | | | | Surface ship and aircraft fired exercise torpedo (lightweight) | Recoverable and non-explosive exercise torpedo |
| AN/SSQ-110A (IEER) | Classified (impulsive, broadband) | Classified | n/a | Omni | Omni | MPA deployed | ASW system consists of explosive acoustic source buoy (contains two 4.1 lb charges) and expendable passive receiver sonobuoy |
| AN/SLQ-25A (NIXIE) | Classified (MF) | Classified | | | | DDG, CG, FFG and certain other surface ship towed array (torpedo countermeasure) | Towed countermeasure to avert localization and torpedo attacks (approximately 20 mins per use) |
| AN/SSQ-125 (AEER) | MF | Classified | | | | MPA deployed | ASW system consists of active sonobuoy and expendable passive receiver sonobuoy |

**Table 1.** Sonar sources used in SOCAL and parameters used for modeling them. Many of the actual parameters and capabilities of these sonars are classified.
*Spacing means distance between pings at the nominal speed
**AN/AQS-22 used as surogote for AN/AQS-13F; AQS-22 source level is higher than AQS-13F
*** MK-48 used as surogote for MK-46/54 in modeling; MK-48 source level is higher than MK-46

| Explosive Type | Net Explosive Weight (lbs) |
|---|---|
| 5" Naval gunfire | 9.5 |
| 76mm rounds | 1.6 |
| Maverick | 78.5 |
| Harpoon | 448 |
| MK-82 | 238 |
| MK-83 | 574 |
| MK-84 | 990 |
| MK-48 | 851 |
| AN/SSQ-110A (IEER) | 5 |

**Table 2**. Ordnance used in SOCAL Explosive Exercises for which take of marine mammals is anticipated

| | Independent Unit-Level Exercises | | | | | | | Integrated / Coordinated / Major Exercises | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Exercise Type** | **S-S GUNEX / NSFS** | **A-S MISSILEX** | **A-S BOMBEX** | **SINKEX** | **ASW TRACKEX including IAC [1]** | **ASW TORPEX including IAC [1]** | **EER/ IEER / AEER** | **IAC** | **Sus-tain-Ment** | **SHAREM** | **JTFEX** | **COMP-TUEX** |
| Sources/ Weapons/ Rounds | 5" rounds | HELLFIRE Harpoon | MK82, MK83, MK84 bombs | Bombs, MK48 5" rounds | 53C AQS-22 sonobuoys | 53C, MK48, AQS22 sonobuoys | AN/SQQ-110A or AN/SQQ-125 | All sources possible | All sources possible | All sources possible | All sources possible | All sources possible |
| Length of Exercise | 2.5 - 9 hrs | 3 hrs | 1 hr | 16 hrs | 2 hrs | 2 | 6 hrs | 2 days | >21 days | 7 days | 10 days | 21 days |
| Detonations/ Rounds per exercise | 6 to 11 | 3 | MK82 - 9<br>MK83 - 5<br>MK84 - 2 | 5" - 120<br>MK82 - 2<br>MK83 - 1<br>MK48 - 1 | N/A | N/A | 36 | N/A | N/A | N/A | N/A | N/A |
| Number Exercises per Year | 402 | 50 | 40 | 2 | 53C – 1.600<br>buoys – 3,864<br>AQS22-2,453 | 53C - 28<br>buoys - 150<br>MK48 - 84<br>AQS22 - 112 | 3 | 2 | 1 | 2 | 4 | 4 |
| Possible Areas Conducted | SOAR<br>SHOBA<br>W-291 | LTR-1/2 | W-291 | W-291 | SOAR<br>W-291 | SOAR | W-291 | SOCAL | Primarily SOAR | SOCAL | SOCAL | SOCAL |
| Months of Year conducted | Year Round | Year Round | Year Round | Year Round | Year Round | Year Round | Year Round | Year Round | Year Round | Year Round | Year Round | Year Round |

**Table 3.** Summary of Exercise Types with sonar or explosive use anticipated to result in take of marine mammals.
1. IAC activities are accounted for in ASW TRACKEX and ASW TORPEX
2. For ASW TRACKEX and ASW TORPEX: 53C number equates to annual hours of use; buoys number equates to annual number of sonobuoys used; AQS22 number equates to annual number of dips; MK48 number equates to annual number of MK48 or 46 torpedoes used.

| **Event** | **SQS-53C Sonar Hours** | **SQS-56C Sonar Hours** | **BQQ-10 Sonar Hours** | **BQQ-15 Sonar Hours** | **Total Sonar Hours** | **AQS-22 Number of Dips** | **SSQ-62 Number of Sonobuoys** | **SSQ-125 AEER Number of Sonobuoys** | **MK-48 Number of Torpedo Events** | **MK-46 Number of Torpedo Events** | **AN/SLQ-25A NIXIE Number of** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Major Exercise (8/yr)** | 1,045 | 261 | 98 | 41 | 1,445 | 337 | 2,255 | 54 | 11 | 28 | 76 |
| **Integrated Exercises (7/yr)** | 403 | 101 | 138 | 41 | 683 | 690 | 845 | 0 | 15 | 28 | 76 |
| **ULT & Maintenance** | 529 | 132 | 579 | 41 | 1,281 | 1,692 | 1,156 | 0 | 61 | 28 | 76 |
| **Total** | **1,977** | **494** | **815** | **122** | **3,408** | **2,719** | **4,256** | **54** | **87** | **84** | **227** |

**Table 4.** Estimated Annual use of each sonar source. Note that values may vary slightly between years but will not exceed 5 times the annual estimate for any source (+/- 10%) over the course of the 5-yr regulations.

### 1.4.2 Marine Mammals for which Incidental Take Regulations are Proposed

Forty-one species of marine mammals (8 mysticetes, 27 odontocetes, and 6 pinnipeds) are known to occur in the SOCAL Range Complex. Based on their rare occurrence in the SOCAL Range Complex, the Navy and NMFS do not anticipate any takes (as that term is defined under the MMPA) of southern resident killer whales, North Pacific right whales, or Steller sea lions. Therefore, NMFS has not proposed to authorize take of these species under the MMPA, and mitigation measures specific to these species are not addressed further in this Mitigation EA.

For the SOCAL Range Complex EIS and MMPA rulemaking, NMFS' Southwest Fisheries Science Center calculated marine mammal density estimates based on compiled densities from vessel surveys conducted from 1986 to 2005, and provided them to the Navy as Government Furnished Information (GFI). These density estimates are included in Table 5 along with the abundance estimates from NMFS Stock Assessment Reports.

Additional information on these species may be found in NMFS' proposed rule and Chapter 3.9 of the SOCAL Range Complex EIS.

| Species Name | Warm Season density/km$^2$ | Cold Season density/km$^2$ | Estimated Population Size | |
|---|---|---|---|---|
| | | | NMFS' 2007 Stock Assessment Report | NMFS' 2008 Stock Assessment Report |
| **MYSTICETES** | | | | |
| Blue whale | 0.0041222 | 0.0041222 | 1,186 | 1,368 |
| Fin whale | 0.0024267 | 0.0008008 | 3,454 | 2,636 |
| Humpback whale | 0.0001613 | 0.0000984 | 1,396 | 1,391 |
| Sei whale | 0.0000081 | 0.000005 | 43 | 46 |
| Bryde's whale | 0.0000081 | 0.0000081 | none published | none published |
| Gray whale | 0 | 0.051 | 18,813 | 18,813 |
| Minke whale | 0.0010313 | 0.0010313 | 898 | 806 |
| **ODONTOCETES** | | | | |
| Sperm whale | 0.0014313 | 0.0008731 | 2,265 | 2,853 |
| Baird's beaked whale | 0.0001434 | 0.0001434 | 313 | 540 |
| Bottlenose dolphin | 0.0123205 | 0.0184808 | 323 inshore stock/ 3,257offshore stock | 323 inshore stock/ 3,495 offshore stock |
| Cuvier's beaked whale | 0.0036883 | 0.0036883 | 2,171 | 2,830 |
| Dall's porpoise | 0.0016877 | 0.0081008 | 57,549 | 48,376 |
| Killer whale | 0.0000812 | 0.0000812 | 422 NPAC offshore stock / 314 West Coast transient stock | 1,014 Eastern NPAC offshore stock/ 314 West Coast transient stock** |
| Long-beaked common dolphin | 0.0965747 | 0.0366984 | 1,893 | 15,335 |
| Mesoplodont beaked whales | 0.0011125 | 0.0011125 | 1,024 | 1,206 |
| Northern right whale dolphin | 0.0056284 | 0.0270163 | 15,305 | 12,876 |
| Pacific white-sided dolphin | 0.0160748 | 0.0160748 | 25,233 | 20,719 |
| Pygmy sperm whale | 0.0013785 | 0.0013785 | none published | 899 |
| Short-finned pilot whale | 0.0003315 | 0.0003315 | 245 | 245 |
| Risso's dolphin | 0.0180045 | 0.0540134 | 12,093 | 11,621 |
| Short-beaked common dolphin | 0.8299606 | 0.315385 | 487,622 | 392,733 |
| Striped dolphin | 0.0175442 | 0.0107019 | 23,316 | 17,925 |
| Ziphiid whales | 0.0008214 | 0.0008214 | | |
| **PINNIPEDS** | | | | |
| Guadalupe fur seal | 0.007 | 0.007 | 7,408 | 7,408 |
| Northern elephant seal | 0.042 | 0.025 | 124,000 | 124,000 |
| Harbor seal | 0.19 | 0.19 | 34,233 | 34,233 |
| California sea lion | 0.605 | 0.87 | 238,000 | 238,000 |
| Northern fur seal | 0.027 | 0.027 | 9,424 | 9,424 |

**Table 5.** Estimated density and abundance of marine mammals anticipated to be taken by the Navy's activities in the SOCAL Range Complex

### 1.4.3 Permissible Methods of Taking

In order to issue incidental take regulations, NMFS is required to set forth the permissible methods of taking. An applicant, in this case the Navy, is required to identify the type of and estimate the number of takes of marine mammals that would occur as a result of its activity. NMFS assesses the number provided by the applicant to determine whether modification is necessary, and then that number (combined with information regarding the nature of the effects) is used to inform NMFS' decisions regarding the negligible impact determination, the appropriate number of takes to authorize (and of what sort, Level A or Level B Harassment, or mortality), and the appropriate mitigation, monitoring and reporting. Based on the analysis in the SOCAL Range Complex Final EIS, the Navy's request for authorization, and NMFS proposed rule, this section contains a summary of the nature of the takes that are likely to result from exposure to MFAS/HFAS and explosive detonations as well as an estimate of how many marine mammal takes would occur.

#### 1.4.3.1 *Summary of Types of Take*

With respect to military readiness activities, Section 3(18)(B) of 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]. Below is a summary of the types of impacts that would be expected to result from the Navy's activities that would qualify as Level A or Level B Harassment under the MMPA. Also included is a brief discussion of mortality and strandings. A more detailed discussion is included in the Navy's FEIS.

1.4.3.1.1 Level B Harassment

Following are the types of anticipated effects from the Navy's action (MFAS/HFAS operation and underwater explosive detonations) that fall into the MMPA Level B Harassment category:

Behavioral Disturbance - Behavioral disturbance that rises to the level described in the definition above is considered Level B Harassment. Behavioral responses to sound are highly variable and context-specific. Following are some examples of the sorts of responses that could be classified as Level B harassment and that could potentially result from the Navy's activities: prolonged vocal modifications or cessation; cessation of feeding; cessation of social interaction; prolonged alteration of movement or diving behavior; habitat abandonment (temporary or permanent); brief cessation of reproductive behaviors, or, in severe cases, panic, flight, or stampede (Southall et al., 2007).

Many different variables can influence an animal's perception of and response to (nature and magnitude) an acoustic event, such as: an animal's prior experience with a sound type; the perceived nearness of the sound; the bearing of the sound (approaching vs. retreating); the similarity of a sound to biologically relevant sounds in the animal's environment (i.e., calls of predators, prey, or conspecifics); the characteristics of the individual (age, gender, reproductive status, etc.); the activity the individual is currently engaged in; or the presence of other factors, such as a nearby boat.

There are few empirical studies of avoidance responses of free-living cetaceans to mid-frequency sonar. Relatively more information is available on the avoidance responses of free-living cetaceans to other acoustic sources, like seismic airguns and low frequency sonar, than mid-frequency active sonar. Richardson et al., (1995) noted that avoidance reactions are the most obvious manifestations of disturbance from anthropogenic sounds in marine mammals.

When Level B Harassment is predicted based on estimated behavioral responses, those takes may have a stress-related (or distress) physiological component as well. When an animal does not have sufficient energy reserves to satisfy the energetic costs of a stress response, energy resources must be diverted from other biotic functions, which could impair those functions that experience the diversion and could potentially pose a risk to the animal's welfare.

In the Navy's SOCAL Range Complex, behavioral disturbance can result either from exposure to MFAS/HFAS or underwater detonation of explosives, though it is more likely to

result from MFAS because the duration of sound transmission is much longer and therefore the potential for exposure of marine mammals to sound levels that may result in Level B harassment is higher.

As mentioned above, there are few empirical studies of the direct responses of cetaceans to MFAS. In addition to the studies analyzed in Chapter 3 of the FEIS, in 2008, results were made available from a series of behavioral response studies (BRSs) conducted by NMFS and other scientists, which showed one individual beaked whale (Mesoplodon densirostris) responding to an MFAS playback. The BRS-07 Cruise Report (NMFS, 2008) indicates that the MFAS playback began when the tagged beaked whale was vocalizing at depth, following a previous controlled dive with no sound exposure. The whale appeared to stop clicking significantly earlier than usual when exposed to mid-frequency signals in the 130-140 dB (rms) range. After a few more minutes of the playback, when the received level reached a maximum of 140-150 dB, the whale ascended on the slow side of normal ascent rates with a longer than normal ascent, at which point the exposure was terminated. The BRS-07 Cruise report notes that the results are from a single experiment and that a greater sample size is needed before robust and definitive conclusions can be drawn (NMFS, 2008).

Acoustic Masking and Communication Impairment – Masking, or auditory interference, generally occurs when sounds in the environment are louder than and of a similar frequency to, auditory signals an animal is trying to receive. Masking is a phenomenon that affects animals that are trying to receive acoustic information about their environment, including sounds from other members of their species, predators, prey, and sounds that allow them to orient in their environment. Similarly, in addition to making it more difficult for animals to perceive acoustic cues in their environment, anthropogenic sound presents separate challenges for animals that are vocalizing. Acoustic masking and communication impairment are considered Level B Harassment as it can disrupt natural behavioral patterns of individuals or groups by interrupting or limiting the marine mammal's receipt or transmittal of important information or environmental cues.

Masking and communication impairment can result either from exposure to MFAS/HFAS or underwater explosives, though the effect is different for each: MFAS/HFAS as proposed in SOCAL Range Complex is a narrower frequency and shorter signal, but for many uses may be repeated every 30 seconds or so over a multi-hour period, while an explosive signal would be longer (still relatively short) and broadband, but planned to occur far fewer times.

Temporary Threshold Shift (TTS) – When animals exhibit reduced hearing sensitivity (i.e., certain sounds must be louder for an animal to recognize them) following exposure to a sufficiently intense sound, it is referred to as a noise-induced threshold shift (TS). An animal can experience temporary threshold shift (TTS) or permanent threshold shift (PTS). TTS results from fatigue of the cochlear hair cells and supporting structures and can last from minutes or hours to days. A marine mammal that experiences TTS is able to recover its hearing sensitivity. TTS occurs in specific frequency ranges (i.e., an animal might only have a temporary loss of hearing sensitivity between the frequencies of 1 and 10 kHz)) and can be of varying amounts (for example, an animals hearing sensitivity might be reduced by only 6 dB or reduced by 30 dB). The type and degree of TTS that is incurred is primarily based on the type (frequency and other

characteristics) and intensity of the sound the animal is exposed to, as well as the duration of the exposure. TTS can effect how an animal behaves in response to the environment, including conspecifics, predators, and prey.

TTS can result either from exposure to MFAS/HFAS or underwater explosives. With explosives, TTS can result from exposure to the pressure wave, in addition to the acoustic energy, and will likely desensitize the animal over a broader frequency bandwidth.

1.4.3.1.2 Level A Harassment

Following are the types of potential effects that fall into the MMPA Level A Harassment category, however, the probability of these effects occurring incidental to the SOCAL Range Complex activities is very low when the implementation of mitigation is considered (from any of the three alternatives):

Permanent Threshold Shift (PTS) – A threshold shift that an animal does not recover from is called permanent threshold shift and is considered an injury. PTS results from exposure to intense sounds that cause a permanent loss of inner or outer cochlear hair cells or exceed the elastic limits of certain tissues and membranes in the middle and inner ears and result in changes in the chemical composition of the inner ear fluids. PTS can effect how an animal behaves in response to the environment, including conspecifics, predators, and prey. PTS can result either from exposure to MFAS/HFAS or underwater explosives. With explosives, PTS can result from exposure to the pressure wave, in addition to the acoustic energy, and will likely desensitize the animal over a broader frequency bandwidth.

Acoustically Mediated Bubble Growth – A few theories suggest ways in which gas bubbles become enlarged through exposure to intense sounds (MFAS) to the point where tissue damage results. In rectified diffusion, exposure to a sound field would cause bubbles to increase in size. Alternately, bubbles could be destabilized by high-level sound exposures such that bubble growth then occurs through static diffusion of gas out of the tissues. Tissue damage from either of these processes would be considered an injury. These effects are hypothesized to occur as a result of exposure to MFAS (not explosives).

Behaviorally Mediated Bubble Growth – Several authors suggest mechanisms in which marine mammals could behaviorally respond to exposure to MFAS/HFAS by altering their dive patterns in a manner (unusually rapid ascent, unusually long series of surface dives, etc.) that might result in unusual bubble formation or growth ultimately resulting in tissue damage (emboli, etc.). These effects are hypothesized to occur as a result of exposure to MFAS/HFAS (not explosives).

Physical Disruption of Tissues Resulting from Explosive Shock Wave – Physical damage of tissues resulting from a shock wave (from an explosive detonation, not MFAS/HFAS) is classified as an injury. Blast effects are greatest at the gas-liquid interface (Landsberg, 2000) and gas-containing organs, particularly the lungs and gastrointestinal tract, are especially susceptible (Goertner, 1982; Hill 1978; Yelverton et al., 1973). Nasal sacs, larynx, pharynx, trachea, and lungs may be damaged by compression/expansion caused by the oscillations of the

blast gas bubble (Reidenberg and Laitman, 2003). Severe damage (from the shock wave) to the ears can include tympanic membrane rupture, fracture of the ossicles, damage to the cochlea, hemorrhage, and cerebrospinal fluid leakage into the middle ear.

1.4.3.1.3 Serious Injury and Mortality

Over the past 12 years, there have been five stranding events coincident with military mid-frequency active sonar use in which exposure to sonar is believed to have been a contributing factor: Greece (1996); the Bahamas (2000); Madeira (2000); Canary Islands (2002); and Spain (2006). Cuvier's beaked whales comprise approximately 80% of the animals involved in these strandings. Other beaked whale species make up the majority of the remaining species.

Several theories have been suggested to account for the potential cause of or contribution to sonar-associated strandings. To date, however, there has been limited scientific information to empirically either confirm or refute some of these theories. Though an exact causal link between the stranding events and naval exercises has not been determined, certain conditions may have existed in several of the exercises that, in their aggregate, may have contributed to the marine mammal strandings (Freitas, 2004): Exercises were conducted in areas of at least 547 fathoms (1000 m) depth near a shoreline where there is a rapid change in bathymetry on the order of 547 to 3,281 fathoms (1000 – 6000 m) occurring across a relatively short horizontal distance; multiple ships were operating MFAS in the same area over extended periods of time in close proximity; and exercises took place in an area surrounded by landmasses, or in an embayment. Exercises involving multiple ships employing MFAS near land may have produced sound directed towards a channel or embayment that may have cut off the lines of egress for the affected marine mammals (Freitas, 2004). The SOCAL Range Complex EIS (in particular, Appendix F) evaluates the strandings in more depth. The potential for Navy's activities in the SOCAL Range Complex to contribute to marine mammal strandings was considered carefully in the SOCAL Range Complex Final EIS, with input from NMFS, and is discussed further in section 1.4.3.2.

1.4.3.2 *Take Estimates*

1.4.3.2.1 Thresholds

NMFS utilizes various thresholds to indicate at what received levels marine mammals are likely to experience Level A and Level B Harassment incidental to exposure to different types of sound sources. These thresholds allow for estimates of the numbers of animals that may be harassed and inform NMFS' decisions regarding appropriate and practicable mitigation measures. The Navy's SOCAL Range Complex FEIS discussed in detail the justification for the various thresholds. The thresholds used for modeling estimated takes (as defined under MMPA) incidental to MFAS/HFAS and underwater explosive detonations are summarized below.

PTS, which is considered a conservative surrogate for the onset of all acoustic injury (Level A Harassment), is predicted to occur whenever an animal is exposed to the following levels of MFAS/HFAS or above (these metrics are called sound energy level (SEL) and incorporate duration):

- Cetaceans - 215 dB re 1 $\mu Pa^2$-s
- Harbor Seals (and closely related species) – 203 dB re 1 $\mu Pa^2$-s
- Northern Elephant Seals (and closely related species) - 224 dB re 1 $\mu Pa^2$-s
- California Sea Lions (and closely related species) - 226 dB re 1 $\mu Pa^2$-s

TTS, which is a subset of Level B Harassment and, is predicted to occur whenever an animal is exposed to the following levels of MFAS/HFAS or above:

- Cetaceans - 195 dB re 1 $\mu Pa^2$-s
- Harbor Seals (and closely related species) – 183 dB re 1 $\mu Pa^2$-s
- Northern Elephant Seals (and closely related species) - 204 dB re 1 $\mu Pa^2$-s
- California Sea Lions (and closely related species) - 206 dB re 1 $\mu Pa^2$-s

The following risk functions (Figure 1) are used to predict what percentage of marine mammals exposed to the given level of MFAS/HFAS will respond in a manner NMFS considers Level B Harassment. As received level increases, a larger percentage of the exposed animals are predicted to be harassed.

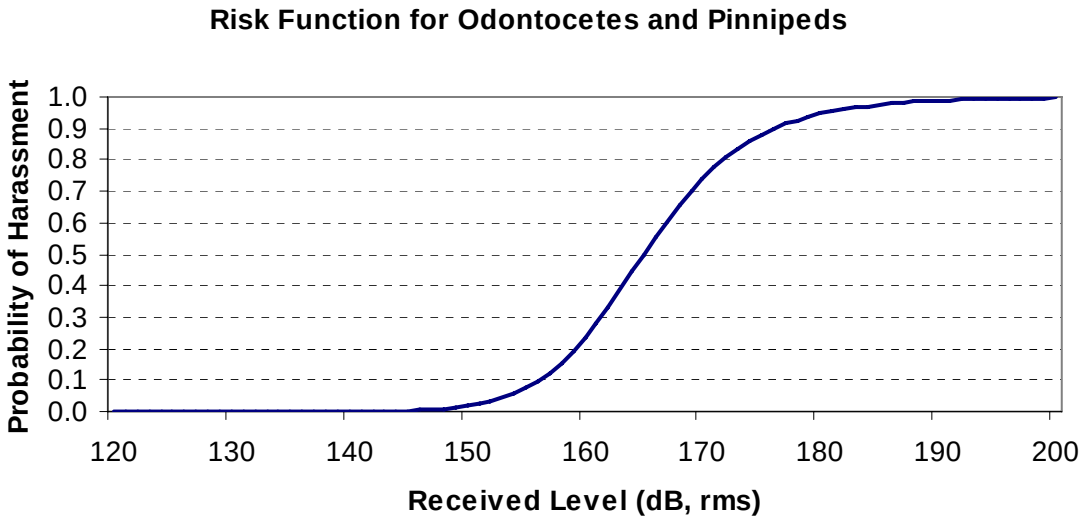


**Figure 1a**. Risk function for odontocetes and pinnipeds. B=120 dB, K=45 dB, A=10

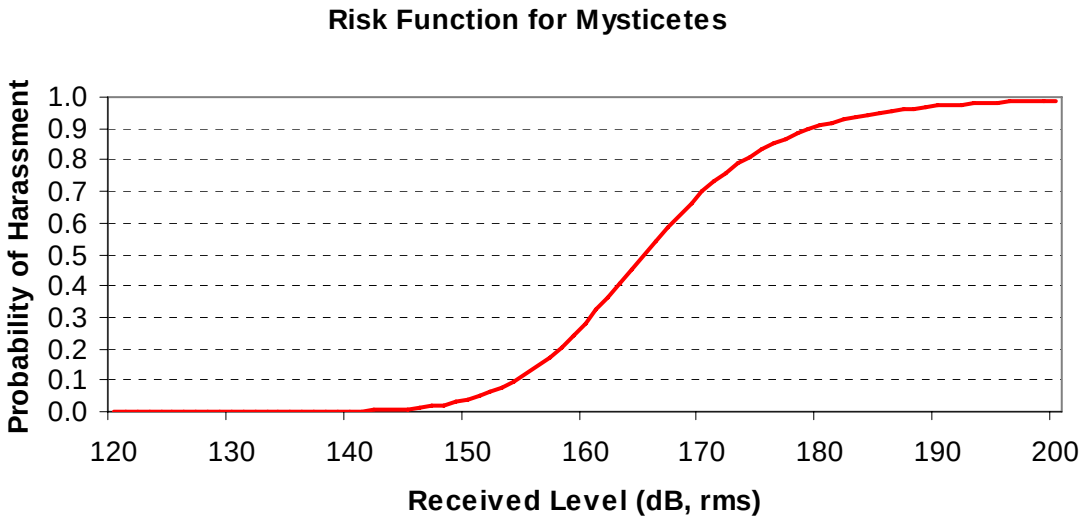


**Figure 1b**. Risk function for mysticetes. B=120 dB, K=45 dB, A=8.

Table 6, below, summarizes the thresholds for underwater detonations.

| Criterion | Criterion Definition | Threshold |
|---|---|---|
| **Mortality** | onset of severe lung injury (1% probability of mortality) | 31 psi-ms (positive impulse) |
| **Level A Harassment (Injury)** | Slight lung injury; or | 13 psi-ms (positive impulse) |
| | 50% of animals exposed would experience ear drum rupture; and 30% exposed sustain PTS | 205 dB re 1 microPa$^2$-s (full spectrum energy) |
| **Level B Harassment** | TTS (dual criteria); or | 23 psi (peak pressure) (explosives < 2,000 lbs.); or |
| | | 182 dB re 1 microPa$^2$-s (peak 1/3 octve band) |
| | Sub-TTS behavioral disruption (for multiple detonations only, not applicable for single detonations) | 177 dB re 1 microPa$^2$-s, (1/3 octave band) |

**Table 6.** Summary of Criteria for Explosive Detonations

1.4.3.2.2 Navy Modeling

As described in Chapter 3.9 and Appendix F of the SOCAL Range Complex EIS and the proposed rule , the Navy uses several different models to perform the calculations necessary to

estimate take, and NMFS may make modifications to the Navy's estimates if appropriate. Following is a summary outline of the steps followed in the SOCAL Range Complex EIS to estimate take:

(1) A sound propagation model predicts the number of animals that will be exposed to a range of levels of pressure and energy (of the metrics used in the criteria) from MFAS/HFAS and explosive detonations based on several important pieces of information, including: characteristics of the sound sources; transmission loss (in 13 representative environmental provinces across 8 sonar modeling areas in two seasons); and the estimated density of each marine mammal species in the SOCAL Range Complex (see Table 5), horizontally distributed uniformly and vertically distributed according to dive profiles based on field data

(2) The criteria discussed in the previous section are applied to the estimated exposures to predict the number of exposures that exceed the criteria, i.e., the number of takes by Level B Harassment, Level A Harassment, and mortality.

(3) Post-modeling corrections are applied to account for the following:

- Acoustic footprints for active sonar sources account for land masses (by subtracting them out).
- Acoustic footprints for active sonar sources should not be added independently, rather, the degree to which the footprints from multiple ships participating in the same exercise would typically overlap is taken into consideration.
- Acoustic modeling accounts for the maximum number of individuals of a species that could potentially be exposed to active sonar within the course of 1 day or a discreet continuous sonar event if less than 24 hours.

(4) Mitigation measures are taken into consideration by NMFS and adjustments may be applied to the numbers produced by the Navy's modeled estimates.

(5) Last, the Navy's specified activities have been described based on best estimates of the number of MFAS/HFAS hours and underwater ordnance detonations that the Navy will conduct. The exact number of hours may vary from year to year, but will not exceed the 5-year total indicated in Table 2 (by multiplying the yearly estimate by 5) by more than 10 percent. NMFS estimates that a 10-percent increase in active sonar hours would result in approximately a 10-percent increase in the number of takes, and we have considered this possibility in our MMPAanalyses.

Table 7 below indicates the Level B and Level A Harassment takes that NMFS proposes to authorize. Neither NMFS, nor the Navy anticipates that marine mammal strandings or mortality will result from the operation of mid-frequency sonar during Navy exercises within the SOCAL Range Complex. However, to allow for scientific uncertainty regarding the contributing causes of beaked whale strandings and the exact behavioral or physiological mechanisms that have lead to the stranding and/or death of marine mammals coincident with sonar in other geographic areas and in different circumstances, NMFS has, through its MMPA authority,

proposed to authorize take, by serious injury or mortality, of 10 individual beaked whales over the course of the five-year rule.

Of note, NMFS (the Endangered Species Division) will also issue Biological Opinions and, as appropriate, associated incidental take statements (ITSs) to NMFS (the Permits, Conservation, and Recreation Division) to exempt the take (under the ESA) that NMFS authorizes in the LOAs under the MMPA. Because of the difference between the statutes, it is possible that ESA analysis of the applicant's action could produce a take estimate that is different than the takes requested by the applicant (and analyzed for authorization by NMFS under the MMPA process), despite the fact that the same proposed action (i.e. number of sonar hours and explosive detonations) is being analyzed under each statute. When this occurs, NMFS staff coordinate to ensure that that the most conservative (lowest) number of takes are authorized. For the Navy's proposed training in the SOCAL Range Complex, coordination with the Endangered Species Division indicates that they will likely allow for a lower level of take of ESA-listed marine mammals than were requested by the applicant (because their analysis indicates that fewer will be taken than estimated by the applicant). Therefore, the number of authorized takes in NMFS' LOA(s) will reflect the lower take numbers from the ESA consultation, though the specified activities (i.e., number of sonar hours, etc.) will remain the same. Alternately, Table 7 reflects the regulations, which indicate the maximum number of takes considered for authorization under the MMPA.

| | Navy's Estimated Sonar Exposures at Indicated Threshold | | | Navy's Estimated Explosive Exposures at Indicated Thresholds | | | | NMFS Proposed Take Authorization | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Level B Take | | Level A Take | Level B Take | | Level A Take | Mortality | Level B | Level A | Mortality |
| Species | behavioral | TTS | PTS | sub-TTS | TTS | | | | | |
| **Mysticetes** | | | | | | | | | | |
| Blue whale | 545 | 67 | 1 | 2 | 2 | 0 | 0 | 617 (0-1) | 0 | 0 |
| Fin whale | 159 | 12 | 0 | 2 | 1 | 0 | 0 | 174 (0-1) | 0 | 0 |
| Humpback whale | 20 | 2 | 0 | 0 | 0 | 0 | 0 | 22 | 0 | 0 |
| Sei whale | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bryde's whale | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Gray whale | 4,910 | 544 | 1 | 6 | 7 | 0 | 0 | 5468 (0-4) | 0 | 0 |
| Minke whale | 117 | 16 | 0 | 0 | 0 | 0 | 0 | 133 (0-16) | 0 | 0 |
| **Odontocetes** | | | | | | | | | | |
| Sperm whale | 144 | 8 | 0 | 2 | 1 | 0 | 0 | 155 (0-9) | 0 | 0 |
| Bottlenose dolphin | 1,298 | 194 | 0 | 14 | 10 | 0 | 0 | 1516 (0-101) | 0 | 0 |
| Long beaked common dolphin | 4,090 | 435 | 1 | 61 | 41 | 1 | 0 | 4629 (0-236) | 0 | 0 |
| Northern right whale dolphin | 1,347 | 169 | 0 | 19 | 12 | 0 | 0 | 1547 | 0 | 0 |
| Pacific white-sided dolphin | 1,191 | 192 | 0 | 12 | 9 | 0 | 0 | 1404 (0-100) | 0 | 0 |
| Pantropical spotted dolphin | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 20* | 0 | 0 |
| Risso's dolphin | 3,164 | 343 | 0 | 57 | 34 | 1 | 0 | 3599 (0-187) | 0 | 0 |
| Rough-toothed dolphin | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 20* | 0 | 0 |
| Short beaked common dolphin | 34,836 | 3,730 | 6 | 528 | 354 | 12 | 4 | 39470 (0-1940) | 0 | 0 |
| Spinner dolphin | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 20* | 0 | 0 |
| Striped dolphin | 1,576 | 249 | 1 | 6 | 6 | 0 | 0 | 1838 (0-128) | 0 | 0 |
| Dall's porpoise | 537 | 88 | 0 | 2 | 2 | 0 | 0 | 629 | 0 | 0 |
| False killer whale | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 20* | 0 | 0 |
| Killer whale | 13 | 1 | 0 | 0 | 0 | 0 | 0 | 14 | 0 | 0 |
| Melon-headed whale | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 20* | 0 | 0 |
| Pygmy killer whale | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 20* | 0 | 0 |
| Short-finned pilot whale | 46 | 6 | 0 | 0 | 0 | 0 | 0 | 52 | 0 | 0 |
| Dwarf sperm whale | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 20* | 0 | 0 |
| Pygmy sperm whale | 148 | 16 | 0 | 1 | 1 | 0 | 0 | 166 (8-17) | 0 | 0 |
| Baird's beaked whale | 19 | 1 | 0 | 0 | 0 | 0 | 0 | 20 (0-1) | 0 | 10 (over 5 years) |
| Cuvier's beaked whale | 390 | 37 | 0 | 5 | 3 | 0 | 0 | 435 (18-40) | 0 | |
| Mesoplodon spp. | 122 | 13 | 0 | 2 | 1 | 0 | 0 | 138(6-14) | 0 | |
| Ziphiid whales | 93 | 8 | 0 | 2 | 1 | 0 | 0 | 104 (4-9) | 0 | |
| **Pinnipeds** | | | | | | | | | | |
| Guadalupe fur seal | 874 | 190 | 0 | 2 | 2 | 0 | 0 | 1068 (0-1) | 0 | 0 |
| Northern elephant seal | 837 | 5 | 0 | 76 | 41 | 0 | 0 | 959 (30-44) | 0 | 0 |
| Pacific harbor seal | 1,052 | 4,562 | 9 | 26 | 26 | 1 | 0 | 5676 (2863-4559) | 0 | 0 |
| California sea lion | 54,384 | 6 | 0 | 584 | 510 | 16 | 6 | 55506 (0-255) | 0 | 0 |
| Northern fur seal | 1,076 | 3 | 0 | 90 | 64 | 3 | 1 | 1237 (0-32) | 0 | 0 |
| **Total** | **112,988** | **10,897** | **19** | **1,499** | **1,128** | **34** | **11** | 126,576 | 0 | 10 |

**Table 7.** Navy's estimated exposures to indicated criteria and NMFS proposed take authorization. Though exposures are predicted by the model, NMFS does not anticipate any injury/PTS to occur because of the mitigation measures (as related to certain characteristics of animals, such as size, gregariousness, or group size) and likely avoidance behavior of marine mammals. As discussed in the Estimated Take of Marine Mammals Section, of the proposed rule for SOCAL, NMFS also anticipates fewer takes by TTS will actually occur than were modeled. Anticipated TTS occurences are indicated in parentheses in the last column (and are already counted within the broad Level B harassment number that NMFS proposes to authorize)

### 1.4.4 Negligible Impact Finding

As mentioned above, NMFS may only issue incidental take regulations if it determines that the total taking over the 5-year period will have a negligible impact on the species or stock(s). NMFS has made this determination in the SOCAL Range Complex proposed rule (for the preferred alternative). The Analysis and Negligible Impact Determination section of NMFS' proposed rule for the SOCAL Range Complex is incorporated herein by reference.

### 1.4.5 Monitoring and Reporting

When issuing incidental take regulations pursuant to section 101(a)(5)(A) of the MMPA, NMFS is required to prescribe regulations setting forth requirements pertaining to the monitoring and reporting of the authorized take.

#### 1.4.5.1 *Monitoring Requirements*

The Navy's Monitoring Plan for the SOCAL Range Complex may be viewed at NMFS' website: http://www.nmfs.noaa.gov/pr/permits/incidental.htm. The Monitoring Plan for the SOCAL Range Complex has been designed as a collection of focused "studies" (described fully in the SOCAL Monitoring Plan) to gather data that will support assessment of the following questions:

(1) Are marine mammals and sea turtles exposed to MFAS, especially at levels associated with adverse effects (i.e., based on NMFS' criteria for behavioral harassment, TTS, or PTS)? If so, at what levels are they exposed?

(2) If marine mammals and sea turtles are exposed to MFAS in the SOCAL Range Complex, do they redistribute geographically as a result of continued exposure? If so, how long does the redistribution last?

(3) If marine mammals and sea turtles are exposed to MFAS, what are their behavioral responses to various levels?

(4) What are the behavioral responses of marine mammals and sea turtles that are exposed to explosives at specific levels?

(5) Is the Navy's suite of mitigation measures for MFAS and explosives (e.g., PMAP, major exercise measures agreed to by the Navy through permitting) effective at avoiding TTS, injury, and mortality of marine mammals and sea turtles?

Data gathered in these studies will be collected by qualified, professional marine mammal biologists that are experts in their field. They will use a combination of the following methods to collect data:

- Visual Surveys – Vessel and aerial
- Passive Acoustic Monitoring (PAM), including working with the passive acoustic detection capabilities of Navy's SOAR fixed range.
- Marine Mammal Observers (MMOs) on Navy Vessels
- Marine Mammal Tagging

In the five proposed study designs (all of which cover multiple years), the above methods will be used separately or in combination to monitor marine mammals in different combinations before, during, and after training activities utilizing MFAS/HFAS or explosive detonations.

Included in the Navy's Monitoring Plan is an Integrated Comprehensive Monitoring Plan (ICMP), which will provide the overarching coordination that will support compilation of data from range-specific monitoring plans (e.g., SOCAL Range Complex plan) as well as Navy funded research and development (R&D) studies. The ICMP will be used both as: 1) a planning

tool to focus Navy monitoring priorities (pursuant to ESA/MMPA requirements) across Navy Range Complexes and Exercises; and 2) an adaptive management tool, through the consolidation and analysis of the Navy's monitoring and watchstander data, as well as new information from other Navy programs (e.g., R&D), and other appropriate newly published information.

#### 1.4.5.2 *Reporting Requirements*

NMFS also worked with the Navy to establish new, more specific (since those included in the proposed rule for the SOCAL Range Complex), reporting requirements that will allow for consistent data collection across different Navy actions and also for the comparison of Navy data with the marine mammal data collected by others. These reporting requirements are designed to verify the extent of the Navy's specified activity and the implementation of the mitigation measures, as well as document any observations of marine mammal occurrence or responses made during the required monitoring period. These reporting requirements include specifications of data gathering for both Navy lookouts involved in training, as well as MMOs implementing the Monitoring Plan. Both annual and 5-yr comprehensive reports from the SOCAL Range Complex are required and the Navy is also required to compare the MFAS data collected in other Range Complexes.

### 1.4.6 Adaptive Management

As presented in the MMPA proposed rule for the SOCAL Range Complex, any final regulations governing the take of marine mammals incidental to Navy training exercises in the SOCAL Range Complex will contain an adaptive management component. NMFS' understanding of the effects of MFAS/HFAS and explosives on marine mammals is still in its relative infancy, and the science in this field continues to improve. These circumstances make the inclusion of an adaptive management component both valuable and necessary within the context of 5-year regulations for activities that have been associated with marine mammal mortality in certain circumstances and locations (though not the SOCAL Range Complex). The use of adaptive management will give NMFS the ability to consider new data from different sources to determine (in coordination with the Navy) on an annual basis if mitigation or monitoring measures should be modified or added (or deleted) if new data suggest that such modifications are appropriate (or are not appropriate) for subsequent annual LOAs. Following are some of the possible sources of applicable data:

- Results from the Navy's monitoring from the previous year (either from the SOCAL Range Complex or other locations)
- Findings of the Workshop that the Navy will convene in 2011 to analyze monitoring results to date, review current science, and recommend modifications, as appropriate to the monitoring protocols to increase monitoring effectiveness
- Compiled results of Navy funded research and development (R&D) studies (presented pursuant to the ICMP, which is discussed elsewhere in this document)
- Results from specific stranding investigations (either from the SOCAL Range Complex or other locations, and involving coincident MFAS/HFAS of explosives training or not involving coincident use)
- Results from the Long Term Prospective Study described below

- Results from general marine mammal and sound research (funded by the Navy (described below) or otherwise)

Mitigation measures could be modified or added (or deleted) if new data suggests that such modifications would have (or do not have) a reasonable likelihood of accomplishing the goals of any mitigation laid out in the SOCAL Range Complex final rule and if the measures are practicable. NMFS would also coordinate with the Navy to modify or add to (or delete) the existing monitoring requirements if the new data suggest that the addition or deletion of a particular measure would more effectively accomplish the goals of monitoring laid out in the final rule. The reporting requirements associated with the final rule would be designed to provide NMFS with monitoring data from the previous year to allow NMFS to consider the data and issue annual LOAs. NMFS and the Navy propose to meet annually to discuss the monitoring reports, Navy R&D developments, and current science and whether mitigation or monitoring modifications are appropriate.

# CHAPTER 2 – ALTERNATIVES INCLUDING THE PROPOSED ACTION

## 2.1 **No Action Alternative: Navy Mitigation Measures**

The No Action Alternative consists of NMFS issuing regulations, a 2009 LOA, and future LOAs as appropriate, that require the Navy to implement the mitigation measures proposed in the Navy's application for incidental take regulations and an LOA with no changes or additions. Note that the No Action alternative for purposes of this EA is distinct from the No Action alternative considered by NMFS in adopting the SOCAL Range Final EIS. Under that No Action alternative, should NMFS be unable to reach required findings under the MMPA, regulations and an LOA would not be issued. As described earlier, this Mitigation EA assumes the MMPA findings can be made and that regulations and an LOA will be issued, requiring that NMFS set forth the means of effecting the least practicable adverse impact (i.e., mitigation measures).

The Navy's standard protective measures associated with each of the specified activities described earlier in this Mitigation EA are listed below. Note that the Navy also developed, and included in their application, a general measure specifically designed for use in both exercise planning and exercise implementation when certain physical and environmental factors that have been associated with sonar and marine mammal strandings are present in their aggregate. However, the factors the Navy analyzed and constructed the measure around do not exist in their aggregate in the SOCAL Range Complex, and therefore the measure is not applicable in the SOCAL Range Complex. Because of public interest and concern and the fact that the general measure falls into a larger category of measures discussed in section 4.3, the measure is described and discussed in Section 4.3.

### 2.1.1 Navy's General SOCAL Maritime Measures for All Training at Sea:

#### 2.1.1.1 Personnel Training (for all Training Types)

(A) All commanding officers (COs), executive officers (XOs), lookouts, Officers of the Deck (OODs), junior OODs (JOODs), maritime patrol aircraft aircrews, and Anti-submarine Warfare (ASW)/Mine Warfare (MIW) helicopter crews shall complete the NMFS-approved Marine Species Awareness Training (MSAT) by viewing the U.S. Navy MSAT digital versatile disk (DVD). All bridge lookouts shall complete both parts one and two of the MSAT; part two is optional for other personnel.

(B) Navy lookouts shall undertake extensive training in order to qualify as a watchstander in accordance with the Lookout Training Handbook (Naval Education and Training Command [NAVEDTRA] 12968-D).

(C) Lookout training shall include on-the-job instruction under the supervision of a qualified, experienced lookout. Following successful completion of this supervised training period, lookouts shall complete the Personal Qualification Standard Program, certifying that they have demonstrated the necessary skills (such as detection and reporting of partially submerged objects). Personnel being trained as lookouts can be counted among required lookouts as long as supervisors monitor their progress and performance.

(D) Lookouts shall be trained in the most effective means to ensure quick and effective communication within the command structure in order to facilitate implementation of mitigation measures if marine species are spotted.

2.1.1.2 Operating Procedures and Collision Avoidance

(A) Prior to major exercises, a Letter of Instruction, Mitigation Measures Message or Environmental Annex to the Operational Order shall be issued to further disseminate the personnel training requirement and general marine species mitigation measures.

(B) COs shall make use of marine species detection cues and information to limit interaction with marine species to the maximum extent possible consistent with safety of the ship.

(C) While underway, surface vessels shall have at least two lookouts with binoculars; surfaced submarines shall have at least one lookout with binoculars. Lookouts already posted for safety of navigation and man-overboard precautions may be used to fill this requirement. As part of their regular duties, lookouts will watch for and report to the OOD the presence of marine mammals.

(D) On surface vessels equipped with a mid-frequency active sensor, pedestal mounted "Big Eye" (20x110) binoculars shall be properly installed and in good working order to assist in the detection of marine mammals in the vicinity of the vessel.

(E) Personnel on lookout shall employ visual search procedures employing a scanning methodology in accordance with the Lookout Training Handbook (NAVEDTRA 12968-D).

(F) After sunset and prior to sunrise, lookouts shall employ Night Lookout Techniques in accordance with the Lookout Training Handbook. (NAVEDTRA 12968-D).

(G) While in transit, naval vessels shall be alert at all times, use extreme caution, and proceed at a "safe speed" so that the vessel can take proper and effective action to avoid a collision with any marine animal and can be stopped within a distance appropriate to the prevailing circumstances and conditions.

(H) When marine mammals have been sighted in the area, Navy vessels shall increase vigilance and take reasonable and practicable actions to avoid collisions and activities that might result in close interaction of naval assets and marine mammals. Actions may include changing speed and/or direction and are dictated by environmental and other conditions (e.g., safety, weather).

(I) Floating weeds and kelp, algal mats, clusters of seabirds, and jellyfish are good indicators of marine mammal presence. Therefore, where these circumstances are present, the Navy shall exercise increased vigilance in watching for marine mammals.

(J) Navy aircraft participating in exercises at sea shall conduct and maintain, when operationally feasible and safe, surveillance for marine mammals as long as it does not violate safety constraints or interfere with the accomplishment of primary operational duties. Marine mammal detections shall be immediately reported to assigned Aircraft Control Unit for further dissemination to ships in the vicinity of the marine species as appropriate when it is reasonable to conclude that the course of the ship will likely result in a closing of the distance to the detected marine mammal.

(K) All vessels shall maintain logs and records documenting training operations should they be required for event reconstruction purposes. Logs and records will be kept for a period of 30 days following completion of a major training exercise.

### 2.1.2 Navy's Measures for MFAS Operations

#### 2.1.2.1 Personnel Training (for MFAS Operations):

(A) All lookouts onboard platforms involved in ASW training events shall review the NMFS-approved Marine Species Awareness Training material prior to use of mid-frequency active sonar.

(B) All COs, XOs, and officers standing watch on the bridge shall have reviewed the Marine Species Awareness Training material prior to a training event employing the use of mid-frequency active sonar.

(C) Navy lookouts shall undertake extensive training in order to qualify as a watchstander in accordance with the Lookout Training Handbook (Naval Educational Training [NAVEDTRA], 12968-D).

(D) Lookout training shall include on-the-job instruction under the supervision of a qualified, experienced watchstander. Following successful completion of this supervised training period, lookouts shall complete the Personal Qualification Standard program, certifying that they have demonstrated the necessary skills (such as detection and reporting of partially submerged objects). This does not forbid personnel being trained as lookouts from being counted as those listed in previous measures so long as supervisors monitor their progress and performance.

(E) Lookouts shall be trained in the most effective means to ensure quick and effective communication within the command structure in order to facilitate implementation of mitigation measures if marine species are spotted.

2.1.2.2 Lookout and Watchstander Responsibilities:

(A) On the bridge of surface ships, there shall always be at least three people on watch whose duties include observing the water surface around the vessel.

(B) All surface ships participating in ASW training events shall, in addition to the three personnel on watch noted previously, have at all times during the exercise at least two additional personnel on watch as marine mammal lookouts.

(C) Personnel on lookout and officers on watch on the bridge shall have at least one set of binoculars available for each person to aid in the detection of marine mammals.

(D) On surface vessels equipped with mid-frequency active sonar, pedestal mounted "Big Eye" (20x110) binoculars shall be present and in good working order to assist in the detection of marine mammals in the vicinity of the vessel.

(E) Personnel on lookout shall employ visual search procedures employing a scanning methodology in accordance with the Lookout Training Handbook (NAVEDTRA 12968-D).

(F) After sunset and prior to sunrise, lookouts shall employ Night Lookouts Techniques in accordance with the Lookout Training Handbook.

(G) Personnel on lookout shall be responsible for reporting all objects or anomalies sighted in the water (regardless of the distance from the vessel) to the Officer of the Deck, since any object or disturbance (e.g., trash, periscope, surface disturbance, discoloration) in the water may be indicative of a threat to the vessel and its crew or indicative of a marine species that may need to be avoided as warranted.

2.1.2.3 Operating Procedures:

(A) Navy will distribute final mitigation measures contained in the LOA and the Incidental take statement of NMFS' biological opinion to the Fleet.

(B) COs shall make use of marine species detection cues and information to limit interaction with marine species to the maximum extent possible consistent with safety of the ship.

(C) All personnel engaged in passive acoustic sonar operation (including aircraft, surface ships, or submarines) shall monitor for marine mammal vocalizations and report the detection of any marine mammal to the appropriate watch station for dissemination and appropriate action.

(D) During mid-frequency active sonar operations, personnel shall utilize all available sensor and optical systems (such as night vision goggles) to aid in the detection of marine mammals.

(E) Navy aircraft participating in exercises at sea shall conduct and maintain, when operationally feasible and safe, surveillance for marine species of concern as long as it does not violate safety constraints or interfere with the accomplishment of primary operational duties.

(F) Aircraft with deployed sonobuoys shall use only the passive capability of sonobuoys when marine mammals are detected within 200 yds (183 m) of the sonobuoy.

(G) Marine mammal detections shall be immediately reported to assigned Aircraft Control Unit for further dissemination to ships in the vicinity of the marine species as appropriate where it is reasonable to conclude that the course of the ship will likely result in a closing of the distance to the detected marine mammal.

(H) Safety Zones—When marine mammals are detected by any means (aircraft, shipboard lookout, or acoustically) within or closing to inside 1,000 yds (914 m) of the sonar dome (the bow), the ship or submarine shall limit active transmission levels to at least 6 decibels (dB) below normal operating levels.

(1) Ships and submarines shall continue to limit maximum transmission levels by this 6-dB factor until the animal has been seen to leave the area, has not been detected for 30 minutes, or the vessel has transited more than 2,000 yds (1829 m) beyond the location of the last detection.

(2) Should a marine mammal be detected within or closing to inside 500 yds (457 m) of the sonar dome, active sonar transmissions shall be limited to at least 10 dB below the equipment's normal operating level. Ships and submarines shall continue to limit maximum ping levels by this 10-dB factor until the animal has been seen to leave the area, has not been detected for 30 minutes, or the vessel has transited more than 2,000 yds (457 m) beyond the location of the last detection.

(3) Should the marine mammal be detected within or closing to inside 200 yds (183 m) of the sonar dome, active sonar transmissions shall cease. Sonar shall not resume until the animal has been seen to leave the area, has not been detected for 30 minutes, or the vessel has transited more than 2,000 yds (457 m) beyond the location of the last detection.

(4) Special conditions applicable for dolphins and porpoises only: If, after conducting an initial maneuver to avoid close quarters with dolphins or porpoises, the

OOD concludes that dolphins or porpoises are deliberately closing to ride the vessel's bow wave, no further mitigation actions are necessary while the dolphins or porpoises continue to exhibit bow wave riding behavior.

(5) If the need for power-down should arise as detailed in "Safety Zones" above, the Navy shall follow the requirements as though they were operating at 235 dB—the normal operating level (i.e., the first power-down will be to 229 dB, regardless of what level above 235 dB active sonar was being operated).

(I) Prior to start up or restart of active sonar, operators will check that the Safety Zone radius around the sound source is clear of marine mammals.

(J) Active sonar levels (generally)—Navy shall operate active sonar at the lowest practicable level, not to exceed 235 dB, except as required to meet tactical training objectives.

(K) Helicopters shall observe/survey the vicinity of an ASW training event for 10 minutes before the first deployment of active (dipping) sonar in the water.

(L) Helicopters shall not dip their active sonar within 200 yds (183 m) of a marine mammal and shall cease pinging if a marine mammal closes within 200 yds (183 m) after pinging has begun.

(M) Submarine sonar operators shall review detection indicators of close-aboard marine mammals prior to the commencement of ASW training events involving active mid-frequency sonar.

(N) Night vision goggles shall be available to all ships and air crews, for use as appropriate.

2.1.3 Navy's Measures for Underwater Detonations

2.1.3.1 Surface-to-Surface Gunnery (explosive rounds)

(A) Lookouts shall visually survey for floating weeds and kelp. Intended impact (i.e., where the Navy is aiming) shall not be within 600 yds (585 m) of known or observed floating weeds and kelp, and algal mats.

(B) For exercises using targets towed by a vessel or aircraft, target-towing vessels/aircraft shall maintain a trained lookout for marine mammals, if applicable. If a marine mammal is sighted in the vicinity, the tow aircraft/vessel shall immediately notify the firing vessel, which shall suspend the exercise until the area is clear.

(C) A 600-yard radius buffer zone shall be established around the intended target.

(D) From the intended firing position, trained lookouts shall survey the buffer zone for marine mammals prior to commencement and during the exercise as long as practicable.

(E) The exercise shall be conducted only when the buffer zone is visible and marine mammals are not detected within it.

2.1.3.2 Surface-to-Surface Gunnery (non-explosive rounds)

(A) Lookouts shall visually survey for floating weeds and kelp, and algal mats. Intended impact will not be within 200 yds (183 m) of known or observed floating weeds and kelp, and algal mats.

(B) A 200-yd (183 m) radius buffer zone shall be established around the intended target.

(C) From the intended firing position, trained lookouts shall survey the buffer zone for marine mammals prior to commencement and during the exercise as long as practicable.

(D) If applicable, target towing vessels shall maintain a lookout. If a marine mammal is sighted in the vicinity of the exercise, the tow vessel shall immediately notify the firing vessel in order to secure gunnery firing until the area is clear.

(E) The exercise shall be conducted only when the buffer zone is visible and marine mammals are not detected within the target area and the buffer zone.

2.1.3.3 Surface-to-Air Gunnery (explosive and non-explosive rounds)

(A) Vessels shall orient the geometry of gunnery exercises in order to prevent debris from falling in the area of sighted marine mammals.

(B) Vessels will expedite the recovery of any parachute deploying aerial targets to reduce the potential for entanglement of marine mammals.

(C) Target towing aircraft shall maintain a lookout, if applicable. If a marine mammal is sighted in the vicinity of the exercise, the tow aircraft shall immediately notify the firing vessel in order to secure gunnery firing until the area is clear.

2.1.3.4 Air-to-Surface Gunnery (explosive and non-explosive rounds)

(A) If surface vessels are involved, lookouts will visually survey for floating kelp in the target area. Impact shall not occur within 200 yds (183 m) of known or observed floating weeds and kelp or algal mats.

(B) A 200 yd (183 m) radius buffer zone shall be established around the intended target.

(C) If surface vessels are involved, lookout(s) shall visually survey the buffer zone for marine mammals prior to and during the exercise.

(D) Aerial surveillance of the buffer zone for marine mammals shall be conducted prior to commencement of the exercise. Aircraft crew/pilot shall maintain visual watch during

exercises. Release of ordnance through cloud cover is prohibited: aircraft must be able to actually see ordnance impact areas.

(E) The exercise shall be conducted only if marine mammals and are not visible within the buffer zone.

2.1.3.5 Small Arms Training - (grenades, explosive and non-explosive rounds)

Lookouts will visually survey for floating weeds or kelp, algal mats, and marine mammals. Weapons shall not be fired in the direction of known or observed floating weeds or kelp, algal mats, or marine mammals.

2.1.3.6 Air-to-Surface At-sea Bombing Exercises (explosive and non-explosive):

(A) If surface vessels are involved, trained lookouts shall survey for floating kelp and marine mammals. Ordnance shall not be targeted to impact within 1,000 yds (914 m) of known or observed floating kelp or marine mammals.

(B) A 1,000 yd (914 m) radius buffer zone shall be established around the intended target.

(C) Aircraft shall visually survey the target and buffer zone for marine mammals prior to and during the exercise. The survey of the impact area shall be made by flying at 1,500 ft (152 m) or lower, if safe to do so, and at the slowest safe speed. Release of ordnance through cloud cover is prohibited: aircraft must be able to actually see ordnance impact areas. Survey aircraft should employ most effective search tactics and capabilities.

(D) The exercise will be conducted only if marine mammals are not visible within the buffer zone.

2.1.3.7 Air-to-Surface Missile Exercises (explosive and non-explosive):

(A) Ordnance shall not be targeted to impact within 1,800 yds (1646 m) of known or observed floating kelp.

(B) Aircraft shall visually survey the target area for marine mammals. Visual inspection of the target area shall be made by flying at 1,500 (457 m) feet or lower, if safe to do so, and at slowest safe speed. Firing or range clearance aircraft must be able to actually see ordnance impact areas. Explosive ordnance shall not be targeted to impact within 1,800 yds (1646 m) of sighted marine mammals.

2.1.3.8 Demolitions, Mine Warfare, and Mine Countermeasures (up to a 20-lb NEW charge):

(A) Exclusion Zones – All Demolitions, Mine Warfare and Mine Countermeasures Operations involving the use of explosive charges must include exclusion zones for marine

mammals to prevent physical and/or acoustic effects to those species. These exclusion zones shall extend in a 700-yard arc radius around the detonation site.

(B) Pre-Exercise Surveys - For Demolition and Ship Mine Countermeasures Operations, pre-exercise survey shall be conducted within 30 minutes prior to the commencement of the scheduled explosive event. The survey may be conducted from the surface, by divers, and/or from the air, and personnel shall be alert to the presence of any marine mammal. Should a marine mammal be present within the survey area, the exercise shall be paused until the animal voluntarily leaves the area. The Navy shall suspend detonation exercises and ensure the area is clear for a full 30 minutes prior to detonation. Personnel shall record any marine mammal observations during the exercise.

(C) Post-Exercise Surveys - Surveys within the same radius shall also be conducted within 30 minutes after the completion of the explosive event.

(D) Reporting - If there is evidence that a marine mammal may have been stranded, injured or killed by the action, that activity shall be immediately suspended and the situation immediately reported by the participating unit to the Officer in Charge of the Exercise (OCE), who will follow Navy procedures for reporting the incident to Commander, Pacific Fleet, Commander, Third Fleet, Commander, Navy Region Southwest, Environmental Director, and the chain-of-command. The situation shall also be reported to NMFS (see Stranding Plan for details).

2.1.3.9 Mine Laying Training

Initial target points shall be briefly surveyed prior to inert ordnance (no live ordnance used) release from an aircraft to ensure the intended drop area is clear of marine mammals. To the extent feasible, the Navy shall retrieve inert mine shapes dropped during Mining Operations.

2.1.3.10 Sinking Exercise:

(A) All weapons firing shall be conducted during the period 1 hour after official sunrise to 30 minutes before official sunset.

(B) An exclusion zone with a radius of 1.5 nm shall be established around each target. This 1.5 nm zone includes a buffer of 0.5 nm to account for errors, target drift, and animal movement. In addition to the 1.5 nm exclusion zone, a further safety zone, which extends from the exclusion zone at 1.5 nm out an additional 0.5 nm, shall be surveyed. Together, the zones (exclusion and safety) extend out 2 nm from the target.

(C) A series of surveillance over-flights shall be conducted within the exclusion and the safety zones, prior to and during the exercise, when feasible. Survey protocol shall be as follows:

(1) Overflights within the exclusion zone shall be conducted in a manner that optimizes the surface area of the water observed. This may be accomplished through the use of the Navy's Search and Rescue Tactical Aid, which provides the best search

altitude, ground speed, and track spacing for the discovery of small, possibly dark objects in the water based on the environmental conditions of the day. These environmental conditions include the angle of sun inclination, amount of daylight, cloud cover, visibility, and sea state.

(2) All visual surveillance activities shall be conducted by Navy personnel trained in visual surveillance. At least one member of the mitigation team shall have completed the Navy's marine mammal training program for lookouts.

(3) In addition to the overflights, the exclusion zone shall be monitored by passive acoustic means, when assets are available. This passive acoustic monitoring would be maintained throughout the exercise. Potential assets include sonobuoys, which can be utilized to detect any vocalizing marine mammals (particularly sperm whales) in the vicinity of the exercise. The sonobuoys shall be re-seeded as necessary throughout the exercise. Additionally, passive sonar onboard submarines may be utilized to detect any vocalizing marine mammals in the area. The OCE would be informed of any aural detection of marine mammals and would include this information in the determination of when it is safe to commence the exercise.

(4) On each day of the exercise, aerial surveillance of the exclusion and safety zones shall commence 2 hours prior to the first firing.

(5) The results of all visual, aerial, and acoustic searches shall be reported immediately to the OCE. No weapons launches or firing may commence until the OCE declares the safety and exclusion zones free of marine mammals.

(6) If a protected species observed within the exclusion zone is diving, firing shall be delayed until the animal is re-sighted outside the exclusion zone, or 30 minutes have elapsed. After 30 minutes, if the animal has not been re-sighted it would be assumed to have left the exclusion zone.

(7) During breaks in the exercise of 30 minutes or more, the exclusion zone shall again be surveyed for any protected species. If marine mammals are sighted within the exclusion zone, the OCE shall be notified, and the procedure described above would be followed.

(8) Upon sinking of the vessel, a final surveillance of the exclusion zone shall be monitored for 2 hours, or until sunset, to verify that no marine mammals were harmed.

(D) Aerial surveillance shall be conducted using helicopters or other aircraft based on necessity and availability. The Navy has several types of aircraft capable of performing this task; however, not all types are available for every exercise. For each exercise, the available asset best suited for identifying objects on and near the surface of the ocean would be used. These aircraft would be capable of flying at the slow safe speeds necessary to enable viewing of marine vertebrates with unobstructed, or minimally obstructed, downward and outward visibility. The exclusion and safety zone surveys may be cancelled in the event that a mechanical problem, emergency search and rescue, or other similar and unexpected event preempts the use of one of the aircraft onsite for the exercise.

(E) Where practicable, the Navy shall conduct the exercise in sea states that are ideal for marine mammal sighting, i.e., Beaufort Sea State 3 or less. In the event of a 4 or above, survey efforts shall be increased within the zones. This shall be accomplished through the use of an additional aircraft, if available, and conducting tight search patterns.

(F) The exercise shall not be conducted unless the exclusion zone can be adequately monitored visually.

(G) In the event that any marine mammals are observed to be harmed in the area, a detailed description of the animal shall be taken, the location noted, and if possible, photos taken. This information shall be provided to NMFS via the Navy's regional environmental coordinator for purposes of identification (see the Stranding Plan for detail).

(H) An after action report detailing the exercise's time line, the time the surveys commenced and terminated, amount, and types of all ordnance expended, and the results of survey efforts for each event shall be submitted to NMFS.

2.1.3.11 Extended Echo Ranging/Improved Extended Echo Ranging (EER/IEER/AEER):

(A) Crews shall conduct visual reconnaissance of the drop area prior to laying their intended sonobuoy pattern. This search shall be conducted at an altitude below 457 m (1500 ft) at a slow speed, if operationally feasible and weather conditions permit. In dual aircraft operations, crews are allowed to conduct coordinated area clearances.

(B) For IEER (AN/SSQ-110A), crews shall conduct a minimum of 30 minutes of visual and aural monitoring of the search area prior to commanding the first post detonation. This 30-minute observation period may include pattern deployment time.

(C) For any part of the briefed pattern where a post (source/receiver sonobuoy pair) will be deployed within 914 m (1,000 yd) of observed marine mammal activity, the Navy shall deploy the receiver ONLY and monitor while conducting a visual search. When marine mammals are no longer detected within 914 m (1,000 yd) of the intended post position, the Navy shall co-locate the explosive source sonobuoy (AN/SSQ-110A) (source) with the receiver.

(D) When able, Navy crews shall conduct continuous visual and aural monitoring of marine mammal activity. This is to include monitoring of own-aircraft sensors from first sensor placement to checking off station and out of RF range of these sensors.

(E) Aural Detection - If the presence of marine mammals is detected aurally, then that shall cue the Navy aircrew to increase the diligence of their visual surveillance. Subsequently, if no marine mammals are visually detected, then the crew may continue multi-static active search.

(F) Visual Detection - If marine mammals are visually detected within 914 m (1,000 yd) of the explosive source sonobuoy (AN/SSQ-110A) intended for use, then that payload shall not be detonated. Aircrews may utilize this post once the marine mammals have not been re-sighted for 30 minutes, or are observed to have moved outside the 914 m (1,000 yd) safety buffer. Aircrews may shift their multi-static active search to another post, where marine mammals are outside the 914 m (1,000 yd) safety buffer.

(G) For IEER (AN/SSQ-110A), aircrews shall make every attempt to manually detonate the unexploded charges at each post in the pattern prior to departing the operations area by using the "Payload 1 Release" command followed by the "Payload 2 Release" command. Aircrews shall refrain from using the "Scuttle" command when two payloads remain at a given post. Aircrews will ensure that a 914 m (1,000 yd) safety buffer, visually clear of marine mammals, is maintained around each post as is done during active search operations.

(H) Aircrews shall only leave posts with unexploded charges in the event of a sonobuoy malfunction, an aircraft system malfunction, or when an aircraft must immediately depart the area due to issues such as fuel constraints, inclement weather, and in-flight emergencies. In these cases, the sonobuoy will self-scuttle using the secondary or tertiary method.

(I) The Navy shall ensure all payloads are accounted for. Explosive source sonobuoys (AN/SSQ-110A) that can not be scuttled shall be reported as unexploded ordnance via voice communications while airborne, then upon landing via naval message.

(J) Marine mammal monitoring shall continue until out of own-aircraft sensor range.

## 2.2 **Alternative 1 (Preferred Alternative)**

Alternative 1 is the issuance of regulations, a 2009 LOA, and subsequent LOAs as appropriate, to the Navy requiring the Navy to implement all of the mitigation measures included in Section 2.1 - No Action Alternative plus the Stranding Response Plan developed by NMFS and the Navy. This is NMFS' preferred alternative.

Note that the SOCAL Stranding Response Plan, which is discussed below, is a stand-alone document that is currently available on the NMFS website: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications, and is incorporated herein by reference. Under this alternative, NMFS' final rule, 2009 LOA, and associated LOAs as appropriate, would indicate that the Navy is required to abide by the SOCAL Stranding Response Plan. Additionally, the primary requirements of the SOCAL Stranding Response Plan would be summarized in the final rule and subsequent LOA(s), as indicated below. The measures described below also are included in the Final EIS and are considered part of the action included in the preferred alternative identified by Navy in the December 2008 Final EIS

(i) Shutdown Procedures – When an Uncommon Stranding Event (USE – defined in 50 C.F.R. § 216.291) occurs during a Major Training Exercise (MTE) (as defined in the Stranding Plan, meaning including Sustainment, SHAREM, IAC2, JTFEX, or COMPTUEX) in the SOCAL Range Complex, the Navy shall implement the procedures described below.

(A) The Navy shall implement a Shutdown (defined in the Stranding Response Plan) when advised by a NMFS Office of Protected Resources Headquarters Senior Official designated in the SOCAL Range Complex Stranding Communication Protocol that a USE involving live animals has been identified and that at least one live animal is

located in the water. NMFS and Navy shall communicate, as needed, regarding the identification of the USE and the potential need to implement shutdown procedures.

(B) Any shutdown in a given area shall remain in effect in that area until NMFS advises the Navy that the subject(s) of the USE at that area die or are euthanized, or that all live animals involved in the USE at that area have left the area (either of their own volition or herded).

(C) If the Navy finds an injured or dead marine mammal floating at sea during an MTE, the Navy shall notify NMFS immediately or as soon as operational security considerations allow. The Navy shall provide NMFS with species or description of the animal (s), the condition of the animal(s) including carcass condition if the animal(s) is/are dead), location, time of first discovery, observed behaviors (if alive), and photo or video (if available). Based on the information provided, NMFS shall determine if, and advise the Navy whether a modified shutdown is appropriate on a case-by-case basis.

(D) In the event, following a USE, that: a) qualified individuals are attempting to herd animals back out to the open ocean and animals are not willing to leave, or b) animals are seen repeatedly heading for the open ocean but turning back to shore, NMFS and the Navy shall coordinate (including an investigation of other potential anthropogenic stressors in the area) to determine if the proximity of MFAS/HFAS activities or explosive detonations, though farther than 14 nm from the distressed animal(s), is likely decreasing the likelihood that the animals return to the open water. If so, NMFS and the Navy shall further coordinate to determine what measures are necessary to further minimize that likelihood and implement those measures as appropriate.

(ii) Within 72 hours of NMFS notifying the Navy of the presence of a USE, the Navy shall provide available information to NMFS (per the SOCAL Range Complex Communication Protocol) regarding the location, number and types of acoustic/explosive sources, direction and speed of units using MFAS/HFAS, and marine mammal sightings information associated with training activities occurring within 80 nm (148 km) and 72 hours prior to the USE event. Information not initially available regarding the 80 nm (148 km), 72 hours, period prior to the event shall be provided as soon as it becomes available. The Navy shall provide NMFS investigative teams with additional relevant unclassified information as requested, if available.

(iii) Memorandum of Agreement (MOA) – The Navy and NMFS shall develop a MOA, or other mechanism consistent with federal fiscal law requirements (and all other applicable laws), that will establish a framework whereby the Navy can (and provide the Navy examples of how they can best) assist NMFS with stranding investigations in certain circumstances.

## 2.3 **Alternative 2**

NMFS considered a variety of reasonable potential mitigation measures that have been recommended in past public comments on activities involving sound in the water, submitted during the comment period on the SOCAL Range Complex proposed rule, discussed within

NMFS as part of the proposed rulemaking for the SOCAL Range Complex, or considered by the Navy in the SOCAL Range Complex EIS but not included as preferred measures in the Navy's proposed action. Alternative 2 is the issuance of regulations, a 2009 LOA, and subsequent LOAs as appropriate to the Navy that requires all of the mitigation measures identified in Alternative 1, but with the addition of a subset of the additional suite of mitigation measures considered herein. Below is a description of the reasonable mitigation measures that NMFS considered in Alternative 2. These measures are broadly grouped into general mitigation measures, with lists of more specific measures that have been recommended by the public. Note that the term 'public comment' as used here includes comments received from other federal and state agencies during public comment periods.

Many of the mitigation measures considered by NMFS for the SOCAL Range Complex are measures that could apply broadly to other Navy actions and the material included in this document may be used to assist in the analysis of mitigation options for other Navy actions. Also note that several of the measures are specific to MFAS (versus HFAS), as MFAS sources are responsible for the majority of the estimated takes presented in Table 8.

### 2.3.1 Seasonal and/or Geographic Limitations

A seasonal or geographic limitation is a requirement that an authorized entity limit or avoid conducting the specified activity in specific areas where marine mammals are *known* to be concentrated, either regularly or to perform a specifically important biological function (such as breeding, calving, or feeding), either all of the time or during specific times of the year (or day). Following are the general types of seasonal and geographic limitations analyzed by NMFS in this Mitigation EA. Note the focus here is on MFAS, as those sources are responsible for the majority of estimated takes presented for MFAS/HFAS in Table 8.

- Disallow any use of MFAS in all areas where specific marine mammal species are known to be conducting specifically important behaviors during all of the time period that the marine mammals are conducting the behavior. Or, the following sub-categories of mitigation could be utilized:

    - Disallow use of MFAS in a subset of the areas described above
    - Disallow use of MFAS for a subset of the time described above
    - Disallow use of MFAS in a subset of the areas and times described above

- Limit use (i.e., require reduced use, either in the planning stages or at the scene) of MFAS in all areas where specific marine mammal species are known to be conducting specifically important behaviors during all of the time period that the marine mammals are conducting the behavior. Or, the following sub-categories of mitigation could be used:

    - Limit use of MFAS in a subset of the areas described above
    - Limit use of MFAS for a subset of the time described above
    - Limit use of MFAS in a subset of the areas and times described above

Following are some specific examples of seasonal or geographic restrictions that NMFS considers in the SOCAL Range Complex:

- Disallowing or limiting MFAS use in coastal areas (within 200-m isobath, 12 nm, 13.5 nm, or 25 nm from shore)

- Disallowing or limiting MFAS use when the factors that have been associated with marine mammal strandings and sonar (such as the presence of more than 3 ships operating in the same area for an extended amount of time, constricted channels or embayments, steep bathymetry, and the presence of significant surface ducts) or other scenarios potentially associated with potential danger to marine mammals (embayments) are present in their aggregate or separately.

- Disallowing or limiting MFAS use in the vicinity of physical or environmental features likely to (or that could potentially) be associated with higher concentrations of marine mammals (or specific marine mammal occurrences themselves), such as:
    - Large seamounts or submarine canyons for beaked whales
    - Fronts and other major oceanographic features
    - Aggregations of beaked whales or mysticetes (such as blue whales)
    - Migrating gray whales (in season)

- Disallowing or limiting MFAS use in areas of known higher marine mammal density (some commenters recommended Tanner and Cortes Banks) or where models estimate higher marine mammal takes.

### 2.3.2 Additional Detection Methods to Implement Mitigation (Shutdown Zones)

Visual observations of marine mammals by Navy lookouts stationed on the decks of surface vessels are currently the primary means of marine mammal detection for use in mitigation implementation. Aircraft and passive acoustic tools involved in training exercises also provide additional detection capabilities, when operationally feasible. A suite of other possible marine mammal detection tools are considered here by NMFS for regular use in the implementation of mitigation (shutdowns):

- Active Sonar (HFM3 or other)
- Additional Passive Sonar (sonobuoys, SQQ89, nodes, instrumented ranges, bottom-mounted sensors, or other)
- Radar
- Infrared technologies
- Additional platforms specifically for detection (aircraft, UAVs, Gliders)

These methods could be used either as dedicated equipment for the detection of marine mammals, or in conjunction with other uses as part of the ongoing Navy training.

In addition to being used all of the time for the detection of marine mammals for mitigation implementation, these additional types of detection methods could be used in different ways or for more specific circumstances, such as at night or in low visibility.

### 2.3.3 Use of Dedicated or Independent Marine Mammal Observers (MMOs) to Implement Mitigation

These measures include the use of dedicated or independent marine mammal observers that are not participating in the Navy exercises to detect marine mammals for the purpose of implementing the mitigation measures (including powerdowns and shutdowns). Considerations include the use of these MMOs either all of the time or during particular times of heightened concern. Related measures would require that the Navy conduct a study to compare the effectiveness of Navy lookouts to experienced MMOs and requiring that the Navy use standardized datasheets during Navy exercises to ensure consistency of data collection and comparability across observations.

### 2.3.4 Enlargement or Modification of Powerdown/Shutdown Zones of Hull-mounted Sonar

Currently, the Navy implements the following powerdowns and shutdowns: powerdown 6 dB (marine mammal closing to or within 1000 yds of source); powerdown additional 4 dB to 10 dB total (marine mammal closing to or within 500 yds of source); shutdown (marine mammal closing to or within 200 yds). There are multiple ways that powerdown or shutdown zones could be modified and following are some examples that NMFS has specifically considered under this alternative for potential use in the SOCAL Range Complex :

- Enlarged shutdown and powerdown zones for use at all times with MFAS (for example, 4 km, 2 km, or equivalent to the 154 dB SPL isopleth)

- Enlarged shutdown and powerdown zones for use when specific marine mammals are detected, such as:
    - Beaked whales
    - Feeding aggregations of large whales

- Use of a prolonged powerdown (i.e., MFAS operated at lower power) in certain circumstances, such as:
    - The presence of a strong surface duct
    - Nighttime or low visibility

### 2.3.5 Ramp Up of Sonar Source Prior to Full Power Operation

One method of potentially reducing impacts to marine mammals is requiring the Navy to "ramp up" the sonar source, which means that the source is turned on at a lower level and then slowly turned up until it is operating at the level needed to conduct the training exercise. This measure is based on the supposition that many marine mammals avoid sonar sources and that they will gradually move farther away from the source as it is gradually turned up and thereby be

exposed to lower levels than if it were turned immediately on to the full level required during a particular activity.

2.3.6 Halting of MFAS Use in the Event of a Marine Mammal Stranding until Cause is Determined

This measure would require the Navy to cease all MFAS use in the event of a stranding until the definitive cause of the stranding was determined.

2.3.7 Suspension of MFAS Training at Night, or During Low Visibility or Surface Duct

This measure would require the suspension of MFAS use at night, during periods of low visibility (including fog, high Beaufort Sea State, or dusk and dawn), or when a strong surface duct is present.

2.3.8 Avoidance of Federal and state marine protected areas, including the Channel Islands National Marine Sanctuary

This measure would disallow or restrict Navy active sonar or underwater detonations in federal and/or state marine protected areas, including the Channel Islands National Marine Sanctuary (CINMS) . Although specific additional state marine protected areas are not analyzed in this EA, this EA does include the approach to analysis that is followed in considering site-specific avoidance.

2.3.8 Delayed Restart of MFAS after Shutdown or Powerdown

Under this measures, NMFS would require the Navy to delay resumption of full operational sonar use following a power-down or shutdown for 30 minutes if the sighted animal can be identified to the species level and the species is not deep diving and 60 minutes if it cannot be identified or is known to be a member of a deep-diving species such as sperm and beaked whales.

2.3.10 Expansion of Exclusion Area Delineated for Use with Explosive Detonations

Currently, the Navy uses certain exclusion zones for different explosive types, which means that an area of a certain size around an explosive must be clear of marine mammals for a certain amount of time prior to the detonation of that explosive. For a few of the larger charges (MK-84s and MK-48s), the distance to the isopleth within which NMFS expects TTS would likely occur is larger than the distance that the Navy must ensure is clear prior to the initiation of some of the exercise types that utilize those larger charges (i.e., an animal could be within the distance from a source where TTS may occur, but outside of the distance that the Navy is required to 'clear' prior to detonation. NMFS considered requiring an enlarged exclusion zone for use with these larger charges.

2.3.11 Monitoring of Explosive Exclusion Area During Exercises

For some explosive detonations, the Navy's current mitigation requires clearance of an area prior to the initiation of an explosive exercise, but does not require continued monitoring of the area throughout the exercise (see 2.1.2). Under this measure, NMFS considered a requirement for Navy to continue monitoring the exclusion zone throughout the exercise and to take appropriate mitigation measures during the exercise should a marine mammals be spotted within that zone.

## 2.4 **Alternatives Considered but Eliminated**

Several additional potential "mitigation measures" were identified by NMFS or raised during the public comment period on the proposed SOCAL Range Complex rule. These measures were addressed in the SOCAL Range Complex Final EIS. However, for the reasons described below, these alternative measures were not appropriate for consideration as mitigation, and therefore were not included in Alternatives 1 or 2 of this mitigation EA. The rationale for eliminating them is presented below.

### 2.4.1 Scaling Back or Changing Specified Activities

NMFS considered the recommendations of some members of the public that the Navy:

- scale back the amount of training they will conduct,
- not expand the SOAR to establish a West Coast Shallow Water Training Range (SWTR) into the Tanner Bank Area or not use sound sources with a source level above 154 dB SPL
- not put an offshore shallow water minefield on Tanner Bank
- or use simulated electronic exercises instead of the real exercises described in the Navy's specified activities pursuant to their request for incidental take regulations and an LOA.

However, NMFS did not carry analysis of these recommendations further because the MMPA requires that NMFS make its findings based on the "specified activity" identified in an applicant's request, and reducing the overall amount of the activity specified by the applicant or replacing part of the specified activity with a completely different activity (training simulations) inherently changes the applicant's specified activity.

The Navy's SOCAL Range Complex Final EIS addresses but eliminates from more detailed consideration reduced training effort or use of simulated electronic exercises (see Chapter 5 of the SOCAL Range Complex FEIS). Sections 2.5.2.2 and 2.5.2.3 of the SOCAL Range Complex EIS and comment responses that would be included in NMFS' final rule specifically describe the factors that must be present to satisfy the Navy's purpose and need for the shallow water minefield and the SWTR, and also discuss the alternative sites that were considered with an explanation as to why these locations were considered by Navy to be most suitable. Similarly, the Navy's specified action includes the use of sound sources that have source levels above 154 dB, and Navy has indicated that they cannot accomplish their identified purpose and need without using the specified sound sources. Note that the Navy Final EIS also addresses and eliminated from further consideration alternatives related to relocation of the

SOCAL range complex. Given NMFS duties under MMPA regarding the specified activity, NMFS does not consider range relocation within the appropriate range of alternatives for NMFS action of analyzing mitigation measures for the specified activity.

While the Navy continues to research new ways to provide realistic training through simulation, simulated training does not fully develop the skills and capabilities necessary to attain appropriate military readiness; thus, such an alternative would also fail to meet the purpose and need of the proposed action for the SOCAL Range Complex. Simulators may assist in developing an understanding of certain basic skills and equipment operation, but cannot sufficiently capture the complexity and uncertainty of real-world training conditions, nor can they offer a complete picture of the detailed and instantaneous interaction within each command and among many commands and warfare communities that actual training at sea provides. The SOCAL Range Complex provides realistic training in the most relevant environments replicating the operational stresses of warfare. Current simulation technology cannot adequately replicate the multi-dimensional training (e.g., training for simultaneous air, surface and subsurface threats) necessary to adequately prepare the nation's Naval forces for combat. Furthermore, it does not provide for adequate anti-submarine warfare (ASW) training, which involves the use of MFA and HFA sonar, with the degree of fidelity necessary to develop and maintain proficiency. An alternative that would cause ASW skills to atrophy is not reasonable because it would put Naval forces at risk during combat.

### 2.4.2 Requirement that Foreign Navies Abide by U.S. Mitigation Measures in the SOCAL Range Complex

As described in the SOCAL Range Complex Final EIS, pursuant to the Navy's 2000 Policy for Environmental Compliance at Sea, the commander or officer in charge of a major exercise provides participating foreign units with a description of the measures to protect the environment required of similar U.S. units as early as reasonable in the exercise planning process and encourages them to comply. It is not within the power of the U.S. Navy to compel foreign sovereign immune vessels to adopt the U.S. mitigation measures and, therefore, NMFS did not consider this measure further. However, the Navy has indicated to NMFS that they strongly encourage foreign navies to abide by the same measures employed by the U.S. Navy.

### 2.4.3 Required Research and Development of Technology to Reduce MFAS Impacts

NMFS considered requiring the Navy to research and develop new technologies to better detect marine mammals and reduce impacts to marine mammals during MFAS use. However, the MMPA does not require that individuals who have applied for an incidental take regulations conduct research and develop new technologies prior to receiving an authorization and, therefore NMFS has not carried this proposed measure forward for analysis as part of an action alternative in this Mitigation EA.

However, NMFS has incorporated an adaptive management component into the SOCAL Range Complex rule which would allow for yearly review of Navy monitoring and current science that could influence (allow for the potential modification of) monitoring and mitigation measures in subsequent LOAs, if appropriate.

NMFS recognizes the importance of research, and notes that the Navy specifically addressed research in the SOCAL Range Complex Final EIS, and that the Navy's Record of Decision notes that Navy will continue to fund research efforts to develop associated data. NMFS encourages research on new or improved methods of marine mammal detection and on understanding the effects of Navy activities on marine mammals. The Navy continues to commit resources to marine mammal and related research efforts. A summary of the Navy's research plans is included in the FEIS, in NMFS' proposed rule, and in the Navy's Marine Mammal Monitoring Program for SOCAL, but these robust programs are not detailed here as the MMPA does not specifically require the conduct of research by applicants.

CHAPTER 3 – AFFECTED ENVIRONMENT

The affected environment for NMFS' decision consists of the marine mammals potentially taken by the Navy's specified activity and their habitats in the SOCAL Range Complex. This Mitigation EA tiers from the analysis presented in the SOCAL Range Complex Final EIS; Section 3.9 of that EIS specifically presents the "Marine Mammals" affected environment that is relevant to NMFS' proposed action.

CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES

This chapter includes an analysis of the environmental consequences associated with each of the three alternatives presented in Chapter 2. The environmental consequences of the underlying Navy action for the marine resources relevant to NMFS' authorization are presented in Chapter 3.9 of the SOCAL Range Complex of the Final EIS, and those consequences (e.g., number of estimated takes) are not reassessed here. Chapter 5 of the SOCAL Range Complex Final EIS presents an analysis of the majority of the mitigation alternatives assessed in this Mitigation EA. Therefore, this tiered Mitigation EA provides additional analyses that build upon the information presented in Chapter 5 of the FEIS, as well as the consequences associated with 2 measures for underwater explosive detonations that were not analyzed in the SOCAL Range Complex Final EIS.

In this EA, NMFS expands the analysis of the potential benefit or lack of benefit of potential marine mammal mitigation measures. The approach to this assessment is founded on the purposes of mitigation described in items a) through f) of Section 1.3 above. Where a benefit to marine mammals is identified in the assessment, NMFS has evaluated the practicability of the measure in greater detail. Note that practicability is not described in additional detail herein if the benefit of a measure to marine mammals is not clear, as NMFS would not seek to require measures with no identified benefit to the affected marine mammal species or their habitats; in these cases the practicability of the measure is as presented in Chapter 5 of the Final EIS.

## 4.1 **No Action Alternative: Navy Mitigation Measures**

As described in Chapter 2 of this Mitigation EA, personnel training and monitoring for the presence of marine mammals for the implementation of the powerdown and shutdown zones are a large part of the Navy's standard protective measures. Section 2.1 presents the suite of

specific mitigation measures that would be required by NMFS as part of the MMPA rulemaking under the No Action alternative. This section does not analyze each specific mitigation measure described in Alternative 2.1. Rather, NMFS considers the mitigation measures as they act together to effect the least practicable adverse impact. For example, the series of personnel training mitigations are analyzed below, followed by NMFS assessment of the effectiveness of this training operating in concert with the various requirements to survey areas for marine mammal presence and the subsequent requirement to implement appropriate mitigation (e.g., shut down) when marine mammals are sighted with certain distances from sound sources. NMFS' resulting analyses of the suite of measures considered under the No Action alternative are provided below.

Marine mammal mitigation training for specific participants in the active sonar activities is a key element of implementing the mitigation measures summarized above. The goal of this training is twofold: (1) that active sonar operators understand the details of the mitigation measures and be competent to carry out the mitigation measures, and (2) that key personnel onboard Navy platforms exercising in the various OPAREAS understand the mitigation measures and be competent to carry them out.

Navy personnel (i.e., lookouts/watchstanders, bridge personnel, active sonar operators, aviation units) on ships, submarines, and aircraft involved in ASW exercises receive a variety of professional training, including the marine species awareness training (MSAT) and the NAVEDTRA 12968-D (as applicable to their workstation) to increase their understanding of the visual cues, physical and behavioral characteristics of marine mammals. Lookout training includes precise scanning procedures for marine species (i.e., detect visual cues indicating the presence of marine mammals and their behavior). Other tools such as a Navy-developed whale identification wheel are provided to aid Navy crews in their identification of marine mammal species. Sonar operators are taught to distinguish biological contacts from other acoustic contacts and to notify lookouts of potential marine mammal detections so that lookouts can confirm the object sited.

Navy shipboard lookout(s) are highly qualified and experienced observers. The information presented here is a summary of input provided by Navy in response to inquiries from NMFS requesting more detail on the lookouts' qualifications and experience:

- Effective visual searching does not come naturally; Navy lookouts learn specialized scanning procedures, undergo extensive training and certification, and have more hours practicing these skills than many non-Navy marine mammal observers. For example, in the daytime, the average person must stop on an object in order to see it but Navy lookouts are skilled at scanning while moving their eyes across the water rapidly from point to point.
- At all times, the shipboard lookouts are required to sight and report all objects (e.g., trash, periscope) or disturbances (e.g., surface disturbance, discoloration) found in the water. Because the safety of the ship is dependent on the eyes of these lookouts, the chances are greater that a lookout will spot something: a faint wisp of smoke on the horizon may be the first indication of an approaching enemy surface unit or a single flash of sunlight on a wingtip may be the only notice of approaching enemy aircraft that can attack at a speed of 500 yards per second. Failure to see and report a

mere pinpoint of light on the horizon jeopardizes the safety of the crew and means disciplinary action if they do not report everything they see or hear.

- Lookouts operate stations, scan for, and report all marine sightings prior to activating MFAS. Lookout watches established on ships survey the waters surface to the horizon. Their assigned areas have a 10-degree overlap, so no area will go unsearched. (Figure 2 Lookout/Watchstander Sectors Assigned). A special watch, called the low visibility lookout, is stationed as far forward in the ship as possible during fog or other conditions of poor visibility. The low visibility lookout watch consists of two people. One person wears sound powered (S/P) phones for communication with the bridge and the other looks and listens. Sounds at night are often heard without seeing their source and it might be possible to determine the bearing of the sound and, sometimes, an estimate of its distance. Conversely, when in a fog, sound sources are difficult to determine because the sound may seem to come from several different directions.

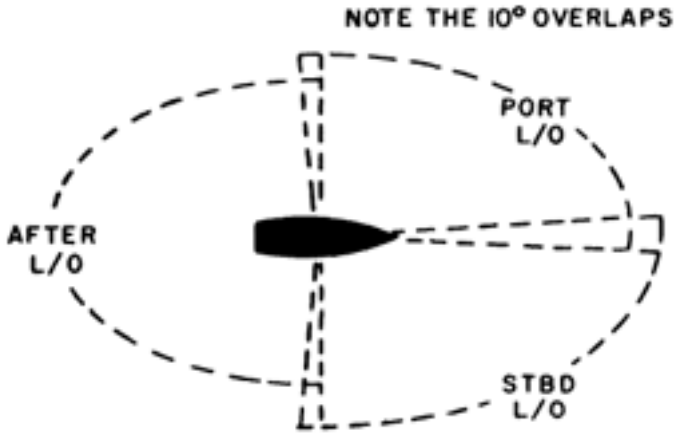


Figure 2 Lookout/Watchstander Sectors Assigned

The normal peacetime watch organization has three people in each watch section whose duties include observing the water surface around the vessel, with two specifically dedicated during ASW training observing the water for marine mammals. Personnel located on the bridge or atop the pilothouse whose duties include observing water also aid in marine mammal detection. In addition to surface ship lookouts, a majority of training exercises involve at least one aerial asset with crews specifically training to hone their detection of objects in the water. Surface and aerial platforms provide good survey capabilities using the Navy's existing exercise assets/personnel because they are faster and more efficient at scanning for and detecting objects in the water than inexperienced non-navy individuals. Sonar operators, lookouts, and the bridge team ensure quick and effective communication within the command structure resulting in facilitated implementation of mitigation measures if marine mammals are spotted.

4.1.1 Benefit to Marine Mammals / Effectiveness of Measure

The range clearance procedures and shutdown/safety zone/exclusion zone measures the Navy has proposed will enable the Navy to avoid injuring or killing any marine mammals and will enable them to minimize the numbers of marine mammals exposed to received sound levels associated with TTS. As described in Section 1.3, this would accomplish purpose (a) and, also, purposes (b), (c), and (d) as they relate to TTS takes. The following subsections provide the rationale for NMFS assessment that these measures will benefit marine mammals and be practicable for the Navy to implement.

4.1.1.1 *MFAS/HFAS*

The Navy's standard protective measures indicate that they will ensure powerdown of MFAS/HFAS by 6 dB when a marine mammal is detected within 1000 yd (914 m), powerdown of 4 more dB (or 10 dB total) when a marine mammal is detected within 500 yd (457 m), and will cease MFAS/HFAS transmissions when a marine mammal is detected within 200 yd (183 m).

PTS/Injury – NMFS' assessment indicates that the proposed mitigation measures will allow the Navy to avoid exposing marine mammals to received levels of MFAS/HFAS sound that would result in injury for the following reasons:

- The estimated distance from the most powerful source at which cetaceans and all pinnipeds except harbor seals would receive a level of 215 dB SEL (threshold for PTS/injury/Level A Harassment) is approximately 10 m (10.9 yd). The PTS threshold for harbor seals is 203 dB SEL, which has an associated distance of approximately 50 m (the other two pinniped thresholds are higher and distance is shorter).
- NMFS believes that the probability that a marine mammal would approach within the above distances of the sonar dome (to the sides or below) without being seen by the watchstanders (who would then activate a shutdown if the animal was within 200 yd (183 m) is very low, especially considering that animals would likely avoid approaching a source transmitting at that level at that distance.
- The model predicted that some animals (19 total individuals annually would be exposed to levels associated with injury, however, the model does not take into account the potential reduction of take associated with the mitigation measures or the likely avoidance behaviors and NMFS has determined that injury is unlikely when those factors are considered.

TTS – NMFS' assessment indicates that the proposed mitigation measures will allow the Navy to minimize exposure of marine mammals to received levels of MFAS/HFAS sound associated with TTS for the following reasons:

- The estimated range of maximum distances from the most powerful source at which an animal would receive 195 dB SEL (the TTS threshold) is from approximately 140 m from the source in most operating environments (except for harbor seals for which

the distance is approximately 1700 m) ( the other two pinniped thresholds are higher and would have a distance less than 140 m)

- Based on the size of the animals, average group size, behavior, and average dive time, NMFS believes that the probability that Navy watchstanders will visually detect mysticetes or sperm whales, dolphins, social pelagic species (pilot whales, melon-headed whales, etc.), and sea lions at some point within the 1000 yd (914 km) safety zone before they are exposed to the TTS threshold levels is high, which means that the Navy would be able to shutdown or powerdown to avoid exposing these species to sound levels associated with TTS.
- However, seals and more cryptic (animals that are difficult to detect and observe), deep-diving cetaceans (beaked whales and Kogia spp.) are less likely to be visually detected and could potentially be exposed to levels of MFAS/HFAS expected to cause TTS (see the Threshold Shift section of the SOCAL Range Complex proposed rule - TTS can have effects on marine mammals ranging from discountable to serious, however, serious effects would be expected in conjunction with TTS of a longer duration and larger amount, which is not expected to occur because of the 2 sets of bullets above). Animals at depth in one location would not be expected to be continuously exposed to repeated sonar signals, though, given the typical 5-10+ knot speed of Navy surface ships during ASW events. During a typical one-hour subsurface dive by a beaked whale, the ship while have moved over 5 to 10 nm from the original location.
- Additionally, the Navy's bow-riding mitigation exception for dolphins may sometimes allow dolphins to be exposed to levels of MFAS/HFAS likely to result in TTS. However, there are combinations of factors that reduce the acoustic energy received by dolphins approaching ships to ride in bow waves. Dolphins riding ship's bow wave are outside of the main beam of the MFAS vertical beam pattern. Source levels drop quickly outside of the main beam. Sidelobes of the radiate beam pattern that point to the surface are significantly lower in power. Together with spherical spreading losses, received levels in the ship's bow wave can be more than 42 dB less than typical source level (i.e., 235 dB- 42 dB = 193 dB). Finally, bow wave riding dolphins are frequently in and out of a bubble layer generated by the breaking bow waves. This bubble layer is an excellent scatterer of acoustic energy and can further reduce received energy.

4.1.1.2 Underwater Explosives

The Navy utilizes exclusion zones (wherein explosive detonation will not begin/continue if animals are within the zone) for explosive exercises. Table 8 indicates the various explosives, the estimated distance at which animals will receive levels associated with take (see Acoustic Take Criteria Section), and the exclusion zone associated with the explosive types.

Mortality and Injury - NMFS believes that the mitigation measures will allow the Navy to avoid exposing marine mammals to underwater detonations that would result in injury or mortality for the following reasons:

- Surveillance for large charges (which includes aerial and passive acoustic detection methods, when available, to ensure clearance) begins two hours before the exercise and extends to 2 nm (3704 m) from the source. Surveillance for all charges extends out 2-12 times the farthest distance from the source at which injury would be anticipated to occur (see Table 3).
- Animals would need to be within less than 193-723 m (211-790 yd) (large explosives) or 24-158 m (26-173 yd) (smaller charges) from the source to be injured.
- Unlike for active sonar, an animal would need to be present at the exact moment of the explosion(s) (except for the short series of gunfire example in GUNEX) to be taken.
- The model predicted only 34 and 7 animals would be exposed (annually?) to levels associated with injury and death, respectively (though for the reasons above, NMFS analysis does not indicate they will be exposed to those levels).
- When the implementation of the exclusion zones (i.e., not starting or continuing to detonate explosives if an animal is detected within the exclusion zone) is considered in combination with the above bulleted rationale , NMFS' assessment indicates that the Navy's mitigation will be effective for avoiding injury and mortality to marine mammals from explosives.

TTS – NMFS' analysis indicates that the proposed mitigation measures will allow the Navy to reduce the exposure of marine mammals to underwater detonations that would result in TTS for the following reasons:

- Surveillance for large charges (which includes aerial and passive acoustic detection methods, when available, to ensure clearance) begins two hours before the exercise and extends to 2 nm (3704 m) from the source. Surveillance for most charges extends out beyond the farthest distance from the source at which TTS would be anticipated to be incurred (see Table 3).
- Unlike for active sonar, an animal would need to be present at the exact moment of the explosion(s) (except for the short series of gunfire example in GUNEX) to be taken.
- A number of animals were predicted to be exposed to explosive levels that would result in TTS, however, based on the conduct of surveillance, need for a mammal to be present at the exact moment of the explosion, and implementation of the exclusion zone , NMFS believes that most modeled TTS takes can be avoided, especially dolphins, mysticetes and sperm whales, and social pelagic species.
- However, pinnipeds and more cryptic, deep-diving species (beaked whales and Kogia spp.) are less likely to be visually detected and could potentially be exposed to explosive levels expected to cause TTS (see the Threshold Shift section of the SOCAL Range Complex proposed rule - TTS can have effects on marine mammals ranging from discountable to serious, however, serious effects would be expected in conjunction with TTS of a longer duration and larger amount, which is not expected to occur because of the surveillance, need for a mammal to be present at the exact moment of the explosion, and implementation of the exclusion zone Additionally, for three of the exercise types (SINKEX, BOMBEX, and MISSILEX), the distance at which an animal would be expected to receive sound or pressure levels associated with TTS (182 dB SEL or 23 psi) is sometimes larger than the exclusion zone, which means that for those two exercise types (a subset of the total estimated TTS), some individuals will likely be exposed to levels associated with TTS outside of the exclusion zone.

| | TTS | | Injury | | Mortality | Exclusion |
|---|---|---|---|---|---|---|
| | 182 SEL | 23 psi | 205 SEL | 13 psi-ms | 31 psi-ms | Zone Used |
| 5" Naval gunfire | 260 | 273 | 18 | 43 | 23 | 548 |
| 76mm rounds | 133 | 151 | 7 | 24 | 12 | 548 |
| Maverick | 1051 | 562 | 70 | 193 | 107 | 1852 (SINKEX), 1645 (MISSILEX) |
| Harpoon | 1959 | 821 | 134 | 273 | 159 | 1852 (SINKEX), 1645 (MISSILEX) |
| MK-82 | 1854 | 800 | 127 | 264 | 154 | 1852 (SINKEX), 914 (BOMBEX) |
| MK-83 | 2898 | 1073 | 198 | 333 | 197 | 1852 (SINKEX), 914 (BOMBEX) |
| MK-84 | 3828 | 1301 | 260 | 379 | 228 | 1852 (SINKEX), 914 (BOMBEX) |
| MK-48 | 3514 | 1232 | 248 | 738 | 437 | 1852 (SINKEX), 914 (BOMBEX) |
| AN/SSQ-110A (IE | 336 | 288 | 72 | 158 | 75 | 914 |

**Table 8**. Range to indicated threshold and size of exclusion zone used in mitigation for indicated explosive type.

### 4.1.2 Practicability of the Measures

The Navy currently utilizes the measures described in the No Action Alternative and has indicated that they are practicable. Therefore, NMFS has determined that these measures are practicable.

## 4.2 **Alternative 1 (NMFS Preferred Alternative)**

Alternative 1 includes the measures described and analyzed for the No Action alternative, plus the SOCAL Stranding Response Plan. The environmental consequences of Alternative 1, with the exception of the measures discussed below, were described in section 4.1 and are equally applicable to this alternative.

### 4.2.1 SOCAL Range Complex Stranding Response Plan

#### 4.2.1.1 *Benefit to Marine Mammals / Effectiveness of Measure*

When marine mammals are in a situation that can be defined as a *stranding* (see glossary in Stranding Response Plan), they are experiencing physiological stress. When animals are stranded, and alive, exposing these compromised animals to additional known stressors would likely exacerbate the animal's distress and could potentially cause its death. Regardless of the factor(s) that may have initially contributed to the stranding, it is NMFS' goal to avoid exposing these animals to further stressors. Therefore, when live stranded cetaceans are in the water and engaged in what is classified as an *Uncommon Stranding Event* (USE) (see Stranding Response Plan glossary), the shutdown component (within 14 nm of the animal) of this plan will minimize the exposure of those animals to MFAS/HFAS and explosive detonations, regardless of whether or not these activities may have initially played a role in the event. This measure will contribute to goals (a) and (d) of the mitigation as described in Section 1.3 of this Mitigation EA.

The Stranding Response Plan includes components more relevant to monitoring measures, but which also provide information that can be used to further benefit marine mammals. The plan will enhance the understanding of how MFAS or explosive detonations (as well as other environmental conditions) may, or may not, be associated with marine mammal

injury or strandings. Information gained from the investigations associated with the Stranding Response Plan may be used in the adaptive management of mitigation or monitoring measures in subsequent LOAs, if appropriate. Finally, the information gathered pursuant to this protocol will inform NMFS' decisions regarding the Navy's compliance with Sections 101(a) (5) (B and C) of the MMPA.

4.2.1.2 *Practicability of the Measure*

The Navy has indicated that the measures contained in the Stranding Response Plan are practicable, and they have been utilizing a subset of these measures (those included in the No Action Alternative) for 2 years. Therefore, NMFS has determined that these measures are practicable.

## 4.3 **Alternative 2**

Alternative 2 includes the measures described and analyzed for Alternative 1, plus all or some subset of the measures analyzed below. The environmental consequences of Alternative 1, with the exception of the measures discussed below, were described in section 4.2 and are equally applicable to this alternative**.**

### 4.3.1 Seasonal and/or Geographic Limitations

4.3.1.1 *Benefit to Marine Mammals / Effectiveness of Measure*

Seasonal or Geographic Limitations are one of the most direct and effective means of reducing adverse impacts to marine mammals. By reducing the overlap in time and space of the known concentrations of marine mammals and the acoustic footprint associated with the thresholds for the different types of take (either at all times and places where animals are concentrated, or times and places where they are concentrated for specifically important behaviors (such as reproduction or feeding)), the amount of take can be reduced. Variations of these types of measures can meet mitigation goals (a-d).

It is important, however, that these measures are used carefully at times and places where their effects are relatively well known. For example, if there is credible evidence that concentrations of marine mammals are known to be high at a specific place or during a specific time of the year (such as the high densities of humpback whales in the main Hawaiian Islands, or North Atlantic right whale critical habitat on the east coast), then these types of blanket seasonal or geographic exclusions or limitations may be appropriate. However, if marine mammals are known to *prefer* certain *types* of areas (as opposed to specific areas) for certain functions (such as beaked whales use of seamounts or marine mammal use of productive areas like fronts), which means that they may or may not be present at any specific time, it is less effective to require avoidance or limited use of the area all of the time.

Marine mammal species in SOCAL are composed of year-round residents, seasonal residents, and transitory migrants. Migrants include the gray whale (and calves on northbound migration routes) which can travel at speeds up to 3 nm hour between winter breeding grounds in

Mexico and summer feeding ground along the NW Pacific coast and Alaska (Mate and Urban-Ramirez, 2003). Individual gray whale presence in SOCAL would, therefore, likely be on the order of hours to a day while in transit. Year-round and seasonal resident marine mammals may utilize waters within SOCAL for both reproduction and feeding. However, there are no known permanent spots within the SOCAL Range Complex that are specifically or exclusively important for the reproduction or feeding of any particular species versus other locations within SOCAL. Variability of marine mammal presence in relatively small ocean sub-areas within SOCAL, such as Tanner and Cortes Banks,is often strongly correlated with daily, weekly, seasonal and even decadal changes in prey availability with prey availability being driven by changes in both local and basin-wide oceanographic conditions. Any specific area of high animal density at a given time may have low animal density the following day, week, or year depending on the biotic and abiotic factors affecting the prey distribution. Some marine mammals may congregate at local foraging hotspots, but the locations of these hotspots are not spatially fixed and change with time. Blue and fin whales, for example, search for food over a large area due to the dietary needs of such large animals. Based on satellite tagging conducted by academic and Navy funded researchers within SOCAL, blue and fin whales, for example, have been shown to move 10 to 50 nautical miles per day, and greater distances over several weeks. Therefore, given the generally wide distribution of marine mammals within SOCAL, narrow footprint of actual ASW operations relative to large ocean expanses, and application of mitigation measures during training events, time or area restrictions in the SOCAL Range Complex (including in Tanner Bank) would likely have limited value

Since public concern regarding constricted channels has particularly been prevalent in prior actions (e.g., RIMPAC 2006), as part of the consideration of seasonal/geographic mitigation based on this analysis of prior marine mammal stranding events, conditions present during prior strandings were considered in the Final EIS to specifically address concerns for MFAS activities in constricted channels. The Final EIS analyzes potential mitigation such as reduction or elimination of MFAS use during transit between islands during exercises in the SOCAL range complex. As described in the FEIS, the conditions of the channels used in SOCAL differ from other channels around the world, including the Northwest Providence channel in the Bahamas. The Bahamas marine mammal stranding event in 2000 involved a critical confluence of conditions. The Northwest Providence channel is 100 nm long and between 25-30 nm wide. In contrast, the channels between the Channel Islands are formed by adjacent islands rather than long, adjacent land mass boundaries. Therefore, these channels do not constrict movement of marine mammals between two long land masses for many miles, as may have been the case in the Bahamas in 2000. Conducting ASW training events while transiting in the SOCAL Range Complex does not present the same conditions as those that resulted in the Bahamas mass stranding event (see Appendix F of the FEIS). Most importantly, the use of MFA sonar during transit between islands would not cause any limited egress capacity for marine mammals during training and RDT&E activites that occur in SOCAL. Based on this analysis of the potential to benefit the species, NMFS did not identify a benefit to marine mammal species associated with requiring reductions in sonar use during transit between islands in the SOCAL range complex.

**Related Measure Developed and Proposed by Navy, but Not Applicable in SOCAL Range Complex**

Both the Navy and NMFS seek to learn from prior stranding events in developing mitigation approaches, and to be responsive to important public concerns and comments. The Navy analyzed the physical factors that were present in the Bahamas (2000), Madeiras (2000), Canaries (2002), and Spain (2006) strandings, which were associated with MFAS use. They used these factors to develop a protective measure, initially established in 2007, for use when this combination of factors was broadly in place. This measure was included by Navy in their application for incidental take authorization, and is also included in the mitigation measures that are part of the proposed action in the Final EIS. However, Navy and NMFS analysis indicates that the factors described below do not exist in their aggregate in the SOCAL Range Complex. The measure indicates that the Navy should avoid planning major ASW training exercises with mid-frequency active sonar in areas where they will encounter conditions which, in their aggregate, may contribute to a marine mammal stranding event.

The conditions to be considered during exercise planning (which do not exist in their aggregate in SOCAL Range Complex) include:

(i) Areas of at least 1000 m depth near a shoreline where there is a rapid change in bathymetry on the order of 1000-6000 meters occurring across a relatively short horizontal distance (e.g., 5 nm).

(ii) Cases for which multiple ships or submarines ($\geq 3$) operating mid-frequency active sonar in the same area over extended periods of time ($\geq 6$ hours) in close proximity ($\leq 10$ nm apart).

(iii) An area surrounded by land masses, separated by less than 35 nm and at least 10 nm in length, or an embayment, wherein operations involving multiple ships/subs ($\geq 3$) employing mid-frequency active sonar near land may produce sound directed toward the channel or embayment that may cut off the lines of egress for marine mammals.

(iv) Though not as dominant a condition as bathymetric features, the historical presence of a significant surface duct (i.e. a mixed layer of constant water temperature extending from the sea surface to 100 or more feet).

For purposes of completeness, this Mitigation EA addressed the steps Navy would follow if the above conditions were found to exist in their aggregate for a particular event. Since the aggregate conditions are not expected in the SOCAL Range Complex, implementation of these measures would not be required by NMFS as part of the rulemaking, and is not intended by Navy for use in planning the SOCAL Range Complex exercises. However, if the Major Exercise must occur in an area where the above conditions were found to exist in their aggregate, these conditions must be fully analyzed in subsequent environmental planning documentation. In such cases, the Navy would increase vigilance by undertaking the following additional mitigation measure:

- A dedicated aircraft (Navy asset or contracted aircraft) will undertake reconnaissance of the embayment or channel ahead of the exercise participants to detect marine mammals that may be in the area exposed to active sonar. Where practical, advance survey should occur within about two hours prior to mid-frequency active sonar use, and periodic surveillance should continue for the duration of the exercise. Any unusual conditions (e.g., presence of sensitive species, groups of species milling out of habitat, any stranded animals) shall be reported to the Office in Tactical Command (OTC), who should give consideration to delaying, suspending or altering the exercise.

- The post-exercise report must include specific reference to any event conducted in areas where the above conditions exist, with exact location and time/duration of the event, and noting results of surveys conducted.

In summary, although the measures related to conditions to avoid in exercise planning was included in the Navy's incidental take application to NMFS and is included in the standard mitigation measures includes as part of the action in the Navy's Final EIS, NMFS concludes that the conditions are not present in their aggregate in the SOCAL range complex, and subsequent "increased vigilance" measures described in the two above bullets are not relevant to the specified activities being considered for authorization by NMFS. For these reasons, this 'exercise planning' mitigation measure would not be required in NMFS rule, 2009 LOA or subsequent LOAs.

4.3.1.2 *Practicability of the Measure*

Generally speaking, the Navy has informed NMFS that they need to have the flexibility to operate at any time or place to meet their training needs pursuant to Title 10. The Navy needs to be able to train in the largest variety of physical (bathymetry, etc.), environmental, and operational (within vicinity of different assets, such as airfields, instrumented ranges, homeports, etc.) parameters in order to be properly prepared. Additionally, Navy training, planning and implementation needs to be adaptable in order to accommodate the need of the Navy to respond to world events and the ever-changing strategic focus of the U.S. In some cases, the Navy has been able to commit to considering certain areas that are important to marine mammals in their planning process, or limiting MFAS use in certain ways in certain areas, but has always expressed a need to maintain the flexibility to train in an area if necessary for national security, and any measures imposed by NMFS need to account for this reality.

Aside from the general reasons of impracticability cited above, below are some of the specific reasons that certain specific types of seasonal and geographic restrictions or limitations are impracticable for the Navy.

Coastal restrictions (including other shallow areas like Tanner and Cortes Banks) - Littoral waterspace is where potential enemies will operate. The littoral waterspace is also the most challenging area to operate due to a diverse acoustic environment. In real world situations, it is highly likely the Navy would be working in these types of areas. It is not realistic to refrain from training in the areas that are the most challenging and operationally important. Areas where SOCAL training events are scheduled to occur are carefully chosen to provide for the safety of events and to allow for the realistic development of the training scenario including the ability of the exercise participants to develop, maintain, and demonstrate proficiency in all areas of warfare simultaneously. Limiting the training event to a few areas would have an adverse impact on the effectiveness of the training by limiting the ability to conduct other critical warfare areas including, but not limited to, the ability of the Strike Group to defend itself from threats on the surface and in the air while carrying out air strikes and/or amphibious assaults. In those locations where amphibious landing events occur, coastal restrictions would decouple ASW training and Amphibious training, which are critically important to be conducted together due to the high risk to forces during actual Amphibious operations. Furthermore, major exercises using integrated

warfare components require large areas of the littorals and open ocean for realistic and safe training.

Sea Mounts and Canyons- Submarine tracking is a long and complicated tactical procedure. Seamounts are often used by submarines to hide or mask their presence, requiring the need to train in this complex ocean environment. This is precisely the type of area needed by the Navy to train. Sea mounts and canyons impact the way sound travels in water as well as the Navy's ability to search and track submarines. If the Navy does not train near sea mounts and canyons and understand how these features affect their ability to search and track a submarine, they will be unable to do so when faced with an actual threat. Exercise locations are carefully chosen based on training requirements and the ability of ships, aircraft, and submarines to operate safely. In addition, the majority of the SOCAL bathymetry within 150 nm of land is composed of complex basin and underwater ridge structures representing the littoral waterspace discussed above, and subject to varying marine mammal presence based on a multitude physical and biological factors. Given the strategic training needs, restricting active sonar operation around seamounts and canyons in the SOCAL Range Complex is not practicable. This discussion considers the impracticability of avoiding all seamounts and canyons. While it may be somewhat less impracticable to avoid a subset of specific seamounts or canyons, marine mammal use of these areas is ephemeral and varies based on many changing factors, which would make it difficult to justify requiring the avoidance of any particular features since doing so may or may not benefit marine mammals at any particular time.

Fronts and other Major Oceanographic Features – NMFS has determined that the impracticability to the Navy of avoiding these features outweighs the potential conservation gain. Though many species may congregate near fronts and other major oceanographic features, these areas may be both large and transitory, and, so restricting access to these features to avoid animals that *may* congregate in a small subset of the total areas is not practicable. Additionally, limiting sonar use in the vicinity of these types of features would disrupt training for the reasons described above for sea mounts and canyons.

### 4.3.2 Use of Additional Detection Methods to Implement Mitigation (Shutdown Zones)

#### 4.3.2.1 *Benefit to Marine Mammals / Effectiveness of Measure*

Lookouts stationed on surface vessels are currently the primary component of the Navy's marine mammal detection capabilities, with some opportunistic assistance from aerial or passive acoustic platforms when such assets are participating in a given exercise. NMFS recognizes the weaknesses inherent in using vessel-based visual observers to detect marine mammals (especially cryptic and deep-diving species like beaked whales, which are not at the surface often and are difficult to see when they are) (Barlow et al., 2002). The use of additional detection methods, such as those listed in chapter 2, for the implementation of mitigation would further minimize the take of marine mammals (through mitigation goal (e), Section 1.3). Specifically, passive and active acoustic methods could detect animals that were below the surface (for passive acoustic detection, the animals would have to be vocalizing to be detected, but for active acoustic detection they would not – the HFM3 system utilized by LFA sonar vessels effectively detects marine mammals to within 1 km of the sonar source). Additionally, the use of more

specialized passive acoustic detection methods could increase the practicability of species-specific measures (such as powering or shutting down when beaked whale aggregations are nearby). Some benefits of specific methods are included in the section below.

In order for additional marine mammal detection methods to assist in the implementation of mitigation (shutdown and powerdown), they must be able to localize, or identify where the marine mammal is in relation to the sound source of concern (since shutdown and powerdown mitigation is triggered by the distance from the sound source), and transmit the applicable data to the commanding officer in real time (i.e., quickly so that the sonar source can be turned down or shut off right away or the explosive detonation can be delayed). Techniques based on the realtime participation of additional observers (such as additional aerial platforms) can achieve this, while many passive acoustic methods cannot. The section below contains information provided by the Navy that speaks both to the practicality of implementation of some methods as well as the effectiveness.

4.3.2.2 *Practicability of the Measure*

The assessments below are based largely on additional information provided by the Navy in response to inquiries from NMFS regarding practicability, which, under the MMPA is to be determined by NMFS after consultation with the Navy.

Radars - While Navy radars are used to detect objects at or near the water surface, radars are not specifically designed to search for and identify marine mammals. For example, when an object is detected by radar, the operators cannot definitively discern that it is a whale. During a demonstration project at Pacific Missile Range Facility (PMRF) in Hawaii, radar systems were only capable of detecting whales under very controlled circumstances and when these whales were already visually spotted by lookouts/watchstanders. Enhancing radar systems to detect marine mammals requires additional resources to schedule, plan and execute Navy limited objective experiments (LOEs) and RDT&E events. The Navy is currently reviewing opportunities to pursue enhancing radar systems and other developmental methods such as laser detection and ranging technology as potential mitigation for detecting marine mammals. Until funding resources and the data are available to develop enhanced systems, it is not known whether it will be technically feasible in the future to implement radar as an additional detection method.

Additional Platforms (aerial, UAV, Gliders, and Other**)** - The number of aerial and unmanned aerial vehicle (UAV) systems currently integrated into fleet training is extremely low and their availability for use in most training events is rare; therefore, shifting their use and focus from hunting submarines to locating marine mammals would be costly and negatively impact the training objectives related to these systems. If additional platforms are civilian, scheduling civilian vessels or aircraft to coincide with training events would affect training effectiveness since exercise events or timetables are not fixed and are based on a free flow development of tactical situations. Waiting for civilian aircraft or vessels to complete surveys, refuel, or be on station would slow the required progress of the training exercise. In addition, the precise location data and exercise plans provided to non-Navy assets poses logistical challenges and classification or security issues. While the Navy is currently reviewing options for additional

detection methods, these additional platforms proved to be impracticable for the following reasons:

- Additional Aerial Survey Detection: Airborne assets already monitor for the presence of marine mammals with no reported incidents where marine mammals were overlooked during an exercise or where aerial assets were unable to perform their duties while watching for marine mammals; therefore, the allocation of additional airborne assets is not well justified. In addition, the presence of additional aircraft (not involved in the exercise) near naval exercises would present safety concerns for both commercial and naval observers because ASW training exercises are dynamic, can last several hours or days, and cover large areas of ocean several miles from land.
- UAV Detection: Currently and in the foreseeable five-year period of the requested authorization, these assets are extremely limited and are rarely if ever available, therefore impractical and expensive.
- Gliders Detection: Gliders are not currently capable of providing real time data, and therefore, are not an effective detection method for use in mitigation implementation.

Active Sonar - As previously noted, the Navy is actively engaged in acoustic monitoring research involving a variety of methodologies; however, none of the methodologies have been developed to the point where they could be used as a mitigation tool for MFAS. At this time, the active sonar and adjunct systems listed in Section 2 proved to be impracticable for the following reasons:

- Use of multiple systems (meaning the MFAS used for the exercise plus any additional active system used for marine mammal detection) operating simultaneously increases the likelihood that a submarine may be detected under conditions where it is attempting to mask its presence before activating sonar, resulting in an impact to the effectiveness of the military readiness activity. Additionally, interference may occur when certain active sonar systems (such as HFM3) are activated concurrently with MFAS.
- HFM3 is an adjunct system used by LFA because the hulls of those platforms can be modified and travel can occur at slow speeds. Of note, LFA systems and associated HFM3 are also not currently proposed for use in the SOCAL Range Complex. MFAS combatants are not equipped with HFM3 systems and it is impractical to install such a system on MFAS combatants.

The Navy will continue to coordinate acoustic monitoring and detection research specific to the proposed use of active sonar. As technology and methodologies become available, their applicability and viability will be evaluated for potential future incorporation.

Additional Passive Acoustic Monitoring - To provide a specialized localization capability (distance, direction, etc.), most of the systems mentioned in Chapter 2 (Sonobuoys, SQQ89, Bottom-Mounted Sensors) require significant modifications. The Navy is working to develop or enhance systems with distance measuring capabilities. Until these capabilities are available, exercise participants can use these systems to aid in marine mammal detection, but not solely to implement mitigation measures. Although passive contact on marine mammals only indicates the presence, not the range (distance and direction), the information on any passive acoustic

detections is disseminated real time to allow lookouts to focus their visual search for marine mammals.

The Navy is improving the capabilities to use range instrumentation to aid in the passive acoustic detection of marine mammals. At the Southern California Offshore ASW Range (SOAR ) Range in the SOCAL Range Complex, development of effective passive acoustic detection as part of the instrumented range is progressing fairly rapidly. Passive acoustic monitoring has the potential to significantly improve the ability to detect marine mammal presence within SOAR. The Navy sponsored Marine Mammal Monitoring on Navy Ranges (M3R) program has developed hardware and software that leverages the SOAR sensors to detect and localize marine mammal vocalizations. Localization is possible when the same signal is detected, precisely time-tagged, and associated on at least three sensors. Prototype M3R systems have been installed on both the AUTEC (Bahamas) and SOAR ranges.

The M3R system is capable of monitoring all the range hydrophones in real-time. The Navy is refining the M3R system by developing tools to display detected transient signals including marine mammal vocalizations and localizations. The tools operate in real-time and are being used in a series of tests to document marine mammal species, their vocalizations, and their distribution on the SOAR range. In addition, they are being used to collect and analyze opportunistic data at AUTEC, and as part of the on-going Behavioral Response Study (BRS) there.

Reliable automated methods are needed for detection and classification of marine mammal calls to allow range hydrophones to be used for routine marine mammal monitoring in SOAR. The performance of these hydrophones must be quantified. The calls of many baleen whale species are stereotyped and well known. Identification of stereotyped mysticete calls within SOAR has been accomplished using automatic detectors. However, the full range of mysticete call types that are expected within SOAR is not known (e.g. sei whales). Odontocete call identification is more difficult owing to their call complexity. Calls of some odontocetes, such as sperm whales, killer whales, and porpoises, are easily distinguishable. For most species, however, the variation in and among call types is a topic of current research. Likewise, pinniped call types are complex and more data are needed to develop automatic detectors and classifiers to allow automated identification for pinniped species within SOAR.
The Navy continues to develop this technology.

Of the 3 major Navy instrumented ranges, only AUTEC monitors the sensors in real-time for mitigation during active sonar operations. Animal densities at AUTEC are low. The dominant species is Blainville's beaked whale. The M3R opportunistic study of these animals during active operations strongly suggests they move off range during operations. This avoidance behavior combined with low densities makes the use of the range for mitigation implementation using imprecise localization associated with passive acoustic monitoring possible without major impact to operations.

At SOAR the large number of species and high animal density combined with imprecise acoustic localization makes the efficacy of such monitoring for use for mitigation implementation during real-time operations questionable.

Prior to implementation of real-time passive acoustic monitoring for use in mitigation, the species present and their distribution should be established. A system must be implemented on range and Detection, Classification, and Localization (DCL) algorithms specific to these species must be developed and tests with visual observers must be conducted to verify their performance. The Navy continues to work on this, and such systems are not yet available for consideration as required mitigation.

Infrared technology – As a complement to existing methods, use of the Infrared (IR) band for marine mammal detection and location has some obvious benefits if proved viable, including the ability to operate infrared at night, as well as the ability to establish automated detections procedures which might well reduce the factor of human fatigue that affects observer-based methods. The Navy has committed to a program of research, development, and testing of IR-based technologies for detection of marine mammals in the wild.

The Navy program will have two main thrusts. NAVAIR will continue to pursue operational tests of their airborne monitoring and mitigation program for marine species using net-centric Intelligence, Surveillance, and Reconnaissance (ISR) systems. The proposed system uses a radar detect and track cueing sensor for a turreted airborne Electro-Optic/Infrared/Multi-spectral imaging sensor. If fully funded for prototyping and demonstration, this program would evaluate the efficacy for marine mammal detection of a large, high-powered system designed, tested, and deployed for other purposes, and operates beyond the domain of research Science and Technology.

At the same time, the Office of Naval Research (ONR) will take the lead in pursuing a longer-range, research S&T program to evaluate new concepts for IR detection that may ultimately lead to an operationally viable technique(s). The focus of the ONR effort will be on comparatively small, low-power systems that might be deployable on small, robot aircraft known as Unmanned Aerial Vehicles (UAVs) as well as operating in a ship-based mode. Either option might allow the inclusion of standard video for confirmation of mammal detections during the day. The UAV option might allow for multiple passages of an area of interest at low altitude to confirm mammal detections and identification.

ONR will continue to support this effort for at least several years, with the potential for sustained support, though the future breadth of this program will depend on the outcome of early efforts. The system is not considered practicable to require for implementation at this time.

### 4.3.3 Use of Dedicated or Independent Marine Mammal Observers (MMOs) to Implement Mitigation

#### 4.3.3.1 *Benefit to Marine Mammals / Effectiveness of Measure*

As discussed in Section 4.2 of this Mitigation EA, Navy lookouts are specifically trained to detect anything (living or inanimate) that is in the vicinity of, visible from, or approaching the vessel. The safety of the personnel on board and of the vessel depends on their performance.

While they receive training that is intended to expose them to the different species of marine mammals they might see and the behaviors they might potentially observe, they would certainly not be expected to differentiate between species or identify the significance of a behavior as effectively as an independent MMO. However, identification to species and understanding of marine mammal behavior is not necessary for mitigation implementation – for that, a lookout must simply detect a marine mammal and estimate its distance (e.g., within 1000 yds, 500 yds, or 200 yds) to the vessel. Though dedicated and independent MMOs are critical to implement a Monitoring Plan, lookouts performing their normal duties would likely be no less effective at detecting marine mammals for mitigation implementation than an MMO.

However, NMFS has recommended, and the Navy has included in their Monitoring Plan a study that compares the effectiveness of Navy lookouts, versus MMOs, at detecting marine mammals to implement mitigation measures. In the meantime, NMFS has not identified important protective value to be gained by utilizing independent MMOs instead of Navy lookouts to implement the mitigation measure.

4.3.3.2 *Practicability of the Measure*

Following are several reasons that the Navy presented for why using third-party observers from air or surface platforms, in addition to or instead of the existing Navy-trained lookouts is not practicable.

- The use of third-party observers could compromise security due to the requirement to provide advance notification of specific times/locations of Navy platforms.
- Reliance on the availability of third-party personnel would also impact training flexibility, thus adversely affecting training effectiveness. The presence of other aircraft in the vicinity of naval exercises would raise safety concerns for both the commercial observers and naval aircraft.
- Use of Navy observers is the most effective means to ensure quick and effective implementation of mitigation measures if marine species are spotted. A critical skill set of effective Navy training is communication. Navy lookouts are trained to act swiftly and decisively to ensure that appropriate actions are taken.
- Security clearance issues would have to be overcome to allow non-Navy observers onboard exercise platforms.
- Some training events will span one or more 24-hour period(s), with operations underway continuously in that timeframe. It is not feasible to maintain non-Navy surveillance of these operations, given the number of non-Navy observers that would be required onboard.
- Surface ships with active mid-frequency sonar have limited berthing capacity. Exercise planning includes careful consideration of this limited capacity in the placement of exercise controllers, data collection personnel, and Afloat Training Group personnel on ships involved in the exercise. Inclusion of non-Navy observers onboard these ships would require that in some cases there would be no additional

berthing space for essential Navy personnel required to fully evaluate and efficiently use the training opportunity to accomplish the exercise objectives.

- Aerial surveying during an event raises safety issues with multiple, slow civilian aircraft operating in the same airspace as military aircraft engaged in combat training activities. In addition, most of the training events take place far from land, limiting both the time available for civilian aircraft to be in the exercise area and presenting a concern should aircraft mechanical problems arise.
- Scheduling civilian vessels or aircraft to coincide with training events would impact training effectiveness, since exercise event timetables cannot be precisely fixed and are instead based on the free-flow development of tactical situations. Waiting for civilian aircraft or vessels to complete surveys, refuel, or be on station would slow the progress of the exercise and impact the effectiveness of the military readiness activity.
- Multiple events may occur simultaneously in areas at opposite ends of the SOCAL Range Complex and continue for up to multiple days at a time. There are not enough qualified third-party personnel to accomplish the monitoring task.

### 4.3.4 Enlargement or Modification of Powerdown/Shutdown Zones of Hull-mounted Sonar

#### 4.3.4.1 *Benefit to Marine Mammals / Effectiveness of Measure*

As described in section 4.2 of this EA and in the FEIS, the current power down and shut down zones are based on scientific investigations specific to MFA sonar for a representative group of marine mammals. They are based on the source level, frequency, and sound propagation characteristics of MFA sonar. The zones are designed to preclude direct physiological effect from exposure to MFA sonar. Specifically, the current power-downs at 500 yards and 1,000 yards, as well as the 200 yard shut-down, were developed to minimize exposing marine mammals to sound levels that could cause TTS and PTS.. The underlying received levels of sound that were used to determine the appropriate safety zone distances are based on: for TTS - empirical information gathered on the levels at which the onset of noise-induced loss in the hearing sensitivity of captive cetaceans occurs, and; and for PTS – extrapolations from the cetacean TTS data that incorporate TTS growth data from terrestrial animals. NMFS has determined that these measures effectively accomplish this.

Enlargement of the powerdown or shutdown zones would primarily result in the further reduction of the maximum received level that the detected animal might be exposed to (mitigation goal (d)), which could potentially mean that an animal expected to respond in a manner NMFS would classify as level B harassment could potentially either respond in a less severe manner or maybe not respond at all. This could be more important at an important time or place or in the presence of species or age-classes of concern (such as beaked whales). NMFS has received varying recommendations regarding the potential size of an expanded powerdown or shutdown zone, including 2 km, 4 km, or the 154 dB isopleth. Regarding potential benefits to marine mammals, Table 9 compares the levels that animals would be exposed to at the different distances and the estimated percentage of exposed animals that would be "taken" based on the risk function used to estimate behavioral harassment.

| Distance from source | Area that must be surveyed by lookouts | Approximate Estimated Received Level (dB rms) (with 6dB powerdown) | | Risk Function - estimated % of exposed animals "taken" given received level (i.e. at edge of indicated zone) | | Risk Function - estimated % of exposed animals "taken" with 6 dB powerdown at indicated distance | |
|---|---|---|---|---|---|---|---|
| | $km^2$ | Cold Season | Warm Season | Cold Season | Warm Season | Cold Season | Warm Season |
| 914 m (1000 yd) | 2.6 | 175 (169) | 163 (157) | 83-85 % | 39-41 % | 66-70 % | 12-17% |
| 2000 m | 12.6 | 170 (164) | 154 (148) | 69-74 % | 6-9 % | 44-45 % | <2 % |
| 4000 m | 50.2 | 164 (158) | 146 (140) | 44-45 % | <1 % | 15-20 % | < 1% |
| 2300 m | | | 154 (148) | | 16% | | < 2 % |
| 12500 m | 346.2 | 154 (148) | | 16% | | <2 % | |

**Table 9.** Comparison of safety zones, estimated received level at edge of safety zones - where powerdown or shutdown required, and % of exposed animals taken at that received level based on risk function. Table also indicates the area necessary to survey in order to effectively implent a powerdown/shutdown zone of indicated size.
Gray shading indicates powerdown/shutdown distances recommended by public.

NMFS notes that review of the Navy's post-exercise reports shows lookouts have not reported any observed response of marine mammals at any distance.

Because sounds propagate further in a surface duct, the purpose of enlarging the powerdown/shutdown zone during a surface duct would not be to reduce the levels that an animal is exposed to. Rather, in the case of a surface duct, the purpose of enlarged safety zones would be to ensure that injury can still be avoided and TTS minimized in the presence of a feature that increases sound propagation, which results in and the received level of sound at the same distance being higher. However, surface ducts have already been factored into the Navy model (through average sound speed profiles) and the estimated distances from the source in which an animal would be exposed to received levels associated with TTS and injury already take surface ducts into account.

4.3.4.2 *Practicability of the Measure*

The outer safety zone the Navy has developed (1000 yd) is also based on a lookout's ability to realistically maintain situational awareness over a large area of the ocean, including the ability to detect marine mammals at that distance during most conditions at sea. Requirements to implement procedures when marine mammals are present well beyond 1,000 yards dictate that lookouts sight marine mammals at distances that, in reality, are not always possible. These increased distances also significantly expand the area that must be monitored to implement these procedures (Column 2 of Table 9). For instance, if a power down zone increases from 1,000 to 4,000 yards, the area that must be monitored increases sixteen-fold. Increases in safety zones are not based in science, provide limited benefit to marine mammals and severely impact realistic ASW training by increasing the number of times that a ship would have to shut down active sonar, impacting realistic training, and depriving ships of valuable submarine contact time. Commanders participating in training designed for locating, tracking, and attacking a hostile submarine could lose awareness of the tactical situation through increased stopping and starting of MFA sonar leading to significant exercise event disruption. Increased shutdowns could allow

a submarine to take advantage of the lapses of active sonar, and position itself for an simulated attack, artificially changing the reality of the training activity. . Given the operational training needs, increasing the size of the safety range is generally impracticable.

### 4.3.5 Ramp Up of Sonar Source Prior to Full Power Operation

#### 4.3.5.1 *Benefit to Marine Mammals / Effectiveness of Measure*

Based on the evidence that some marine mammals avoid sound sources, such as vessels, seismic sources, or MFAS (Richardson et al., 1995, Southall et al., 2008, and BRS Cruise Report, 2008), the theory behind the ramp-up is that animals would move away from a sound source that was ramped up starting at low energy, which would result in the animals not being suddenly exposed to a more alarming, or potentially injurious sound. Compton et al. (2008) noted that this response has not been empirically demonstrated, that the effectiveness of the measure would likely vary between species and circumstances, and that the effectiveness of the measure should be the focus of further research (i.e., controlled exposure experiments). With seismic surveys, which have relatively large safety zones compared to MFAS (and for which NMFS estimates that injury can occur at greater distances from the source than MFAS), NMFS utilizes ramp-up as a cautious mitigation measure to reduce Level B harassment and help ensure that Level A harassment does not occur. This measure would likely accomplish (at least for some species and in some circumstances) mitigation goals (b-d), but mostly (d) (see Section 1.3).

#### 4.3.5.2 *Practicability of the Measure*

Ramp-up procedures are not a viable alternative for MFA sonar training events as the ramp-up would alert opponents to the participants' presence, thus undermining training realism and effectiveness of the military readiness activity. When a MFA sonar ship turns its sonar on, area submarines are alerted to its presence. A submarine can hear an active sonar transmission farther away than the surface ship can hear the echo of its sonar off the submarine. Ideally, the surface ship will detect the submarine in time to attack the submarine before the submarine can attack one of the ships of the Strike Group (noting of course, that attacks during training events are not actual attacks). If the MFA sonar ship starts out at a low power and gradually ramps up, it will give time for the submarine to take evasive action, hide, or close in for an attack before the MFA sonar is at a high enough power level to detect the submarine. Additionally, using these procedures would not allow the Navy to conduct realistic training, or "train as they fight," thus adversely impacting the effectiveness of the military readiness activity. Therefore, NMFS considers this measure to be impracticable.

### 4.3.6 Halting of MFAS Use in the Event of a Marine Mammal Injury or Death (and Stranding) until Cause is Determined

#### 4.3.6.1 *Benefit to Marine Mammals / Effectiveness of Measure*

Only in a very small portion of incidents (such as when a ship strikes a whale and personnel realize it immediately) is the cause of marine mammal injury or death immediately known. NMFS almost always includes a measure in an MMPA authorization that requires the

authorized entity to cease their action and immediately contact NMFS in cases where their activity is known to have caused the injury or death of a marine mammal. This measure is more responsive to ensuring compliance with the MMPA than to the reduction of effects to any marine mammal.

Halting MFAS use in the event of a marine mammal stranding may have an immediate benefit to marine mammals if animals have stranded and are still in the water and are within a certain distance of a Navy sound source(s) (not to imply that the Navy source would be assumed to have caused the event), i.e., it is physically possible for them to be exposed to received levels of sound that could potentially result in an additional adverse effects. In this case, cessation of sonar could alleviate additional stress to an animal that is already in a compromised physical state.

However, if stranded animals are dead or on the beach, the benefit of a cessation of sonar is less clear as neither dead nor beached animals can benefit from it. Additionally, when animals are dead or on the beach, the Stranding response plan proposed in NMFS' preferred alternative indicates that "NMFS will coordinate internally, with the Navy, and with other agencies and entities with the intent of obtaining aerial survey arrangements. If an aircraft is available, a survey will be conducted within 10 miles (on the shore and in the water) to look for additional animals that meet the USE criteria. NMFS will request that the Navy assist with aerial surveys, as resources are available," to ensure that continuing effects, not visible at the stranding site, are not continuing to occur.

#### 4.3.6.2 *Practicability of the Measure*

Investigations into the causes of stranding events often take months or years and the most probable outcome is that a definitive determination of cause is not made. Despite the fact that the Navy has been conducting thousands of hours of sonar, each, in southern California, around Hawaii, and off the east coast of the U.S. for multiple years, NMFS and the Navy have concluded that only 5 strandings worldwide (and not in the areas mentioned) can be definitively associated with MFAS use. It is impracticable to halt the use of MFAS while the cause of a stranding is determined.

### 4.3.7 Suspension of MFAS Training at Night, or During Low Visibility or Surface Duct

#### 4.3.7.1 *Benefit to Marine Mammals / Effectiveness of Measure*

The Navy indicates that it is capable of ***effectively monitoring*** a 1000-yd safety zone using night vision goggles and passive acoustic monitoring (infrared cameras are sometimes used as an extra tool for detection, when available, but have not been shown to show a significant enhancement of current capabilities). Night vision goggles are always available to all vessel and aircrews as needed and passive acoustic monitoring is always in use. As mentioned previously, the estimated zone in which TTS may be incurred is within about 140 m of the sound source (1700 m for harbor seals), and the estimated zone for injury is within 10 m of the sonar dome. The powerdown and shutdown zones are at 1000, 500, and 200 yds. The Navy is expected to be

able to effectively implement the necessary mitigation measures during nighttime and times of lower visibility.

Because of the limited visibility beyond 1000 m, Navy personnel could potentially detect fewer animals early (outside of the 1000 yds), as they are approaching to within 1000 yd, which could result in a slightly delayed powerdown or shutdown as compared to when operations are conducted in full daylight. However, any such potential delays would be at the outer edge of the safety zone and would not result in an animal being exposed to received sound levels associated with TTS or injury. So, suspension of MFAS during times of lower visibility could slightly reduce the exposures of marine mammals to levels associated with behavioral harassment (goals b-d), but would not reduce the number of marine mammals exposed to sound levels associated with TTS or injury.

Regarding surface ducts, their presence is based on water conditions in the exercise areas, is not uniform, and can change over a period of a few hours as the effects of environmental conditions such as wind, sunlight, cloud cover, and tide changes alter surface duct conditions. Across a typical exercise area, the determination of "significant surfacing ducting" is continually changing, and Navy has determined that this mitigation measure cannot be accurately implemented. Furthermore, surface ducting alone does not necessarily increase the risk of MFA sonar impacts to marine mammals. While surface ducting causes sound to travel farther before losing intensity, simple spherical and cylindrical spreading losses result in a received level of no more than 175 dB rms at approximately 1,100 yards (assuming the nominal source of 235 dB rms), even in significant surface ducting conditions. There is no scientific evidence that this mitigation measure is effective or that it provides additional protection for marine mammals beyond that afforded by an appropriate safety zone.

4.3.7.2 *Practicability of the Measure*

ASW training using MFAS is required year round in all environments, to include nighttime and low visibility conditions or conditions that realistically portray bathymetric features where adversary submarines threats (i.e., extremely quite diesel electric or nuclear powered) can hide and present significant detection challenges. Unlike an aerial dogfight, which is over in minutes or even seconds, ASW is a cat and mouse game that requires large teams of personnel working in shifts around the clock (24-hours) typically over multiple days to complete an ASW scenario. ASW can take a significant amount of time to develop the tactical picture (i.e., understanding of the battle space such as area searched or unsearched, identifying false contacts, and water conditions). Reducing or securing power at night or in low visibility conditions would affect a Commander's ability to develop the tactical picture as well as not provide the needed training realism. If there is an artificial break in the exercise by reducing power or suspending MFAS use, the flow of the exercise is lost and several hours of training will have been wasted. Both lost time and training differently than what would be needed in combat diminish training effectiveness.

MFAS training at night is vital because differences between daytime and nighttime affect the detection capabilities of MFAS systems. Ambient noise levels are higher at night because many species use the nighttime period for foraging and movement. Temperature layers, which

affect sound propagation, move up and down in the water column from day to night. Consequently, personnel must train during all hours of the day to ensure they identify and respond to changing environmental conditions. An ASW team trained solely during the day cannot be sent on deployment and be expected to fight at night because they would not identify and respond to the changing conditions.

Finally, as a matter of safety and international law, Navy vessels are required to use all means available in restricted visibility, including MFAS and positioning of additional lookouts, to provide heightened vigilance to avoid collision. The *International Navigation Rules of the Road* considers periods of fog, mist, falling snow, heavy rainstorm, sandstorms, or any similar events as "restricted visibility." In restricted visibility, all mariners, including Navy vessel crews, are required to maintain proper lookout by sight and hearing as well as "by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision." Prohibiting or limiting vessels from using sensors like MFAS during periods of restricted visibility violates international navigational rules, increases navigational risk, and jeopardizes the safety of the vessel and crew.

Surface ducting occurs when water conditions (e.g., temperature layers, lack of wave action) result in sound energy emitted at or near the surface to be refracted back up to the surface, then reflected from the surface only to be refracted back up to the surface so that relatively little sound energy penetrates to the depths that otherwise would be expected. This increases active detection ranges in a narrow layer near the surface, but decreases active sonar detection below the thermocline, a phenomenon that submarines have long exploited. Significant surface ducts are conditions under which ASW training must occur to ensure Sailors learn to identify these conditions, how they alter the abilities of MFA sonar systems, and how to deal with the resulting effects on MFA sonar capabilities. To be effective, the complexity of ASW requires the most realistic training possible. Reducing power in significant surface ducting conditions undermines training realism, and is, therefore, impracticable.

### 4.3.8 Avoidance of Federal and State Marine Protected Areas, including the Channel Islands National Marine Sanctuary (CINMS)

#### 4.3.8.1 *Benefit to Marine Mammals / Effectiveness of Measure*

Pursuant to the MMPA, NMFS makes decisions regarding required mitigation based on biological information pertaining to the potential impacts of an activity on marine mammals and their habitat (and the practicability of the measure), not management designations intended for the broad protection of various other marine resources.

The SOCAL EIS identifies all of the MPAs and marine managed areas within and near the SOCAL Range Complex. Both the No Action Alternative and Alternative 1 include measures intended to limit the take of marine mammals in the CINMS, other MPAs, and throughout the SOCAL Range Complex.

A small portion of the CINMS overlaps with the SOCAL Range Complex (about half of the 6-mile wide area encircling Santa Barbara). The Navy has not indicated they would refrain

from operating in the CINMS. However, if operations do occur in this small area or any of the other MPAs, the Navy would be required to follow the general mitigation protocols established in the final rule and LOA, for example, in accordance with the preferred alternative in this EA, these include powerdown and shutdown sonar when marine mammals are detected within ranges where the received sound level is likely to result in temporary threshold shift (TTS) or injury; use exclusion zones that avoid exposing marine mammals to levels of explosives likely to result in injury or death of marine mammals, and; implement the Stranding Response Plan for the SOCAL Range Complex. NMFS expects that the mitigation measures employed in the CINMS and other MPAs, reduce the number of marine mammals exposed to levels of sound expected to result in TTS in these areas, and provide a framework for the protection of marine mammals and effective investigation of cause should a marine mammal stranding occur.

As mentioned previously, no known areas of specific importance to marine mammals (that would benefit from a training restriction, i.e., not counting pinniped haulouts where the animals are not in the water the majority of the time) are present within these designated areas. Therefore, limiting activity in these areas would be of questionable value to marine mammals.

4.3.8.2 *Practicability of the Measure*

As discussed above, these measures would be expected to offer only limited additional benefit to marine mammals. Additionally, the impracticability of seasonal and geographic restrictions and limitations, which applies to this measure, is discussed at length in 4.1.3.2.

4.3.9 Delayed Restart of MFAS after Shutdown or Powerdown

4.3.9.1 *Benefit to Marine Mammals / Effectiveness of Measure*

NMFS' asssement indicates that expanding the delay (until sonar can be restarted after a shutdown due to a marine mammal sighting) from 30 to 60 minutes for deep-diving species adds minimal protective value for the following reasons:

- The ability of an animal to dive longer than 30 minutes does not mean that it will always do so. Therefore, the 60 minute delay would only potentially add value in instances when animals had remained under water for more than 30 minutes.
- Navy vessels typically move at 10-12 knots (5-6 m/sec) when operating active sonar and potentially much faster when not. Fish et al. (2006) measured speeds of 7 species of odontocetes and found that they ranged from 1.4–7.30 m/sec. Even if a vessel was moving at the slower typical speed associated with active sonar use, an animal would need to be swimming near sustained maximum speed for an hour in the direction of the vessel's course to stay within the safety zone of the vessel (i.e., to be in danger of being exposed to levels of sonar associated with injury or TTS).
- Additionally, the times when marine mammals are deep-diving (i.e., the times when they are under the water for longer periods of time) are the same times that a large portion of their motion is in the vertical direction, which means that they are far less likely to keep pace with a horizontally moving vessel.

- Given that, the animal would need to have stayed in the immediate vicinity of the sound source for an hour and considering the maximum area that both the vessel and the animal could cover in an hour, it is improbable that this would randomly occur. Moreover, considering that many animals have been shown to avoid both acoustic sources and ships without acoustic sources, it is improbable that a deep-diving cetacean (as opposed to a dolphin that might bow ride) would choose to remain in the immediate vicinity of the source. It is unlikely that a single cetacean would remain in the safety zone of a Navy sound source for more than 30 minutes.
- Last, in many cases, the lookouts are not able to differentiate species to the degree that would be necessary to implement this measure. Plus, Navy operators have indicated that increasing the number of mitigation decisions that need to be made based on biological information is more difficult for the lookouts (because it is not their area of expertise).

4.3.9.2 *Practicability of the Measure*

As described in 4.3.7.2, when there is an artificial break in the exercise (such as a shutdown) the flow of the exercise is lost and several hours of training may be wasted, depending on where the Navy was in the exercise. An increase in the delay of MFAS use that occurs during an exercise will likely further negatively affect the effectiveness of the military readiness training because it will be harder to regain the flow of the exercise the longer the equipment and personnel are on hold. Moreover, lengthening a delay in training necessitates a continuation of the expenditure of resources (operation of all of the equipment and personnel), while not making progress towards the accomplishment of the mission (training completion)

4.3.10 Expansion of Exclusion Area Delineated for Use with Explosive Detonations

4.3.10.1*Benefit to Marine Mammals / Effectiveness of Measure*

As described previously, the current designated exclusion zones for three exercise types (SINKEX, BOMBEX, and MISSILEX) are not large enough to prevent TTS should one of the largest explosives (MK-84, MK-48, MK-83, MK-82 or Harpoon) detonate while the animal is at some distance outside of the exclusion zone (see Table 8). If the exclusion zone were enlarged, the Navy could theoretically reduce the number of TTS takes that might occur (mitigation goals (b-d)). NMFS notes that 1128 TTS takes were modeled to occur from explosives; . since these exercise have associated marine mammal clearance procedures, fewer TTS takes would likely occur.

Note that the exclusion zones are more than large enough to avoid injury from all charges.

4.3.10.2 *Practicability of the Measure*

As mentioned above, the exercises utilizing the explosives in question have associated range clearance procedures that cover a circle with a radius of either 2 nm (though the exclusion zone is only 1 nm), 1645 m, or 914 m. Enlarging these circles to encompass the TTS isopleths for these explosives means doubling the radius of the exclusion zones (or more), which would

mean that an area 4 times the size would need to be monitored. Generally speaking, the Navy could do this in one of two ways: they could either use the same amount of resources to monitor the area that is 4 times larger, which could potentially result in less focus on the center area that is more critical (because more severe effects are expected closer to the source where the received level would be louder), or they could maintain the same level of coverage by increasing the resources used for monitoring by four times (or more), which is not practicable considering the limited anticipated protective value of the measure.

#### 4.3.11 Monitoring of Explosive Exclusion Area During Exercises

##### 4.3.11.1 *Benefit to Marine Mammals / Effectiveness of Measure*

The Navy's SINKEX and BOMBEX measures currently require that the Navy survey a safety zone prior to an exercise, and then during the exercise when feasible. Additionally, passive acoustic means are used to detect marine mammals during the exercise. Continuous monitoring during an explosive exercise could potentially decrease the number of animals exposed to energy or pressure levels associated with take. However, one could assume that animals would continue to avoid the area to some degree if continuous explosions were occurring in the areas.

Of note, aside from SINKEXs, training events involving explosives are generally completed in a short amount of time. For smaller detonations such as those involving underwater demolitions training, the area is observed to ensure all the charges detonated and that they did so in the manner intended; however, it is not possible to have visual contact 100 percent of the time for all explosive inwater events. Navy must clear all people from the explosive zone of influence prior to an inwater explosive event for the safety of personnel and assets. If there is an extended break between clearance procedures and the timing of the explosive event, clearance procedures are repeated.

##### 4.3.11.2*Practicability of the Measure*

There are potentially serious safety concerns associated with monitoring an area where explosions will occur and the Navy must take those into consideration when determining when monitoring during an exercise is feasible. While the Navy's measures allow for some monitoring during explosive exercises, it is not practicable to do all of the time.

## 4.5 Cumulative Impacts

A detailed assessment of potential cumulative impacts associated with the proposed Navy activities in the SOCAL Range Complex is provided in the SOCAL Range Complex Final EIS (chapter 4). The environmental consequences in this tiered Mitigation EA focus on evaluating the direct and indirect effects of mitigation measures that are under consideration for inclusion in any incidental take regulations that NMFS may issue to the Navy. For this Mitigation EA, an additional assessment of cumulative impacts is not warranted beyond that presented in the SOCAL Range Complex Final EIS, as the goal of mitigation is specifically to reduce impacts to marine mammals and their habitats from the proposed Navy actions to the least practicable

adverse level. NMFS' preference for certain mitigation is based on the practicability of the measures and the benefit the measures provide to reducing impacts to species under NMFS jurisdiction. The mitigation measures required by NMFS through a final rule and associated LOAs would be expected to reduce the potential for cumulatively significant impacts over time.

## 4.4 Comparison of Alternatives and Conclusion

No Action Alternative - As described in Section 4.1, NMFS determined that the measures included in the No Action Alternative will benefit marine mammals by being effective at avoiding the injury of marine mammals and minimizing exposure of marine mammals to received levels of sound or pressure associated with TTS (mitigation goals (a-d)). Additionally, these measures are practicable for the Navy to implement.

Alternative 1 - As described in Section 4.2, the additional measure included in Alternative 1 (the Stranding Response Plan) will provide additional benefit to marine mammals (above and beyond the standard Navy measures analyzed in the No Action Alternative). When live stranded cetaceans are in the water and engaged in what is classified as an *Uncommon Stranding Event*, the shutdown component of the Stranding Response Plan will minimize the exposure of those animals to MFAS/HFAS and explosive detonations (goals (a) and (d) of the mitigation). Information gained from the investigations associated with the Stranding Response Plan may be used in the adaptive management of mitigation or monitoring measures in subsequent LOAs, if appropriate. Additionally, these measures are practicable to implement.

Alternative 2 – As described in Section 4.3, NMFS determined that all of the individual measures discussed as part of this alternative either could not likely be effectively implemented or would not likely reduce adverse effects to marine mammals (could not be tied to the goals of mitigation discussed in Section 1.3 if they could be implemented, or the measures were not practicable for the Navy to implement.

For the reasons described above, Alternative 1 is considered the Preferred Alternative. The information and analysis contained in NMFS' proposed rule for the SOCAL Range Complex, the Navy's SOCAL Range Complex Final EIS, and this document support a conclusion that the mitigation measures identified in the preferred alternative (Alternative 1) will further the purposes of the MMPA by effecting the least practicable adverse impact on affected species or stocks and their habitat, while taking into account personnel safety, practicality of implementation and impact on the effectiveness of the military readiness activity.

# CHAPTER 5 – LIST OF PREPARERS AND AGENCIES CONSULTED

This Mitigation EA was prepared by a Fisheries Biologist in the Office of Protected Resources with input from U.S. Navy personnel.

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APPENDICES

SOCAL Range Complex Stranding Response Plan

**Stranding Response Plan for the Southern California Range Complex (SOCAL)**
***January 2009***

## Strandings

Strandings, as defined by the Marine Mammal Protection Act (MMPA), have occurred throughout recorded history, although U.S. stranding programs have only been keeping consistent records in some cases as long as the last the last three decades but more commonly the last decade. Strandings may result from many different causes, including, for example, infectious agents, biotoxicosis, starvation, fishery interaction, ship strike, unusual oceanographic or weather events, sound exposure, or combinations of these stressors sustained concurrently or in series. In many cases, a cause of stranding or death cannot be unequivocally determined for a number of reasons. Approximately five marine mammal strandings in the Mediterranean Sea, Caribbean Sea, and Eastern Atlantic Ocean and involving beaked whale species have been associated with mid-frequency active sonar (MFAS), however, scientific uncertainty remains regarding the exact combination of behavioral and physiological responses that link MFAS exposure to strandings (though several mechanisms have been theorized). Available evidence suggests that in some cases it may be the presence of additional specific environmental or physical conditions working in confluence with the exposure of marine mammals to MFAS that can potentially result in a stranding. The National Marine Mammal Stranding Network (created under the Marine Mammal Health and Stranding Response Program Act (MMHSRPA)) consists of over 100 organizations partnered with the National Marine Fisheries Service (NMFS) to investigate marine mammal strandings in U.S. waters. NMFS is currently developing (with help anticipated from the Navy, the petroleum industry, and other agencies and entities) a series of studies to correlate long-term stranding patterns and pathologies with all known anthropogenic stressors, such as sound and including seismic surveys and active military sonar. Among other things, the plan discussed below is intended to contribute to the better understanding of why strandings occur.

## Introduction to the Stranding Plan

Pursuant to 50 CFR Section 216.105, the plan outlined below will be included by reference and summarized in the SOCAL Range Complex final rule and included fully as part of (attached to) the Navy's MMPA Letter of Authorization (LOA), which indicates the conditions under which the Navy is authorized to take marine mammals pursuant to Navy training activities, involving MFAS or explosive detonations conducted off the coast of Southern California. This Stranding Response plan is specifically intended to outline the applicable requirements the authorization is conditioned upon in the event that a marine mammal stranding is reported off the Southern California Coast during an intermediate, coordinated, or *major training exercise* (MTE) (see glossary below). As mentioned above, NMFS considers all plausible causes within the course of a stranding investigation and this plan in no way presumes that any strandings are related to, or caused by, Navy training activities, absent a determination made in a Phase 2 Investigation as outlined in Paragraph 7 of this plan, indicating that MFAS or explosive detonation in the HRC were a cause of and/or contributed to the stranding. This plan is designed to address the following three issues:

- **Mitigation** – When marine mammals are in a situation that can be defined as a *stranding* (see glossary below), they are experiencing physiological stress. When animals are stranded, and alive, NMFS believes that exposing these compromised animals to additional known stressors would likely exacerbate the animal's distress and could potentially cause its death. Regardless of the factor(s) that may have initially contributed to the stranding, it is NMFS' goal to avoid exposing these animals to further stressors. Therefore, when live stranded cetaceans are in the water and engaged in what is classified as an *Uncommon Stranding Event* (USE) (see glossary below), the shutdown component of this plan is intended to minimize the exposure of those animals to mid-frequency active sonar (MFAS) and explosive detonations, regardless of whether or not these activities may have initially played a role in the event.

- **Monitoring** – This plan will enhance the understanding of how MFAS (as well as other environmental conditions) may, or may not, be associated with marine mammal injury or strandings. Additionally, information gained from the investigations associated with this plan may be used in the adaptive management of mitigation or monitoring measures in subsequent LOAs, if appropriate. We note that detections of stranded marine mammals off the Southern California Coast are typically accomplished using passive surveillance, i.e. individuals conducting their normal activities happen to see an animal and report it to the stranding network. If surveys or expanded active detection efforts are specifically used during Navy training exercises, we expect that the number of strandings detected during training may be higher relative to other times because of the increased targeted effort.

- **Compliance** – The information gathered pursuant to this protocol will inform NMFS' decisions regarding compliance with Sections 101(a) (5) (B and C) of the MMPA.

In addition to outlining the necessary procedural steps for the Navy to undertake in the event of a USE during an MTE (as required by the LOA), this document describes NMFS' planned participation in stranding responses off the Southern California Coast, as NMFS' response relates specifically to the Navy requirements described here. The NMFS Marine Mammal Health and Stranding Response Program (MMHSRP) and the participating Southwest Regional Stranding Networks have specific responsibilities regarding unusual marine mammal mortality events (UMEs) pursuant to Title IV of the MMPA. This document does not serve to replace or preclude any of the procedures currently in place for NMFS' response to UMEs or to any normal operations of the stranding network. NMFS will pursue any activities to fulfill obligations relative to UMEs any time that a trigger is reached as determined by the Working Group on Marine Mammal Unusual Mortality Events. This document highlights (or adds to) applicable existing (and in development) protocols and procedures to be used with the specific circumstances and specific subset of strandings addressed here, namely a USE off the Southern California Coast during the MTE. This document has been reviewed and approved by the NMFS staff responsible for conducting and overseeing the referenced activities and this plan will be implemented by NMFS to the degree that resources are available and logistics are feasible.

**General Notification Provision**

If, at any time or place (i.e., not just in southern California and not just during the activities covered under NMFS' regulations), Navy personnel find a *stranded* marine mammal (see glossary below) either on the shore, near shore, or floating at sea, NMFS requests the Navy contact NMFS immediately (or as soon as clearance procedures allow) as described in the SOCAL Stranding Communication Protocol (currently under development, but subject to incorporation into this plan upon mutual agency approval). NMFS requests the Navy provide NMFS with species or description of animal (s), the condition of the animal (including carcass condition if the animal is dead – see glossary for condition codes), location, time of first discovery, observed behaviors (if alive), and photo or video (if available).

In addition, NMFS requests that in the event of a ship strike by any Navy vessel, at any time or place, the Navy do the following:

- Navy immediately report to NMFS the species identification (if known), location (lat/long) of the animal (or the strike if the animal has disappeared), and whether the animal is alive or dead (or unknown)
- as soon as feasible report to NMFS, the size and length of animal, an estimate of the injury status (ex., dead, injured but alive, injured and moving, unknown, etc.), vessel class/type and operational status.
- report to NMFS the vessel length, speed, and heading as soon as feasible.
- Provide NMFS a photo or video, if possible

**Operational Response Plan**

This section describes the specific actions the Navy must take in order to comply with the Southern California Range Complex (SOCAL) LOA if a USE is reported to the Navy off the Southern California Coast coincident to, or within 72 hours of, an MTE. This Stranding Response Plan will include an associated SOCAL Stranding Communication Protocol (currently under development, but subject to incorporation into this plan upon mutual agency approval), which will indicate, among other things, the specific individuals (NMFS Office of Protected Resources - HQ senior administrators) authorized to advise the Navy that certain actions are prescribed by the Stranding Response Plan. A glossary is included at the end of this document. Words included in the glossary are italicized in this section the first time they are used.

**1. <u>Initial Stranding Response</u>** - The NMFS regional stranding network will respond to reports of stranded marine mammals in areas where there is geographic coverage by the stranding network, when feasible. All cetaceans that are responded to will receive examination appropriate to the condition code of the animal and the feasibility of the logistics. If a *qualified* individual determines that the stranding is a *USE*, NMFS staff (or other qualified individual) will initiate a *Phase 1 Investigation*. NMFS will immediately contact appropriate NMFS and Navy personnel (pursuant to the SOCAL Stranding Communication Protocol). NMFS and Navy will maintain a dialogue, as needed, regarding the identification of the USE and the potential need to implement shutdown procedures.

**2. *Shutdown* Procedures** – Shutdown procedures are not related to the investigation of the cause of the stranding and their implementation is in no way intended to imply that MFAS is the cause of the stranding. Rather, as noted above, shutdown procedures are intended to protect cetaceans *exhibiting indicators of distress* and involved in a USE by minimizing their exposure to possible additional stressors (MFAS or explosive detonations), regardless of the factors that initially contributed to the USE. Only individuals specifically identified in the SOCAL Stranding Communication Protocol (NMFS Protected Resources – HQ senior administrators) will be authorized to advise the Navy of the need to implement shutdown procedures (pursuant to the Stranding Response Plan/LOA).

a) If live or freshly dead cetaceans are involved in the USE, the Navy will implement the following procedures:

- If live cetaceans involved in the USE are in the water (i.e., could be exposed to sonar), NMFS will advise the Navy of the need to implement shutdown procedures defined in the glossary (pursuant to the Stranding Response Plan/LOA).

- NMFS will coordinate internally, with the Navy, and with other agencies and entities with the intent of obtaining aerial survey arrangements. If an aircraft is available, a survey will be conducted within 14 miles (on the shore and in the water near the coast) of the stranding to look for additional animals that meet the USE criteria. NMFS will request that the Navy assist with aerial surveys, as resources are available.

    - If no additional animals that meet the USE criteria are found (including if no aircraft were available to conduct a survey), and the originally detected animals are not in the water, and will not be put back in the water for rehabilitation or release purposes, or are dead, NMFS will advise the Navy that shutdown procedures need not be implemented at any additional locations.

    - If additional cetacean(s) meeting the USE criteria are detected by surveys, the shutdown procedures will be followed for the newly detected animal(s) beginning at 2(a) above.

- If a qualified individual determines that it is appropriate to put live animals that were initially on the beach back in the water for rehabilitation or release purposes, NMFS will advise the Navy of the need to implement shutdown procedures pursuant to the Stranding Response Plan/LOA.

b) If the Navy finds an injured (or entangled) or dead cetacean floating at sea during an MTE, the Navy shall notify NMFS (pursuant to SOCAL Stranding Communication Protocol) immediately or as soon as operational security considerations allow. The Navy should provide NMFS with the information outlined in the general notification provision above, as available. Based on the information provided, NMFS will determine if a

modified shutdown (i.e. a shutdown other than those described here, based on specific information available at the time) is appropriate on a case-by-case basis.

c) In the event, following a USE, that: a) qualified individuals are attempting to herd animals back out to the open ocean and animals are not willing to leave, or b) animals are seen repeatedly heading for the open ocean but turning back to shore, NMFS and the Navy will coordinate (including an investigation of other potential anthropogenic stressors in the area) to determine if the proximity of MFAS operations or explosive detonations, though farther than 14 nm from the distressed animal(s), is likely decreasing the likelihood that the animals return to the open water. If so, NMFS and the Navy will further coordinate to determine what measures are necessary to further minimize that likelihood and implement those measures as appropriate. Navy and NMFS will maintain a dialogue regarding the plan to return the animal(s) to the water.

d) If no live (*Condition Code 1*) or freshly dead (*Condition Code 2*) cetaceans are involved in the USE, NMFS will advise the Navy that shutdown procedures need not be implemented. Aerial surveys will be conducted if feasible (see second bullet under b, below).

**3. <u>Restart Procedures</u>**

- If at any time, the subject(s) of the USE die or are euthanized, NMFS will immediately advise the Navy that the shutdown around that animal(s)' location is no longer needed,

- Shutdown procedures will remain in effect until NMFS determines that, and advises the Navy that, all live animals involved in the USE have left the area (either of their own volition or herded). Leading up to restart, NMFS will coordinate internally, with the Navy, and with other federal and state agencies with the intent of securing arrangements to track the movement of the animals (via aircraft, vessel, tags, etc.) following the dispersal of the USE. If the Navy has restarted operations in the vicinity of the animals, NMFS and the Navy will further coordinate to determine (based on location and behavior of tracked animals and location/nature of Navy activities) if the proximity of MFAS operations is likely increasing the likelihood that the animals re-strand. If so, NMFS and the Navy will further coordinate to determine what measures are necessary to minimize that likelihood and implement those measures as appropriate.

**4. <u>Information</u>** - Within 72 hours of the notification of the USE the Navy will inform NMFS where and when they were operating MFAS or conducting explosive detonations (within 80 nm and 72 hours prior to the event). Within 7 days of the completion of any exercises that were being conducted within 80 nm or 72 hours prior to the event, the Navy will further provide available information to NMFS (per the HRC Stranding Communication Protocol) regarding the number and types of acoustic/explosive sources, direction and speed of units using MFAS, and marine mammal sightings information associated with those training activities. Information not initially available regarding the 80 nm, 72 hours, period prior to the event will be provided as soon as it becomes available. The Navy will provide NMFS investigative teams with additional

relevant unclassified information as requested (or classified information to designated NMFS staff), if available.

**5. <u>Phase 1 Investigation</u>** – Because of the variability of available resources across stranding network agencies in the Southwest region, NMFS cannot currently commit, in advance, to the specific degree of investigation that will be conducted for any given stranding. NMFS stranding coordinators are currently assessing available resources with the goal of setting forth a plan that realistically outlines the possible responses in a given area. Meanwhile, the ideal responses (Phase 1 and 2 Investigations) are described in the Biomonitoring Protocols and are referred to below (here and in # 7), and NMFS will respond in the indicated manner when resources are available and it is logistically feasible:

Within 4 weeks of a USE (when feasible), NMFS will conduct and complete the Phase 1 Investigation (list of procedures typically included in Phase 1 investigation are included in the Glossary of this document, description of actual procedures are contained in the Biomonitoring Protocols)) for all USEs that occur along the Southern California Coast coincident with MTEs. Results from the Phase 1 Investigation will be categorized in one of the two ways discussed below and trigger the indicated action:

- If the results of the Phase 1 Investigation indicate that the USE was likely caused by something (such as entanglement or ship strike) other than MFAS or explosive detonations authorized by the Navy's LOA, then the USE investigation will be considered complete as related to the MMPA authorization.

- If NMFS cannot conclude that the stranding was likely caused by something other than MFAS or explosive detonations authorized by the Navy LOA, rather, the results of the Phase 1 Investigation range from completely inconclusive to including potential early indicators that acoustic exposure could have played a role, then a Phase 2 Investigation will be conducted by qualified individuals, under the direction of NMFS staff, and an individual case report will be prepared for each animal (list of procedures typically included in Phase 2 investigation are included in the Glossary of this document, description of actual procedures are contained in the Biomonitoring Protocols).

**6. <u>Memorandum of Agreement (MOA)</u>** - The Navy and NMFS will develop an MOA, or other mechanism consistent with federal fiscal law requirements (and all other applicable laws), that allows the Navy to assist NMFS with the Phase 1 and 2 Investigations of USEs through the provision of in-kind services, such as (but not limited to) the use of plane/boat/truck for transport of stranding responders or animals, use of Navy property for necropsies or burial, or assistance with aerial surveys to discern the extent of a USE. The Navy may assist NMFS with the Investigations by providing one or more of the in-kind services outlined in the MOA, when available and logistically feasible and which do not negatively affect Fleet operational commitments.

**7. <u>Phase 2 Investigation</u>** – Please see # 5, above. Results from the Phase 2 Investigation (procedures outlined in the Biomonitoring Protocols) will be categorized in one of the three ways discussed below and trigger the indicated action:

- If the results indicate that the USE was likely caused by something (such as entanglement or blunt force trauma) other than MFAS or explosive detonations authorized by the Navy's LOA, then the *USE* investigation will be considered complete as related to the MMPA authorization.

- If the results are inconclusive which, historically, is the most likely result (i.e. NMFS can neither conclude that the USE was likely caused by something other than acoustic trauma nor conclude that there is a high likelihood that exposure to MFAS or explosive detonations were a cause of the USE), then the USE investigation will be considered complete as related to the MMPA authorization.

- If the results of a comprehensive and detailed scientific investigation into all possible causes of the stranding event indicate that there is a high likelihood that MFAS was a cause of the USE, one of the following will occur:

    - If the total mortalities determined to be caused by MFAS or explosive detonation do not exceed the number analyzed for the 5-yr period in the regulations (10 and 0, respectively), they will be recorded (to add on to if there is another stranding) and NMFS will take no further action beyond that indicated in 8, below.

    - If the total mortalities determined to be caused by MFAS exceed the number analyzed for the 5-yr period in the regulations, NMFS will begin the process of determining whether or not suspension or withdrawal of the authorization is appropriate.

The Navy will be provided at least ten working days to review and provide comments on NMFS' summary and characterization of the factors involved in the USE. NMFS will consider the Navy's comments prior to finalizing any conclusions and/or deciding to take any action involving any take authorization.

**8. <u>USE Response Debrief and</u>** <u>Evaluation</u> – Within 2 months after a USE, NMFS and Navy staff will meet to discuss the implementation of the USE response and recommend modifications or clarifications to improve the Stranding Response Plan. These recommendations will feed into the adaptive management strategy discussed below.

**9. <u>Adaptive Management</u>** - The regulations under which the Navy's LOA (and this Stranding Response Plan) are issued will contain an adaptive management component. This gives NMFS the ability to consider the results of the previous years' monitoring, research, and/or the results of stranding investigations when prescribing mitigation or monitoring requirements in subsequent years. In the event that NMFS concludes that there is a high likelihood that MFAS or explosive detonations were a cause of a USE, NMFS will review the analysis of the environmental and operational circumstances surrounding the USE. In subsequent LOAs, based on this review and

through the adaptive management component of the regulations, NMFS may require the mitigation measures or Stranding Response Plan be modified or supplemented if the new data suggest that modifications would either have a reasonable likelihood of reducing the chance of future USEs resulting from a similar confluence of events or would increase the effectiveness of the stranding investigations. Further based on this review and the adaptive management component of the regulations, NMFS may modify or add to the existing monitoring requirements if the data suggest that the addition of a particular measure would likely fill a specifically important data or management gap. Additionally, the USE Debrief and Evaluation discussed above (in combination with adaptive management) will allow NMFS and the Navy to further refine the Stranding Response Plan for maximum effectiveness.

**Communication**

Effective communication is critical to the successful implementation of this Stranding Response Plan. Very specific protocols for communication, including identification of the Navy personnel authorized to implement a shutdown and the NMFS personnel authorized to advise the Navy of the need to implement shutdown procedures (NMFS Protected Resources HQ – senior administrators) and the associated phone trees, etc. (to be included in the document entitled "SOCAL Stranding Communication Protocols") are currently in usable draft form and will be finalized for the HRC by March 2009 and updated yearly (or more frequently, as appropriate).

The Stranding Response Plan is dependent upon advance notice to NMFS (HQ and Southwest Regional Office) of the planned upcoming MTE. NMFS and the Navy will develop a mechanism (that conforms with operational security requirements) wherein the Navy can provide NMFS with necessary advance notification of MTEs.

NMFS will keep information about planned MTE's in a confidential manner and will transmit information to NMFS personnel responding to USE's to the minimum necessary to accomplish the NMFS mission under this plan.

**Glossary:**

**Condition Code** – a method for evaluating the stage of decomposition of a stranded animal or carcass. Codes range from live animals (Code 1) to skeletal remains (Code 5) (modified from Marine Mammals Ashore: A Field Guide for Strandings by J.R. Geraci and V.J. Lounsbury).

- Code 1: Live animals
- Code 2: Freshly dead. The carcass is in good condition (fresh/edible), as if it has just died.
- Code 3a: The carcass is in fair condition, with only slight decomposition or scavenger damage. There may be slight bloating and a minimal smell.
- Code 3b: The carcass is moderately decomposed with obvious bloating, some sunburn (blackening and cracking of the skin), sloughing or missing skin, and scavenger damage.
- Code 4: The carcass is in an advanced state of decomposition with a strong odor, skin may be entirely missing, and there is likely extensive scavenger damage.

- Code 5: Mummified or skeletal remains. Skin may be draped over skeletal remains and any remaining tissues are dessicated.

**Major training exercise (MTE)** – An MTE, within the context of this document, means

- Joint Task Force Exercise (JTFEX.) – 3-4 events annually, 10 days per event
- Composite Training Unit Exercise (Comptuex) – 3-4 events annually, 21 days per event
- Ship ASW Readiness and Evaluation Measuring (SHAREM) – 1 event annually, two weeks or less per event
- Sustainment Exercise – 1-2 events annually, 14 days or less
- Integrated ASW Course (IAC) Phase II – 4 events per year, 2-day event

Note: Sonar is typically not in use throughout an entire event.

**Exhibiting Indicators of Distress** – Animals exhibiting an uncommon combination of behavioral and physiological indicators typically associated with distressed or stranded animals. This situation would be identified by a qualified individual and typically includes, but is not limited to, some combination of the following characteristics:

- Marine mammals continually circling or moving haphazardly in a tightly packed group – with or without a member occasionally breaking away and swimming towards the beach.
- Abnormal respirations including increased or decreased rate or volume of breathing, abnormal content or odor
- Presence of an individual or group of a species that has not historically been seen in a particular habitat, for example a pelagic species in a shallow bay when historic records indicate that it is a rare event.
- Abnormal behavior for that species, such as abnormal surfacing or swimming pattern, listing, and abnormal appearance

**Phase 1 Investigation** – A Phase 1 Investigation, for the purposes of this document, will typically include the following tests and procedures (which are described in NMFS' Biomonitoring Protocols):

- Demographics of the stranding
- Environmental parameters
- Behavioral assessment of group
- Live animal
  - physical examination
  - blood work
  - diagnostics such as AEP or ultrasound
  - assessment or treatment
- Dead animal
  - External examination and external human interaction evaluation
  - Morphometrics
  - Photographs
  - Diagnostic imaging including CT/MRI scans or ultrasound as appropriate and feasible

- Necropsy with internal examination, descriptions, photographs and sample collection

Note that several factors will dictate whether all or a subset of these procedures are conducted, including:

- The condition of a carcass
- For live cetaceans - the time it would take necessary personnel and equipment to arrive at the site
- Availability (both in time and space) of resources and feasibility of implementation

**Phase 2 Investigation** – A Phase 2 Investigation, for the purposes of this document, will typically include the following tests and procedures (which are described in NMFS' Biomonitoring Protocols):

- Analyses and review of diagnostic imaging obtained in Phase I
- Histopathology
- Special stains
- Ancillary diagnostics (e.g., PCR for infections, gas emboli)
- CT of ears
- Additional diagnostic imaging as needed
- Histology of ears
- Case summaries
- Review

Note that several factors will dictate whether all or a subset of these procedures are conducted, including:

- The condition of a carcass
- Logistics for transport
- Available resources
- Validated diagnostic techniques

**Qualified** – NMFS has a rigorous set of standards and training in place to qualify stranding responders, however, since the stranding network is a largely volunteer network, there is significant variability from one area to another. In the Biomonitoring Protocol, NMFS will identify the minimum qualifications necessary for individuals to make the determinations necessary to carry out this plan. These qualifications are currently in development and will be finalized in the Biomonitoring Protocols. Not all qualified individuals (veterinarians, technicians, etc.) will be NMFS employees. However, only specific individuals (NMFS Protected Resources, HQ – senior administrators) indicated in the SOCAL Stranding Communication Protocol will be empowered to advise the Navy of the need to implement shutdown procedures.

**Stranding** – an event in the wild in which:

(a) a marine mammal is dead and is –

(i) on the beach or shore of the United States; or

(ii) in waters under the jurisdiction of the United States (including any navigable waters); or

(b) a marine mammal is alive and is –

(i) on a beach or shore of the United States and unable to return to the water;

(ii) on a beach or shore of the United States and, although able to return to the water, is in apparent need of medical attention; or

(iii) in the waters under the jurisdiction of the United States (including navigable waters), but is unable to return to its natural habitat under its own power or without assistance.

**Shutdown Procedures** – The act of the Navy ceasing operation of sonar or explosive detonations within a designated area for a designated time. The time is designated by the Restart Procedures (# 3, above). The designated area, for the purposes of this document, is an area within 14 nm of any live, in the water animal involved in the USE. This distance (14 nm) is the distance at which sound from the sonar source is anticipated to attenuate to approximately 140-145 dB (SPL). The risk function predicts that less than 1% of the animals exposed to sonar at this level (mysticete or odontocete) would respond in a manner that NMFS considers Level B Harassment. As indicated above in 2(d), if this distance appears too short (i.e, the proximity of sonar use may likely be deterring the animals from returning to the open water), NMFS and the Navy will further coordinate to determine what measures are necessary to further minimize that likelihood and implement those measures as appropriate.

**Uncommon Stranding Event (USE)** – A stranding event that takes place during an MTE and involves any one of the following:

- Two or more individuals of any cetacean species (i.e., could be two different species, but not including mother/calf pairs, unless of species of concern listed in next bullet) found dead or live on shore within a two day period and within 10 miles of one another.
- A single individual or mother/calf pair of any of the following marine mammals of concern: beaked whale of any species, kogia sp., short-finned pilot whales, humpback whales, sperm whales, blue whales, fin whales, or sei whales
- A group of 2 or more cetaceans of any species exhibiting indicators of distress.

**Supplemental Documents in Development**

**SOCAL Stranding Communication Protocol** – This document, which is currently in development, will include all of the communication protocols (phone trees, etc.) and associated contact information required for NMFS and the Navy to carry out the actions outlined in this Stranding Response Plan. This document document is currently in usable draft form and will be finalized by March 2009 and updated yearly (or more frequently, as appropriate .

**Biomonitoring Protocols for SOCAL** – This document (which is currently in a usable draft form, but will be finalized in 2009) will contain protocols for the procedures that are necessary for NMFS staff to implement this Stranding Plan including:

- Qualifications necessary for individuals to implement certain parts of the Stranding Plan, such as: identifying a USE, identifying a Code 2 animal, or conducting a Phase 1 or 2 Investigation
- A protocol for the stranding responders that outlines the actions to take in the event of a USE during MTEs
- Protocols for the investigators that describe in detail the procedures implemented for conducting the Phase 1 and Phase 2 Investigations

**Memorandum of Agreement** – This document (or other mechanism consistent with federal fiscal law requirements and all other applicable laws), which will be finalized in 2009, will establish whereby the Navy can assist with stranding investigations, when feasible. This document will include a comprehensive list of the specific ways the Navy could provide this assistance.

**LOA Stranding Plans in Other Geographic Regions**

The frequency and nature of strandings (naturally occurring or otherwise), the nature of military operations, and the NMFS resources and qualified staff available for stranding response, can be highly variable in different geographic regions, and sub-regions within those regions. Measures and procedures developed for and implemented in this Stranding Response Plan may not be appropriate, or even possible, in other geographic regions. As the need arises, NMFS and the Navy will work together to develop appropriate Stranding Response Plans for other geographic regions based on available information and resources. This Stranding Response Plan is not intended to serve as a template for other geographic regions, and, in fact, Stranding Plans for other areas may be significantly different.