Prepared for
National Marine Fisheries Service
Office of Protected Resources

Prepared by
Department of the Navy

In accordance with
National Defense Exemption 23 January 2007
Biological Opinion 09 February 2007

Department of the Navy
SOUTHERN CALIFORNIA
COMPOSITE TRAINING UNIT EXERCISE / JOINT TASK FORCE EXERCISE
Combined After Action Report
February-March 2007

FINAL

28 June 2007

Abstract

This report presents an analysis of the effectiveness of the mitigation and monitoring measures as required under the Biological Opinion on the U.S. Navy's Proposed Composite Unit Training Exercises and Joint Task Force Exercises Off Southern California From February 2007 to January 2009

AND

Discussion of the nature of effects, if observed, under the National Defense Exemption from the Requirements of the Marine Mammal Protection Act (MMPA) for Mid-Frequency Active Sonar

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INTRODUCTION

This report is presented to fulfill Navy and Pacific Fleet written reporting requirements conditional to the 23 January 2007 National Defense Exemption (NDE) from the Requirements of the MMPA for Certain DoD Military Readiness Activities That Employ Mid-Frequency Active Sonar (MFAS) or Improved Extended Echo Ranging Sonobuoys. In addition, these NDE mitigation measures are included in the 9 February 2007 Biological Opinion (BO) for the *U.S. Navy's Proposed Composite Unit Training Exercises (COMPTUEX) and Joint Task Force Exercises (JTFEX) Off Southern California From February 2007 to January 2009*. Reporting under the BO also fulfills reporting requirements for the NDE.

REPORT ORGANIZATION

This report, which contains only unclassified material, provides the information and analyses for three Southern California (SOCAL) at-sea major exercises, and is submitted in fulfillment of NDE and BO written requirements.

The report is organized by section in the following order:

Section 1 Exercise Summaries provides exercise specific summary including the starting and ending dates, the number of ships and aircraft participating, and the number of hours of active sonar used.

Section 2 Observations and Mitigation Effectiveness provides an estimated number of marine mammals observed during COMPTUEX 07-02, JTFEX-07-03, and JTFEX 07-05 potentially affected or not affected by Anti-submarine Warfare (ASW) operations, noting the nature of any observed effects where possible. In addition, Section 2 assesses the effectiveness of the NDE and BO mitigation and monitoring measures required during exercises with regard to minimizing the use of MFAS in the vicinity of marine mammals.

Appendices contain tables and figures (**Appendix A**), and other supplementary information (**Appendix B**).

BACKGROUND

Composite Unit Training Exercises (COMPTUEX) is part of an Integrated Phase of the Fleet Readiness Training Plan (FRTP) and may involve either a Carrier Strike Group (CSG) or an Expeditionary Strike Group (ESG). A COMPTUEX is conducted as a series of scheduled training events that occur according to a given time schedule against an opposition force. COMPTUEX provides an opportunity for the Strike Group to become proficient in the myriad of required warfare skill sets. Additionally, it stresses the integration or coordination of the different warfare areas and provides realistic training on in-theater operations. The COMPTUEX is normally more structured than the JTFEX, so it is longer in duration.

JTFEX is in the Sustainment or Final Phase of the FRTP and may involve either a CSG or an ESG. It is a scenario-driven, at-sea training exercise designed to evaluate the Strike Group's preparedness for forward deployed contingency and combat operations. JTFEX also utilizes a simulated (mock) opposition force and serves as the venue for U.S. THIRD Fleet to assess the readiness, interoperability, and proficiency of naval forces in realistic, free-play scenarios, ranging from military operations other-than- war to armed conflict. As the final certification event of the FRTP, the Strike Group must demonstrate the ability to operate and integrate into a Joint Operations Area under simulated austere, hostile conditions.

One COMPTUEX and two JTFEXs were conducted in the waters off Southern California from 14 February to 24 March 2007 (**Table A-1 Appendix A**). The types of ASW training conducted during COMPTUEX and JTFEX involved the use of ships, submarines, aircraft, non-explosive exercise weapons, and other training related devices within portions of the Southern California Operating Area (**Figure A-1 Appendix A**).

COMPTUEX 07-02, JTFEX 07-03, and JTFEX 07-05 were planned and prepared by the U.S. Navy prior to receiving the Terms and Conditions of the BO on 13 February 2007. This includes coordinating the logistical arrangements for these advanced training events, ensuring marine species awareness training was provided to exercise participants, and preparation and distribution of the Letter of Instruction (LOI) (**Appendix B**) which reiterates the applicable mitigation measures and explains procedures for reporting marine mammal sightings discussed in Section 2.

Given the timing between issuance of the BO and exercise start dates, some of the procedures used to report sighting information could not be modified in time to collect relevant data to more fully address the exact language of the Terms and Conditions. In addition, the Terms of the BO required the U.S. Navy to submit a monitoring plan by 31 March 2007. These three exercises occurred prior to that plan's submission, therefore the procedures used were consistent with the measures described in the BO. The Office of Protected Resources (OPR), National Marine Fisheries Service (NMFS) and the U.S. Navy have been coordinating to improve data objectives, data quality, and reporting requirements to assist in the analysis for future COMPTUEXs and JTFEXs. This has been a continual, iterative dialog leading to integration of additional monitoring techniques and procedures that will help to advance the state of knowledge on marine mammal distribution and potential MFAS effects or, lack of effects, within the SOCAL Operating Area (OPAREA). The U.S. Navy will explore establishment of new metrics and processes based on these enhancements to the exercise monitoring program, and plans to integrate new results into future reports.

MFAS equipped platforms participating in COMPTUEX and JTFEX include Ticonderoga-class guided missile cruisers (CG) and Arleigh Burke-class guided missile destroyers (DDG) surface combatants with AN/SQS-53C sonar and associated aviation assets (SH-60B/F/R with AN/AQS-13F or AQS-22 dipping sonar, and AN/SSQ-62B/C/D/E Directional Command Activated Sonobuoy System -DICASS), and P-3 Maritime Patrol Aircraft (MPA) (DICASS sonobuoy).

Total numbers of ASW capable aviation assets participating in a given exercise varies based on maintenance ready aircraft and ship configuration. For instance, early versions of the DDG destroyers, the newest Navy surface combatant, do not have onboard hangers for helicopters. Later versions have hangars and up to two SH-60B/F/Rs. Of more importance than actual aircraft numbers however, is that active sonar use by aviation assets is captured and added to sonar totals reported in this document. MFAS on Los Angeles-class (SSN) submarines (AN/BQQ-5) is seldom used in tactical training scenarios, where passive sonar use is the preferred system in order to maximize the stealth aspects of undersea operations.

SECTION 1 EXERCISE SUMMARIES

EXERCISE SPECIFICS

COMPTUEX 07-02 was conducted from 14 February to 02 March 2007 and involved an ESG (**Table A-1 Appendix A**). Ships assigned to this ESG included: (3) non-MFAS equipped ships and (3) MFAS equipped ships. Other participating units representing support and opposition forces included (2) submarines and (2) MFAS equipped ships, although there was no active sonar use by these supporting platforms. Based on DDG ships participating in COMPTUEX 07-02, there were approximately six ASW SH-60s helicopters participating. In addition, one to two ASW P-3 MPA also participated.

JTFEX 07-03 was conducted from 23 February to 03 March 2007 and involved a CSG (**Table A-1 Appendix A**). Ships assigned to this CSG included: (1) non-MFAS equipped ship and (5) MFAS equipped ships. Other participating units representing support and opposition forces included (2) submarines and (3) MFAS equipped ships, although there was no active sonar use by these supporting platforms. Based on the DDG ships participating in JTFEX 07-03, there were approximately of 8-12 ASW SH-60s helicopters available.

JTFEX 07-05 from 14 to 24 March 2007 again involved the same ESG that participated in COMPTUEX 07-02 (**Table A-1 Appendix A**). Other participating units representing support and opposition forces included (2) submarines and (2) MFAS equipped ships, although there was no active sonar use by these supporting platforms. Based on the DDG ships participating in JTFEX 07-05, there were approximately six ASW SH-60 helicopters available.

MITIGATION MEASURES PERFORMED

All mitigations measures as stated in the 23 January 2007 NDE were adhered to for all three Southern California exercises. These 29 NDE measures include specific details for Personnel Training, establish Lookout and Watchstander Responsibilities, mandate specific Operating Procedures, and describe Coordination and Reporting requirements. Observation data from Navy lookout sightings for each exercise is described in Section II.

NDE mitigation measures include:

I. General Maritime Protective Measures: Personnel Training:

1. All lookouts onboard platforms involved in ASW training events will review the NMFS approved Marine Species Awareness Training (MSAT) material prior to use of mid-frequency active sonar.
2. All Commanding Officers, Executive Officers, and officers standing watch on the bridge will have reviewed the MSAT material prior to a training event employing the use of MFAS.
3. Navy lookouts will undertake extensive training in order to qualify as a watchstander in accordance with the Lookout Training Handbook (NAVEDTRA 12968-B).
4. Lookout training will include on-the-job instruction under the supervision of a qualified, experienced watchstander. Following successful completion of this supervised training period, Lookouts will 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 preclude personnel being trained as lookouts counted as those listed in previous measures so long as supervisors monitor their progress and performance.
5. Lookouts will be trained in the most effective means to ensure quick and effective communication within the command structure in order to facilitate implementation of protective measures if marine species are spotted.

II. General Maritime Protective Measures: Lookout and Watchstander Responsibilities:

6. On the bridge of surface ships, there will always be at least three people on watch whose duties include observing the water surface around the vessel.
7. In addition to the three personnel on watch noted previously, all surface ships participating in ASW exercises will have at all times during the exercise at least two additional personnel on watch as lookouts.
8. Personnel on lookout and officers on watch on the bridge will have at least one set of binoculars available for each person to aid in the detection of marine mammals.
9. On surface vessels equipped with MFAS, pedestal mounted "Big Eye" (20x110) binoculars will be present and in good working order to assist in the detection of marine mammals in the vicinity of the vessel.
10. Personnel on lookout will employ visual search procedures employing a scanning methodology in accordance with the Lookout Training Handbook (NAVEDTRA 12968-B).
11. After sunset and prior to sunrise, lookouts will employ Night Lookouts Techniques in accordance with the Lookout Training Handbook.
12. Personnel on lookout will 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.

III. Operating Procedures

13. A Letter of Instruction, Mitigation Measures Message or Environmental Annex to the Operational Order will be issued prior to the exercise to further disseminate the personnel training requirement and general marine mammal protective measures.
14. Commanding Officers will 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.
15. All personnel engaged in passive acoustic sonar operation (including aircraft, surface ships, or submarines) will monitor for marine mammal vocalizations and report the detection of any marine mammal to the appropriate watch station for dissemination and appropriate action.
16. During MFAS operations, personnel will utilize all available sensor and optical systems (such as Night Vision Goggles to aid in the detection of marine mammals.
17. Navy aircraft participating in exercises at sea will 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.
18. Aircraft with deployed sonobuoys will use only the passive capability of sonobuoys when marine mammals are detected within 200 yards of the sonobuoy.
19. Marine mammal detections will 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.
20. Safety Zones - When marine mammals are detected by any means (aircraft, shipboard lookout, or acoustically) within 1,000 yards of the sonar dome (the bow), the ship or submarine will limit active transmission levels to at least 6 dB below normal operating levels.

    (i) Ships and submarines will 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 yards beyond the location of the last detection.

(ii) Should a marine mammal be detected within or closing to inside 500 yards of the sonar dome, active sonar transmissions will be limited to at least 10 dB below the equipment's normal operating level. Ships and submarines will 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 yards beyond the location of the last detection.

(iii) Should the marine mammal be detected within or closing to inside 200 yards of the sonar dome, active sonar transmissions will cease. Sonar will 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 yards beyond the location of the last detection.

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

(v) If the need for power-down should arise as detailed in "Safety Zones" above, 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 at what level above 235 sonar was being operated).

21. 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.

22. Sonar levels (generally) – The ship or submarine will operate sonar at the lowest practicable level, not to exceed 235 dB, except as required to meet tactical training objectives.

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

24. Helicopters shall not dip their sonar within 200 yards of a marine mammal and shall cease pinging if a marine mammal closes within 200 yards after pinging has begun.

25. Submarine sonar operators will review detection indicators of close-aboard marine mammals prior to the commencement of ASW operations involving active mid-frequency sonar.

26. Increased vigilance during major ASW training exercises with tactical active sonar when critical conditions are present.

Based on lessons learned from strandings in Bahamas 2000, Madeiras 2000, Canaries 2002, and Spain 2006, beaked whales are of particular concern since they have been associated with MFAS operations. Navy should avoid planning major ASW training exercises with MFAS 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 include:

(1) 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).

(2) Cases for which multiple ships or submarines (≥ 3) operating MFAS in the same area over extended periods of time (≥ 6 hours) in close proximity (≤ 10NM apart).

(3) 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 (≥ 3) employing MFAS near land may produce sound directed toward the channel or embayment that may cut off the lines of egress for marine mammals.

(4) Although 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).

If the major exercise must occur in an area where the above conditions exist in their aggregate, these conditions must be fully analyzed in environmental planning documentation. Navy will increase vigilance by undertaking the following additional protective 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 MFA 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 Officer in Tactical Command (OTC), who should give consideration to delaying, suspending or altering the exercise.

All safety zone requirements described in Measure 20 apply.

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.

IV. Coordination and Reporting

27. Navy will coordinate with the local NMFS Stranding Coordinator for any unusual marine mammal behavior and any stranding, beached live/dead or floating marine mammals that may occur at any time during or within 24 hours after completion of mid-frequency active sonar use associated with ASW training activities.

28. Navy will submit a report to the OPR, NMFS, within 120 days of the completion of a Major Exercise. This report must contain a discussion of the nature of the effects, if observed, based on both modeled results of real-time events and sightings of marine mammals.

29. If a stranding occurs during an ASW exercise, NMFS and Navy will coordinate to determine if MFAS should be temporarily discontinued while the facts surrounding the stranding are collected.

SECTION 2 OBSERVATIONS AND MITIGATION EFFECTIVENESS

MARINE MAMMALS AND OCEANOGRAPHIC CONDITIONS

Section 2 provides estimated numbers of marine mammals observed in Southern California waters during COMPTUEX 07-02 (Bonhomme Richard ESG), JTFEX 07-03 (USS Nimitz CSG), and JTFEX 07-05 (Bonhomme Richard ESG). This information is based on analysis of actual events and sightings of marine mammals reported by exercise participants noting the nature of any observed effects. **Table A-2 Appendix A** lists a subset of possible marine mammal species occurring in Southern California waters and highlights the Endangered Species Act (ESA) listed species described in the BO.

All detections were made by standard Navy surface ship lookout reporting procedures as detailed in a Commander, THIRD Fleet LOI issued to each CSG and ESG prior to participation in a COMPTUEX or JTFEX (**Appendix B**). No marine mammal sightings were reported by helicopters or P-3s.

February to March 2007 oceanographic conditions, a factor in small scale marine mammal distribution within Southern California waters, were typical for the winter season (Hickey 1993). Satellite monitoring data for sea surface temperature (SST), chlorophyll, and frontal probability index were obtained online from the OceanWatch North Pacific Demonstration Project, a program of CoastWatch and the Environmental Research Division, Southwest Fisheries Science Center (SWFSC), National Marine Fisheries Service (NMFS) (http://las.pfeg.noaa.gov/oceanWatch/oceanwatch.php). **Figures A-2 through A-4 Appendix A** show 14-day composite averages of SST, chlorophyll, and frontal probability for the period ending 28 February and 24 March. SST values ranged from approximately 11-16.5°C (51.8-61.7°F) and were fairly uniform throughout the COMPTUEX\JTFEX OPAREAs (**Figure A-2**). Chlorophyll was higher in February than in March (**Figure A-3**), and no significant February front features are visible at the resolution provided by the frontal probability index (**Figure A-4**).

Based on seasonal survey and monitoring results for Southern California (Dohl et al. 1981, Dohl et al. 1986, Bonnell and Dailey 1993, Carretta et al. 2000, Ferguson and Barlow 2001, Hildebrand 2005, Soldevilla et al. 2006, Carretta et al. 2007, Oleson et al. 2007), expected February to March marine mammal occurrence within the SOCAL OPAREA include in order of likely abundance:

- For toothed whales and dolphins, the most abundant species type in Southern California are the Pacific white-sided dolphin, northern right whale dolphin, Dall's porpoise, and short-beaked common dolphin;
- For pinnipeds, the California sea lion;
- For baleen whales, migrating gray whales, and ESA listed fin whales. (**Table A-2 Appendix A)**

A significant portion of northward migrating gray whales travel along offshore paths to the east and west of San Clemente Island (Bonnell and Dailey 1993, Carretta et al. 2000). ESA listed fin whales are found on the Southern California shelf year round (Carretta et al. 2000, Hildebrand 2005, Soldevilla et al. 2006). ESA listed blue whales are, in general, not observed or tracked acoustically in Southern California between February and March (**Figure A-5 Appendix A**) (Hildebrand 2005, Soldevilla et al. 2006, Oleson 2007). ESA listed sperm whale clicks have been detected year-round in Southern California but more often in offshore slope waters, although detections and visual detections are more limited during winter (**Table A-3 Appendix A**) (Soldevilla et al. 2006).

On the U.S. West coast, several species of naturally occurring diatoms produce a toxin called domoic acid which has been linked to marine mammal strandings including pinnipeds (Geraci et al. 1999, Van Dolah et al. 2003, MMC 2004, Van Dolah 2005, Greig et al. 2005, Brodie et al. 2006, NMFS, 2007a). Domoic acid causes amnesic shellfish poisoning (ASP) and is a phycotoxin (algal toxin) found associated with

certain algal blooms of the genus *Pseudo-nitzschia*. In particular, California sea lions have been reported to be particular susceptible to domoic acid poisoning (CDFG 2002, Greig et al. 2005, Brodie et al. 2006), leading to unexpected mortality events (UME) as defined by Dierauf and Gulland 2001, Harwood 2002, Gulland 2006, NMFS 2007a. There were documented California sea lion UMEs from domoic acid poisoning in 2000 and 2002 (NMFS 2007b), and although not formally reported by NMFS or in peer-reviewed literature yet, there are indications that a severe domoic acid event occurred within California ocean waters this year from late winter to spring and increases in cetacean and pinniped mortalities predicted (CDFG 2007, Morris 2007, UCSC 2007).

EXERCISE MARINE MAMMAL SIGHTINGS

COMPTUEX 07-02 Observations

Table A-4 provides a detailed timeline of marine mammal observations made by Navy exercise participants for COMPTUEX 07-02. During COMPTUEX 07-02, there were 26 live marine mammal sightings for a total of 404 animals (**Table A-4**). Numbers of animals reported by a ship are based on the observer's estimate of the number of animals present. Four sightings of two animals were of floating dead animals (see below). Of these 30 (26 +4) sightings, 37% (355 animals) were identified as dolphins. During this COMPTUEX, 37% of the sightings were categorized as "unidentified whales" that could have been either non-ESA listed gray whales, ESA large whales (most likely fin, or less likely sperm whales), or non-ESA small whales. Small whales constituted 10% of the sightings.

A single unidentified badly decomposed whale carcass was sighted floating southeast of San Clemente Island on 22 February 2007 by a surface ship. The sighting vessel was not using MFAS at the time (**Table A-4**). Species identification of the carcass was not possible due to the advanced state of decomposition. A voice report was made to NMFS HQ, and a Navy message sent to Chief of Naval Operations (CNO). Subsequent sighting of a whale carcass 30 minutes later on 22 February 2007 by another ship and again 29 hours later on 23 February 2007 by a third vessel (**Figure A-6 Appendix A**). Regional ocean circulation in the region is dominated by the California Current and various counter-currents and eddies (Hickey 1993). In winter the California Current has less velocity and is more variable around the southern Channel Islands, typically flowing along underwater isobaths and across sill contours (Hickey 1993). Information on surface currents for 22 February in **Figure A-6** was obtained from the Southern California Coastal Ocean Observing System (SCCOOS), a joint organization providing real-time ocean monitoring data for Southern California (http://www.sccoos.org/index.html). The surface current velocity vector diagram in **Figure A-6** was provided by the Coastal Ocean Currents Monitoring Program. This figure represents a 25-hour averaging of surface current (i.e. determined from the preceding 25 hours of data) derived from non-Navy radar based measurements. Velocity vectors indicate that surface currents in the region of the first carcass sighting were from 5-15 centimeters/second (approximately 0.2-0.5 feet/second) heading to the southeast. This is consistent with typical velocities reported in Hickey (1993). These multiple sightings of the same carcass, therefore, most likely represent southeasterly movement of the carcass as a result of local surface currents. Due to the advanced degree of decomposition and southerly movement of the carcass, the animal most likely died from possibly natural causes some time before the exercise start date on 14 February and to the north of the vessels participating in COMPTUEX 07-02.

One dead floating sea lion was observed on 25 February by a non-MFAS equipped ship. As discussed previously, significant sea lion mortalities and UMEs are expected based on the current 2007 winter-spring Southern California domoic acid poisoning event, and in line with past historic UMEs for sea lions from the same cause.

JTFEX 07-03 Observations

Table A-5 provides a detailed timeline of marine mammal observations made by Navy exercise participants for JTFEX 07-03.

During JTFEX 07-03, there were 42 live marine mammal sightings for an estimated total of 881 animals (**Table A-5**). There were no sightings of floating dead animals. Of these 42 sightings, 67% (858 animals) were identified as dolphins. During this JTFEX, "unidentified whales" that could have been either ESA large whales, or non-ESA small whales accounted for 21% of the sightings. Small whales constituted 5% of the sightings. There was only one sighting of a single large whale.

JTFEX 07-05 Observations

Table A-6 provides a detailed timeline of marine mammal observations made by Navy exercise participants for JTFEX 07-05.

During JTFEX 07-05, there were 61 live marine mammal sightings for an estimated total of 729 animals (**Table A-6**). Five sightings of five floating dead animals were reported, four seals or sea lions, and one dolphin (discussed below). Of these 61 live sightings, 44% (607 animals) were identified as dolphins. Post-analysis of the species identification for the 18 March sighting raises questions as to whether the lookout reports are accurate in their identification. As stated previously in discussion on predicted SOCAL marine mammal species, blue whales are not commonly sighted during these winter and early spring periods. This does not rule out the possibility that blue whales could be present, but is worth clarifying for future reports.

Four dead floating seals or sea lions were reported during JTFEX 07-05 twice on 16 March 2007, on 18 March 2007, and 19 March 2007. MFAS was not in use at the time by exercise participants and the reporting vessels (**Table A-6**). Although estimated decomposition of the animals was not reported, given the relative short distance between sightings (<10 nm), the short time span between successive sightings, the relative plots of the sighting locations, and typical current flow, these events again represents multiple sightings of the same one or two carcasses. As discussed previously, significant sea lion mortalities and UMEs are expected based on the current 2007 winter-spring Southern California domoic acid poisoning event, and in line with past historic UMEs for sea lions from the same cause. A dead dolphin reported by a non-MFAS equipped ship at the end of the exercise on 24 March 2007 was sighted significantly after the majority of MFAS use, and in a location where MFAS ships had not been operating. This animal mortality can not be associated with sonar operation and may have been caused by other factors. Domoic acid poisoning, since it affects the marine food chain, may also have played a role.

MITIGATION AND MONITORING ASSESSMENT

OVERVIEW

The NDE calls for the U.S. Navy to submit a report to NMFS that includes a discussion of the nature of the effects, if observed, based on modeling results and marine mammal sightings. In addition, the BO Terms and Conditions require a report that evaluates the mitigation measures and details results from the U.S. Navy's exercise monitoring program. In this case, the mitigation measure under the BO are the NDE measures, therefore the discussion is presented together in this section.

This section of the report, therefore, provides an assessment of the effectiveness of the mitigation and monitoring measures. It must also be recognized that ASW proceeds slowly and requires careful development of a tactical frame of reference over time as data is integrated from a number of sources and

sensors. Once MFAS is turned off for a period of time, turning it back on later does not usually allow a Commander to simply continue from the last frame of reference. Thus, lost MFAS time not only equates to lost exercise time but should be considered in the fuller context of its overall impact on the tempo and development of a "tactical picture" shared among exercise participants as they trained toward the goal of improving ASW skills in general.

Passive Sonar

Passive sonar involves acoustic listening to underwater sounds and does not involve transmitting active sound into the water column. Passive sonar use is driven by the tactical nature of an ASW or training event, and should be assumed to be employed whenever possible. Given the nature of passive sonar technology and underwater sound propagation, localizing or determining absolute position of an object is more difficult than active sonar.

The U.S. Navy does not have a reporting system to capture the amount of passive sonar employed within a given geographic region. For COMPTUEX 07-02, JTFEX 07-03, and JTFEX 07-05, there were no reports of passive acoustic detections of marine mammals by exercise participants. Future reports will explore whether metrics for passive acoustic use can be generated, and if marine mammal detections are occurring.

Active Sonar

Typically, there are no measurements (calibrated or otherwise) of actual sound levels made during an exercise and none were made during COMPTUEX 07-02, JTFEX 07-03, and JTFEX 07-05. Source levels, numbers of sources, and frequencies are classified since that information would provide potential adversaries with important tactical data. An explanation of sonar hours as presented in this report is also warranted. Total active sonar hours represent a sum of the total time from a number of individual training events during a COMPTUEX or JTFEX. This value does not represent actual total sonar ping hours. In other words, the ship logs when the sonar was turned on at the beginning of a training event, and reports time until the event is finished. During this period, the MFAS only puts active sound into the water at discrete intervals. Sonar signals are not a continuous source of acoustic energy. For example, surface ship sonar signal consists of a pulse (i.e. ping) less than two seconds long with approximately a minimum of 30 seconds between successive pings (NMFS 2007c).

Given that location planning and mitigation measures are designed to minimize interactions between Navy assets and marine mammals, the observations of marine mammals by Navy assets only occurred as infrequent and very brief encounters, the majority of which occurred when there was no MFAS in use.

COMPTUEX 07-02 Assessment

During COMPTUEX 07-02, 130.5 hours of MFAS use was reported. Of note, this estimate may be missing data from one vessel whose sonar times were not found in classified Navy tracking systems, yet performed mitigation during some sightings. At worst, and in line with other vessels during COMPTUEX 07-02, estimated MFAS use would be between 15-65 hours leading to a total sonar hours of 145.5 to 195.5.

MFAS is only used during carefully reviewed scenarios and for only a small subset of any given exercise time frame. Therefore, as expected in COMPTUEX 07-02, a majority of these mammals were sighted during periods when MFAS was not in use (**Table A-4**). 80 percent of the sightings were in this category. Although there was high-level emphasis placed upon marine mammal protection as mandated by Navy regulation and policy, during COMPTUEX 07-02 there were three instances where MFAS was secured (i.e. transmission stopped) due to sighting of marine mammals during MFAS operation. This represented

10% of the total sighting events, and may have impacted ASW training. Sonar was secured at observed ranges of 50, 4000, and 4000 yards (**Tables A-4 and A-7**). Securing of MFAS at the 4000 yard range is not required under Navy SOP and NDE, and represents an overall conservative mitigation procedure conducted twice by the same MFAS vessel.

There were two sightings where MFAS was powered down per NDE requirements, once at 300 yards and once at 1000 yards.

There were no sightings of marine mammal outside of the mitigation safety zone where MFAS was in use, but no mitigation occurred.

In summary for COMPTUEX 07-02, the reports from exercise participants contained nothing that could be construed as abnormal or "observed effects" of MFAS, or other vessel operations. There were no instances where marine mammals behaved in any erratic, unusual, or anything other than apparently normal manner. There were no reports of ship strikes on marine mammals, and one report of a vessel maneuvering to avoid the path of a marine mammal.

JTFEX 07-03 Assessment

During JTFEX 07-03, 99.9 hours of MFAS use was reported.

MFAS is only used during carefully reviewed scenarios and for only a small subset of any given exercise time frame. During JTFEX 07-03 there were no reported sightings of marine mammals concurrent with MFAS operation, and no reports of MFAS having to be secured due to the presence of marine mammals.

There were no instances where marine mammals behaved in any erratic, unusual, or anything other than apparently normal manner. There were no reports of ship strikes on marine mammals, and one report of a vessel maneuvering to avoid the path of a marine mammal.

JTFEX 07-05 Assessment

During JTFEX 07-05, 47.8 hours of MFAS use was reported.

MFAS is only used during carefully reviewed scenarios and for only a small subset of any given exercise time frame. Therefore, as expected in JTFEX 07-05, a majority of these mammals were sighted during periods when MFAS was not in use (**Table A-6 and A-8**). 83% of the sightings were in this category.

Although there was high-level emphasis placed upon marine mammal protection as mandated by Navy regulation and policy, during JTFEX 07-05 there were five instances where MFAS was secured (i.e., transmission stopped) due to sighting of marine mammals during MFAS operation. This represented 8% of the total sighting events, and may have impacted ASW training. Sonar was secured at observed ranges of 75, 800, 2000, and 2000 yards (**Tables A-6 and A-8**). There were three sightings when MFAS was in use and where the distance to the animal(s) was not recorded by the reporting unit. Securing MFAS at ranges greater than 200 yard range is not required under Navy SOP and NDE, and represents an overall conservative mitigation procedure conducted twice by a single MFAS vessel.

There were six sightings where MFAS was powered down per NDE requirements: unknown range, unknown range, 500, 500, 500, and 1500 yards. There was no explanation for why the unknown ranges were not reported which will be addressed in future marine species awareness training and additional LOI language to stress the importance of this piece of information.

There were no sightings of marine mammal outside of the mitigation safety zone where MFAS was in use, but no mitigation occurred.

There were 12 instances when MFAS was not in use and the vessel changed course to maneuver away from a marine mammal.

In summary for JTFEX 07-05, the reports from exercise participants contained nothing that could be construed as abnormal or "observed effects" of MFAS, or other vessel operations. There were no instances where marine mammals behaved in any erratic, unusual, or anything other than in apparently normal manner. There were no reports of ship strikes on marine mammals, and 12 reports of vessels maneuvering to avoid the path of a marine mammal.

NDE AND BO ASSESSMENT

All 23 Jan 2007 NDE measures promulgated in the *Mid-Frequency Active Sonar Mitigation Measures during Major Training Exercises or within Established DoD Maritime Ranges and Established Operating Areas* (NDE) section were implemented for COMPTUEX 07-02, JTFEX 07-03, and JTFEX 07-05.

Prior to COMPTUEX and JTFEX, the U.S. Navy assessed the physical and oceanographic conditions of the SOCAL OPAREA per NDE Measure 26 "*Increase vigilance during major ASW training exercises with tactical active sonar when critical conditions are present*", and determined that pre-MFAS aerial surveys were not warranted. While there can be complex bottom topography underlying the ocean areas of Southern California (NCCOS 2005), there are no MFAS operations with surrounding land masses, channels, or embayments thought to be contributing factors associated with past strandings of certain beaked whale species in the Atlantic Ocean and Mediterranean Sea (Cox et al. 2006). Therefore, the requirements stated in NDE Measure 26 do not apply to the physical conditions found in Southern California.

In addition to the above assessment of the NDE, the BO calls for a report that evaluates the effectiveness of the U.S. Navy's exercise mitigation measures. As described previously, the three categories of measures, Personnel Training, Lookout and Watchstander Responsibilities, and Operating Procedures as outline in the NDE, appear effective in detecting and responding appropriately to the presence of marine mammals, when observed. For instance, one BO Term and Condition requests the U.S. Navy to estimate the number of ESA listed marine mammals that may have been exposed to received energy level equal to or greater than 173 dB re 1 $\mu Pa^2 \cdot s$.

If a conservative metric of between 1000-1400 yards from a surface ship MFAS is used as an approximate boundary to 173 dB re 1 $\mu Pa^2 \cdot s$, then counts of marine mammals sighting distances during MFAS use from **Tables A-7** and **A-8** can be compared to this distance.

- For COMPTUEX, 54 animals were sighted at ranges less than 1400 yards, representing 20 potential ESA species, and 34 MMPA species (see **Table A-7**). However, in the three cases involved, U.S. Navy mitigation resulted in MFAS either being reduced in power or turned off, which would have reduced or eliminated potential exposures.
- For JTFEX 07-03, no marine animals were sighted within the proscribed mitigation ranges (200, 500, 1000 yards), so no MFAS exposure is expected.
- For JTFEX 07-05, 164 animals were sighted at ranges less than 1400 yards, representing 34 potential ESA species, and 130 MMPA species (see **Table A-7)**. In the eight cases involved, U.S. Navy mitigation resulted in MFAS either being reduced in power or turned off, which would have reduced or eliminated potential exposures. Complicating this assessment is the lack of range to animals for three sightings mentioned previously.

From **Table A-9 Appendix A**, potential exposure estimates are shown based on acoustic impact modeling conducted for the COMPTUEX/JTFEX Environmental Assessment/Overseas Environmental Assessment

(EA/OEA) (DoN 2007). Using an exercise average for ESA species for instance, an estimated 48.2 blue whales (46.4 Level B Sub-TTS + 2.0 Level B), 39.0 fin whales (37.6 Level B Sub-TTS + 1.4 Level B), 4.7 humpback whales (4.7 Level B Sub-TTS + 0 Level B), 0.3 sei whales (0.3 Level B Sub-TTS + 0 Level B), and 9.0 sperm whales (8.4 Level B Sub-TTS + 0.6 Level B) would be predicted to be exposed to MFAS during any given COMPTUEX or JTFEX. By way of comparison, even the 54 and 162 animals from COMPTUEX 07-02 and JTFEX 07-05 are significantly less than the total marine mammals estimated by the model.

The U.S. Navy acknowledges that this discussion does not account for potential marine mammal species not observed, which is a difficult determination even for the marine mammal scientific community, and is seeking to address this issue as discussed below.

As to the effect of MFAS power reduction and securing due to the presence of marine mammals, there is no additional information that can be added at this time as to the operational effect of these events. There is an effort underway within the operational community to try and articulate exactly what kind of relative effect MFAS mitigation measures have on ASW training.

In regards to impacts not associated with MFAS such as ship strikes, the U.S. Navy has a robust ship strike reporting program and reports from COMPTUEX and JTFEX of no ship strikes and of maneuvering to avoid animals provides some evidence that these avoidance measures are effective.

Data Limitations and Improvements

The U.S. Navy is committed to development of robust exercise and long-term range complex monitoring plans that will integrate multiple tools in order to provide better assessment of marine mammal occurrence and possible MFAS effects, or lack of effects.

Future reporting requirements will collect more detailed descriptions on marine mammal behavioral observations by Navy lookouts for validation by NMFS. Improvements to reporting requirements are planned for September 2007 and 2008 exercises to better incorporate non-subjective categories of behavioral description, and instead report "what the observer saw", and how long the observation continued. Adding sea state and visibility reports at the time of sighting may result in a better determination of the effective visual monitoring ranges being reported. While identification to species-level would be optimal, that level of detail may not be immediately obtainable from U.S. Navy lookout reports without further training and testing of alternative methodologies to supplement existing shipboard reports. In accordance with the BO, data collection needs to address these questions will be incorporated into future exercises as the U.S. Navy's exercise monitoring program evolves.

There is no information from which to assess how many, if any, animals not observed by Navy lookouts may or may not have been exposed to MFAS received levels greater than 173 dB re 1 $\mu Pa^2 \cdot s$. Data collection needs to address this question will also be incorporated into future exercises, although this remains a problematic science issue for even non-Navy marine mammal surveys.

Although not conducted specifically for these February 2007 to March 2007 exercises, ship based and aerial monitoring designed in support of future exercise monitoring and future range complex monitoring is being developed by the U.S. Navy. The COMPTUEX/JTFEX Monitoring Plan is being reviewed and enhanced for FY08 implementation. New information on the scope and results from any exercise monitoring will be provided in subsequent U.S. Navy After Action Reports. The U.S. Navy is looking to integrate additional monitoring tools and techniques in future exercises as the exercise and range complex monitoring plans are designed and implemented.

NDE Measure 27 calls for the U.S. Navy to report any dead and floating marine mammals that may be sighted. Since the floating whale carcass observed during COMPTUEX 07-02 was found badly decomposed, the U.S. Navy seeks clarification from NMFS on whether these coincidental encounters with decomposing floating carcasses warrant reporting under the NDE should a similar circumstance be encountered in future exercises. Navy does not believe that repeated reports are required when different units locate the same floating carcass.

Circumstantial evidence for increased natural marine mammal mortality associated with potential algal toxin within California ocean waters during early 2007 is not unexpected and may have contributed to floating pinniped and dolphin carcasses observed during COMPTUEX 07-02 and JTFEX 07-05.

CONCLUSIONS AND SUMMARY

- Marine mammals were sighted 138 times by exercise participants during COMPTUEX 07-02, JTFEX 07-03, and JTFEX 07-05. These sightings reported approximately 2,014 animals.
- In each of these cases, the marine mammals were detected by Navy watchstanders in accordance with Navy standard operational procedures and as reiterated by NDE mitigation measures.
- Observations of marine species and their behaviors, as previously detailed, showed no unusual behaviors due to MFAS use. There were no indications from the observations reported that the presence of exercise participants had any affect on any marine mammals. The U.S. Navy acknowledges that it is difficult to assess the potential exposure to sonar for species not observed, but is willing to address this challenge by integrating other monitoring elements in accordance with the BO.
- There were no ship strikes on marine mammals during these exercises and 13 instances where U.S. Navy vessels maneuvered to avoid crossing a marine mammal's path and increase the separation between the ship and animal.
- In approximately 88% of the instances where marine mammals were detected during COMPTUEX 07-02, JTFEX 07-03, and JTFEX 07-05, MFAS was not operating and there were no mandated sonar shut downs.
- Between combined COMPTUEX 07-02, JTFEX 07-03, and JTFEX 07-05 events, MFAS was secured eight times representing an approximately 6% loss of ASW training opportunities, as well as potentially interrupting the tactical situational awareness of the participating units and ESG/CSG.
- For COMPTUEX 07-02, JTFEX 07-03, and JTFEX 07-05, when marine mammals were observed within 1000 yards of a MFAS ship using sonar regardless of the species, sonar power was either reduced or secured per the mitigation measures until the animals clear the area or the range between the ship and animals increases.
- Improvements to the U.S. Navy lookout reporting procedures will be implemented for future exercises to better capture metrics on weather conditions during the sighting, and more detailed observations of animal behavior.
- The U.S. Navy is committed to development of robust exercise and long-term range complex monitoring plans that will integrate multiple tools in order to provide better assessment of marine mammal occurrence and possible MFAS effects, or lack of effects. FY08 plans may include various mixes of ship and aerial surveys independent of exercise participants, validation by experienced biologist(s) on lookout effectiveness in observing marine mammals, and use of new research and development technologies to advance the state of marine mammal monitoring.

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APPENDIX A- TABLE AND FIGURES

INTRODUCTION

This Appendix contains material supporting the discussion in the U.S. Navy's COMPTUEX/JTFEX After Action Report. It is divided into two Appendices. Appendix A contains tables and figures referred to in the main Report. Appendix B contains the THIRD FLEET Letter of Instruction (LOI) directing exercise participants to comply with NDE and BO conditions, and specifies the exact marine mammal sighting reporting language ships are responsible for providing after the exercise.

Table A-1. SOCAL COMPTUEX and JTFEX in SOCAL between February and March 2007.

CSG/ESG	Event Name	Dates	MFAS Use Reported (hours)
ESG	COMPTUEX 07-02	14 Feb-02 Mar 2007	130 hrs
CSG	JTFEX 07-03	23 Feb-03 Mar 2007	99.9 hrs
ESG	JTFEX 07-05	14-24 Mar 2007	47.8
* This estimate may be missing data from one vessel whose sonar times were not found in classified Navy tracking systems, yet performed mitigation during some sightings. At worst, and in line with other vessels during COMPTUEX 07-02, estimated use would be between 15-65 hours leading to a total sonar hours of 145.5 to 195.5.			

Table A-2. Potential sighting probabilities for select Southern California marine mammal species.

Sighting Probability	Species
Likely Occurrence, Most Likely Seen	**Gray whale (non-ESA listed)** Seasonal migration through Southern California, northward migration occurring during COMPTUEX 07-02, JTFEX 07-03, and JTFEX 07-05 **Fin whale (ESA listed)** Small regional population
Possible Occurrence, Less Likely Seen	**Sperm whale (ESA listed)** Generally seen >2000 meter depth contour. Less common on California shelf waters. Limited visual sighting during Feb-Mar. **Humpback whale (ESA listed)** Wintering grounds possibly off Mexico. Limited visual sighting during Feb-Mar. **Guadalupe fur seal (ESA listed)** Small population, limited breeding on southern California Channel Islands.
Not Expected to Be Seen	**Blue whale (ESA listed)** Not common winter Southern California species, limited to no acoustic and visual sightings Feb-Mar. **Sei whale (ESA listed)** Very rare in Southern California. Only three visual sightings since 1970, may prefer water temperatures greater than 21C

Table A-3. Visual detections of cetaceans over California Cooperative Oceanic Fisheries Investigations (CalCOFI) cruises from July 2004–November 2005. Total number of individuals sighted per species for each trip (Table from: Soldevilla et al. 2006).

	Jul. 2004	Nov. 2004	Jan. 2005	Apr. 2005	Jul. 2005	Nov. 2005	Total
Blue whale	9	7	–	–	14	–	30
Fin whale	11	9	–	2	7	32	61
Gray whale	–	1	4	–	–	–	5
Humpback whale	2	22	–	17	7	7	55
Minke whale	–	–	–	1	2	1	4
Sperm whale	14	–	–	5	5	3	27
Killer whale	–	–	–	–	6	–	6
Baird's beaked whale	20	–	–	–	–	–	20
Cuvier's beaked whale	2	4	–	–	–	–	6
Unid. beaked whale	–	2	–	–	–	–	2
Unid. whale	34	25	6	7	18	6	96
Common dolphin—short-beaked	1657	1946	2421	440	2184	412	9060
Common dolphin—long-beaked	475	3729	60	1650	1084	235	7233
Common dolphin—unid. spp	843	852	29	32	3481	1621	6858
Risso's dolphin	17	102	12	26	–	235	392
Northern right whale dolphin	–	2	5	299	3	14	323
Pacific white-sided dolphin	25	183	44	157	81	2	492
Rough-toothed dolphin	–	–	–	9	–	–	9
Striped dolphin	77	–	–	–	–	–	77
Bottlenose dolphin	30	11	–	20	–	56	117
Unid. dolphin	900	2204	1220	183	207	392	5106
Dall's porpoise	2	–	21	58	–	17	98
Harbor porpoise	2	–	–	–	–	–	2
Total individuals sighted	4120	9099	3822	2906	7099	3033	30079

Table A-4. Marine mammal sightings and actions by exercise participants during COMPTUEX 07-02.
Text in red **Bold** indicate events when MFAS was in use and secured due to marine mammal mitigation. Red text in *Italics* indicates when MFAS was in use, but mitigation other than securing sonar enacted.

Date-Time (local)	Ship Type	Description of Actions Taken	# of animals	Animal Type
02/15-1708	MFAS ship	Surface ships sights 2 "whales" traveling at 800 yards. MFAS NOT in use. No action taken.	2	whale
02/15-0905	MFAS ship	Surface ships sights 1 "dolphin" traveling at 20 yards. MFAS NOT in use. No action taken.	1	dolphin
02/15-1005	*non- MFAS ship*	Surface ships sights 30 "porpoises" traveling at 50 yards. NO MFAS on ship. No action taken.	30	dolphin
02/15-0534	*non- MFAS ship*	Surface ships sights 3 "whales" traveling at 1000 yards. NO MFAS on ship. No action taken.	3	whale
02/17-0921	MFAS ship	Surface ships sights 1 "pilot whale" resting at 800 yards. MFAS NOT in use. No action taken.	1	sm whale
02/17-1137	MFAS ship	Surface ships sights 1 "whale" resting at 4000 yards. MFAS NOT in use. No action taken.	1	whale
02/20-0747	MFAS ship	Surface ships sights 4 "dolphins" bow riding at 15 yards. MFAS NOT in use. No action taken.	4	dolphin
02/20-0714	MFAS ship	Surface ships sights 3 "whales" traveling at 10000 yards (5 nm). MFAS NOT in use. No action taken.	3	whale
02/20-0910	MFAS ship	Surface ships sights 1 "whale" traveling at 4000 yards (2 nm). **MFAS IN USE. Sonar secured.**	1	whale
02/20-0910	MFAS ship	Surface ships sights 20 "dolphins" traveling at 4000 yards (2 nm). **MFAS IN USE. Sonar secured.**	20	dolphin
02/20-0834	MFAS ship	Surface ships sights 1 "pilot whale" traveling at 11000 yards. MFAS NOT in use. No action taken.	1	sm whale
02/20-1103	MFAS ship	Surface ships sights 4 "pilot whales" traveling at 300 yards. ***MFAS IN USE. Reduce by 10dB*.**	4	sm whale
02/21-0801	MFAS ship	Surface ships sights 20 "whales" traveling at 1000 yards. ***MFAS IN USE. Reduce dB and ship speed*.**	20	whale
02/21-0830	*non- MFAS ship*	Surface ships sights 20 "dolphins" closing to bow riding at 1000 yards. NO MFAS on ship. No action taken.	20	dolphin
02/21-0845	MFAS ship	Surface ships sights 30 "dolphins" traveling at 26000 yards. MFAS NOT in use. No action taken.	30	dolphin
02/22-1030	MFAS ship	Surface ships sights 1 "**dead whale**" floating at 1000 yards. MFAS NOT in use. No action taken.	x	dead whale
02/22-1100	*non- MFAS ship*	Surface ships sights 1 "**dead whale**" floating near bow. NO MFAS on ship. No action taken.	x	dead whale
02/23-1604	MFAS ship	Surface ships sights 1 "**dead whale**" floating at 500 yards. MFAS NOT in use. No action taken.	x	dead whale
02/24-1345	MFAS ship	Surface ships sights 1 "whale" traveling at 2000 yards. MFAS NOT in use. No action taken.	1	whale
02/25-1355	*non- MFAS ship*	Surface ships sights 1 "**dead sea lion**" floating at 300 yards. NO MFAS on ship. No action taken.	x	dead sea lion
02/25-1428	*non- MFAS ship*	Surface ships sights 1 "seal" traveling at 500 yards. NO MFAS on ship. No action taken.	1	seal
02/25-1444	*non- MFAS ship*	Surface ships sights 1 "whale" traveling at 500 yards. NO MFAS on ship. No action taken.	1	whale

Date-Time (local)	Ship Type	Description of Actions Taken	# of animals	Animal Type
02/25-1636	*non- MFAS ship*	Surface ships sights 60-80 "dolphins" traveling at 1000-10000 yards. NO MFAS on ship. No action taken.	80	dolphin
02/27-0646	*non- MFAS ship*	Surface ships sights 100 "dolphins" traveling at 1000-10000 yards. NO MFAS on ship. No action taken.	100	dolphin
02/28-0818	MFAS ship	Surface ships sights 20 "dolphins" traveling at 500 yards. MFAS NOT in use. No action taken.	20	dolphin
02/28-1048	MFAS ship	Surface ships sights 20 "dolphins" traveling at 20 yards. MFAS NOT in use. No action taken.	20	dolphin
02/28-1425	MFAS ship	Surface ships sights 30 "dolphins" traveling at 50 yards. **MFAS IN USE. Sonar secured.**	30	dolphin
03/01-1115	MFAS ship	Surface ships sights 2 "whales" traveling at 6 yards. MFAS NOT in use. **Ship maneuvers to avoid.**	2	whale
03/01-1145	MFAS ship	Surface ships sights 5 "whales" traveling at 1000 yards. MFAS NOT in use. No action taken.	5	whale
03/01-1615	MFAS ship	Surface ships sights 3 "whales" traveling at 2000 yards. MFAS NOT in use. No action taken.	3	whale
	30 (26 + 4 dead)	= total sighting events total number of animals =	**404**	

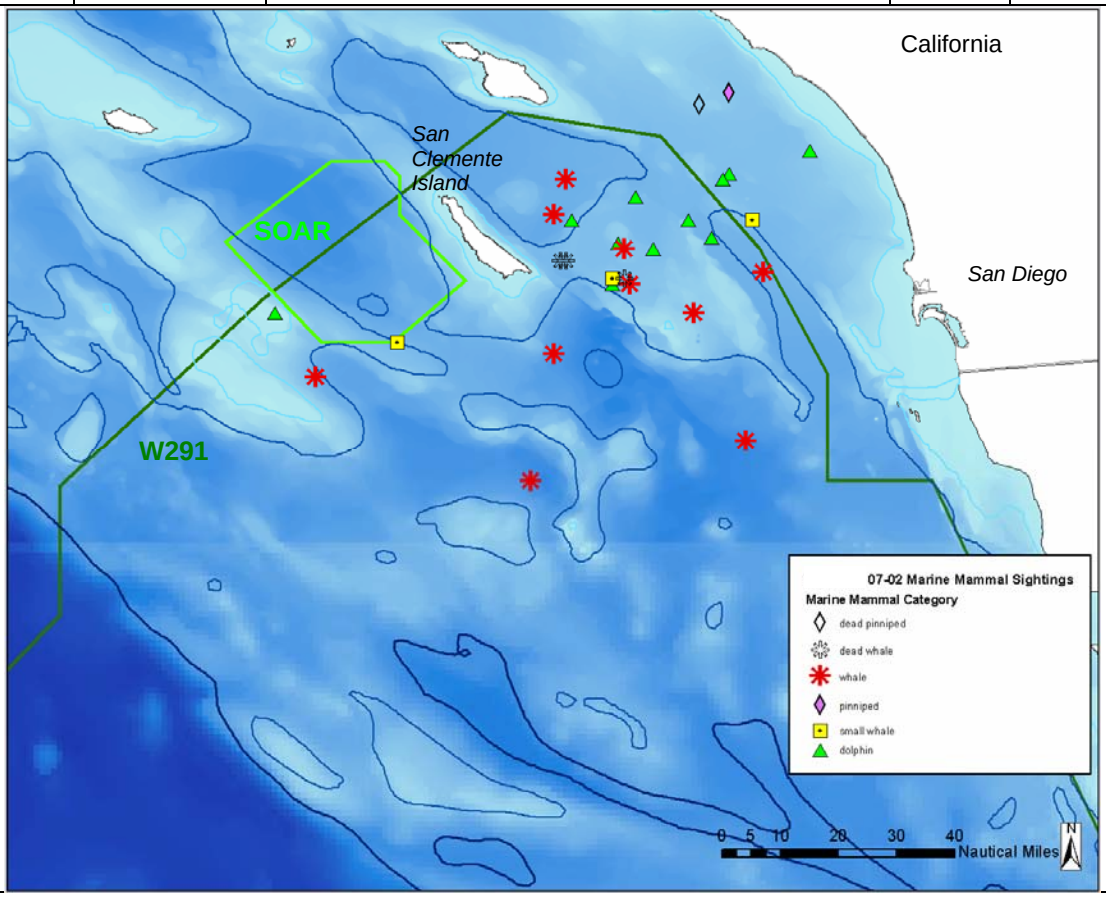

Table A-5. Marine mammal sightings and actions by exercise participants during JTFEX 07-03. Text in red **Bold** indicate events when MFAS was in use and secured due to marine mammal mitigation. Red text in *Italics* indicates when MFAS was in use, but mitigation other than securing sonar enacted.

Date-Time (local)	Ship Type	Description of Actions Taken	# of animals	Animal Type
02/15-1110	MFAS ship	Surface ships sights 1 "dolphin" jumping at 300 yards. MFAS NOT in use. No action taken.	1	dolphin
02/23-1432	MFAS ship	Surface ships sights 20+ "dolphins" jumping at 300 yards. MFAS NOT in use. No action taken.	20	dolphin
02/24-0747	MFAS ship	Surface ships sights 100+ "dolphins" bow riding at 50 yards. MFAS NOT in use. No action taken.	100	dolphin
02/24-0824	MFAS ship	Surface ships sights 70 "dolphins" swimming at 500 yards. MFAS NOT in use. No action taken.	70	dolphin
02/24-0958	MFAS ship	Surface ships sights 15 "dolphins" traveling at 1700 yards. MFAS NOT in use. No action taken.	15	dolphin
02/24-1154	MFAS ship	Surface ships sights 1 "whale" traveling at 1200 yards. MFAS NOT in use. No action taken.	1	whale
02/24-1408	MFAS ship	Surface ships sights 20+ "dolphins" traveling at 100 yards. MFAS NOT in use. No action taken.	20	dolphin
02/24-1623	MFAS ship	Surface ships sights 1 "large whale" milling at 1000 yards. MFAS NOT in use. No action taken.	1	large whale
02/25-0924	MFAS ship	Surface ships sights 1 "whale" traveling at 4000 yards. MFAS NOT in use. No action taken.	1	whale
02/25-0924	MFAS ship	Surface ships sights 4 "whales" spouting at 4000 yards. MFAS NOT in use. No action taken.	4	whale
02/25-0924	MFAS ship	Surface ships sights 1 "pilot whale" traveling at 500 yards. MFAS NOT in use. No action taken.	1	small whale
02/25-1031	MFAS ship	Surface ships sights 2 "dolphins" traveling at 1000 yards. MFAS NOT in use. No action taken.	2	dolphin
02/25-1112	MFAS ship	Surface ships sights 3 "dolphins" traveling at 400 yards. MFAS NOT in use. No action taken.	3	dolphin
02/25-1128	MFAS ship	Surface ships sights 30 "dolphins" jumping at 20 yards. MFAS NOT in use. No action taken.	30	dolphin
02/25-1128	MFAS ship	Surface ships sights 1 "sea lion" traveling at 300 yards. MFAS NOT in use. No action taken.	1	sea lion
02/25-1130	MFAS ship	Surface ships sights 6 "small whales" milling at 4000 yards. MFAS NOT in use. No action taken.	6	small whale
02/25-1130	MFAS ship	Surface ships sights 20+ "dolphins" traveling at 4000 yards. MFAS NOT in use. No action taken.	20	dolphin
02/25-1518	MFAS ship	Surface ships sights 2 "dolphins" traveling at 10 yards. MFAS NOT in use. No action taken.	2	dolphin
02/25-1700	MFAS ship	Surface ships sights 250 "dolphins" traveling at 1000 yards. MFAS NOT in use. No action taken.	250	dolphin
02/25-1733	MFAS ship	Surface ships sights unknown number of "dolphins" traveling at 100 yards. MFAS NOT in use. Ship maneuvered.	?	dolphin
02/25-1745	MFAS ship	Surface ships sights 10 "dolphins" jumping at 100 yards. MFAS NOT in use. No action taken.	10	dolphin
02/26-1110	MFAS ship	Surface ships sights 20 "dolphins" traveling at 500 yards. MFAS NOT in use. No action taken.	20	dolphin

Date-Time (local)	Ship Type	Description of Actions Taken	# of animals	Animal Type
02/26-1112	MFAS ship	Surface ships sights 2 "whales" traveling at 200 yards. MFAS NOT in use. No action taken.	2	whale
02/26-1112	MFAS ship	Surface ships sights 15 "dolphins" traveling at 500 yards. MFAS NOT in use. No action taken.	15	dolphin
02/26-1112	MFAS ship	Surface ships sights 8 "dolphins" bow riding at 10 yards. MFAS NOT in use. No action taken.	8	dolphin
02/26-1128	MFAS ship	Surface ships sights 6 "dolphins" bow riding at 10 yards. MFAS NOT in use. No action taken.	6	dolphin
02/26-1642	MFAS ship	Surface ships sights 17 "dolphins" swimming at 2000 yards. MFAS NOT in use. No action taken.	17	dolphin
02/26-1706	MFAS ship	Surface ships sights 1 "whale" swimming at 500 yards. MFAS NOT in use. No action taken.	1	whale
02/26-1711	MFAS ship	Surface ships sights 4 "dolphins" swimming at 500 yards. MFAS NOT in use. No action taken.	4	dolphin
02/27-0808	MFAS ship	Surface ships sights 6-8 "dolphins" bow riding at 10 yards. MFAS NOT in use. No action taken.	8	dolphin
02/27-0856	MFAS ship	Surface ships sights 5-6 "dolphins" bow riding at 10 yards. MFAS NOT in use. No action taken.	6	dolphin
02/27-1512	MFAS ship	Surface ships sights 5 "dolphins" swimming at 100 yards. MFAS NOT in use. No action taken.	5	dolphin
02/27-1814	MFAS ship	Surface ships sights several "whales" traveling at 1000 yards. MFAS NOT in use. Ship maneuvered.	?	whale
03/01-1430	MFAS ship	Surface ships sights 1 "humpback whale" jumping at 100 yards. MFAS NOT in use. No action taken.	1	whale
03/02-0800	MFAS ship	Surface ships sights 1 "dolphin" spouting at 4000 yards. MFAS NOT in use. No action taken.	1	dolphin
03/02-1128	MFAS ship	Surface ships sights 200 "dolphins" jumping at 100 yards. MFAS NOT in use. No action taken.	200	dolphin
03/02-1750	MFAS ship	Surface ships sights 1 "whale" swimming at 1000 yards. MFAS NOT in use. No action taken.	1	whale
03/03-1006	MFAS ship	Surface ships sights 2 "dolphins" jumping at 300 yards. MFAS NOT in use. No action taken.	2	dolphin
03/03-1006	MFAS ship	Surface ships sights 8 "dolphins" swimming at 1000 yards. MFAS NOT in use. No action taken.	8	dolphin
03/05-0620	MFAS ship	Surface ships sights 15 "dolphins" bow riding at 180 yards. MFAS NOT in use. No action taken.	15	dolphin
03/05-0957	MFAS ship	Surface ships sights 1 "whale" jumping at 2000 yards. MFAS NOT in use. No action taken.	1	whale
03/05-0958	MFAS ship	Surface ships sights 2 "seals" swimming at 500 yards. MFAS NOT in use. No action taken.	2	seal
	42	= total sighting events total number of animals =	**881**	

Date-Time (local)	Ship Type	Description of Actions Taken	# of animals	Animal Type

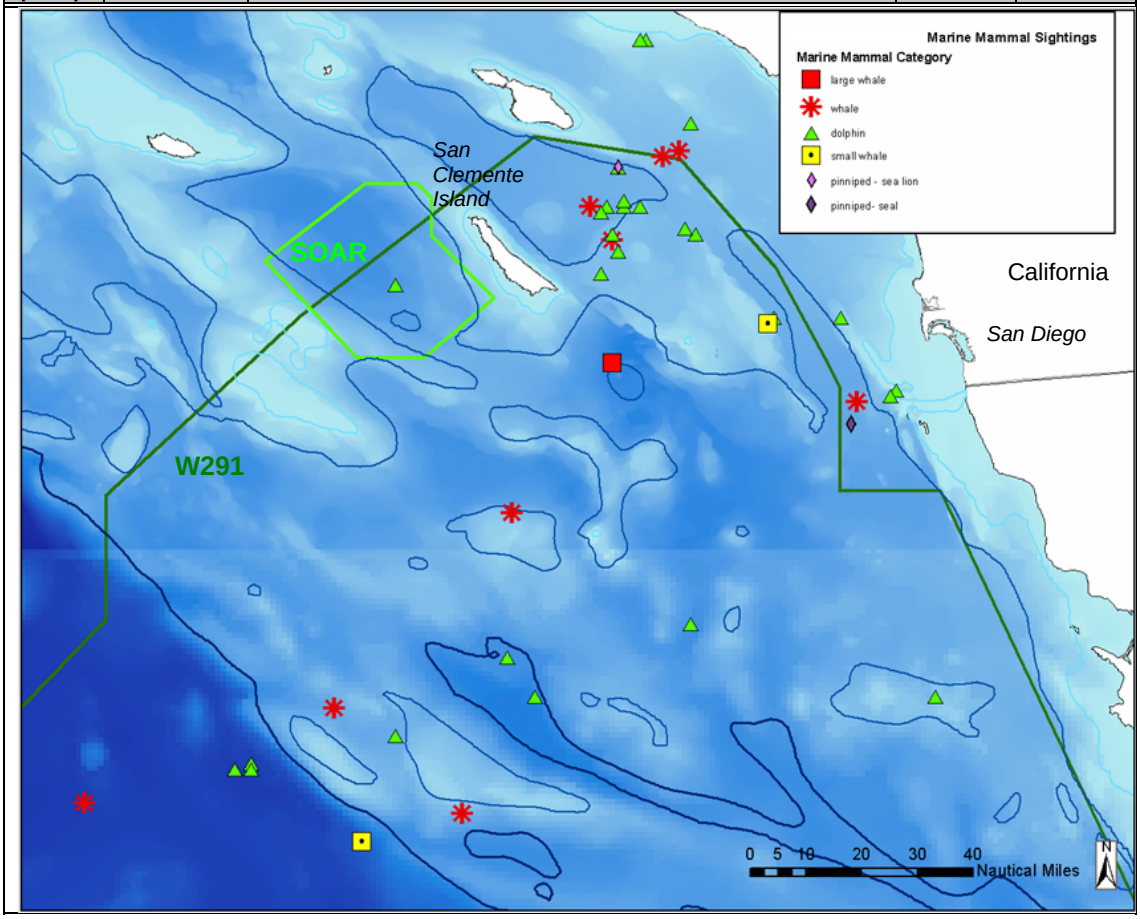

Table A-6. Marine mammal sightings and actions by exercise participants during JTFEX 07-05.
Text in red **Bold** indicate events when MFAS was in use and secured due to marine mammal mitigation. Red text in *Italics* indicates when MFAS was in use, but mitigation other than securing sonar enacted.

Date-Time (local)	Ship Type	Description of Actions Taken	# of animals	Animal Type
03/14-0838	MFAS ship	Surface ship sights 10 "sm whales" milling at 4000 yards. MFAS NOT in use. **Ship alters course.**	10	sm whale
03/14-1020	MFAS ship	Surface ship sights 2 "lg whales" traveling at 700 yards. MFAS NOT in use. No action taken.	2	lg whale
03/14-1207	MFAS ship	Surface ship sights 2 "sm whales" traveling at 2000 yards. MFAS NOT in use. **Ship alters course.**	2	sm whale
03/14-1344	MFAS ship	Surface ship sights 1 "sm whale" traveling at 200 yards. MFAS NOT in use. **Ship alters course.**	1	sm whale
03/14-1613	MFAS ship	Surface ship sights 1 "lg whale" traveling at 3000 yards. MFAS NOT in use. **Ship alters course.**	1	lg whale
03/14-1642	MFAS ship	Surface ship sights 2 "sea lions" milling at 20 yards. MFAS NOT in use. No action taken.	2	pinniped
03/15-0700	MFAS ship	Surface ship sights 2 "lg whales" traveling at 3000 yards. MFAS NOT in use. **Ship alters course.**	2	lg whale
03/15-0715	MFAS ship	Surface ship sights 3 "dolphins" traveling at 2000 yards. MFAS NOT in use. No action taken.	3	dolphin
03/15-0753	MFAS ship	Surface ship sights 1 "sm whale" traveling at 1000 yards. MFAS NOT in use. No action taken.	1	sm whale
03/15-0822	MFAS ship	Surface ship sights 2 "pilot whales" traveling at 1000 yards. MFAS NOT in use. No action taken.	2	sm whale
03/15-0826	MFAS ship	Surface ship sights 17 "dolphins" traveling at 200 yards. MFAS NOT in use. **Ship alters course.**	17	dolphin
03/15-0826	MFAS ship	Surface ship sights 3 "dolphins" traveling at 500 yards. MFAS NOT in use. No action taken.	3	dolphin
03/15-0949	MFAS ship	Surface ship sights 9 "sm whales" traveling at 1000 yards. MFAS NOT in use. **Ship alters course.**	9	sm whale
03/15-1028	MFAS ship	Surface ship sights 5 "dolphins" milling at 1000 yards. MFAS NOT in use. No action taken.	5	dolphin
03/15-1054	MFAS ship	Surface ship sights "several hundred dolphins" playing at 3800 yards. MFAS NOT in use. No action taken.	100	dolphin
03/15-1258	MFAS ship	Surface ship sights 1 to 4 "lg whales" traveling forward to aft at unknown range. **MFAS IN USE. Sonar secured.**	4	lg whale
03/15-1427	MFAS ship	Surface ship sights 4 "dolphins" traveling at 100 yards. MFAS NOT in use. No action taken.	4	dolphin
03/15-1545	MFAS ship	Surface ship sights 4 "dolphins" traveling at 4000 yards. MFAS NOT in use. No action taken.	4	dolphin
03/15-1622	MFAS ship	Surface ship sights 40 "dolphins" traveling at 4000 yards. MFAS NOT in use. No action taken.	40	dolphin
03/15-1647	MFAS ship	Surface ship sights 1 "dolphin" at unknown range. MFAS NOT in use. No action taken.	1	dolphin
03/15-1753	MFAS ship	Surface ship sights 1 "whale" traveling at 500 yards. MFAS NOT in use. No action taken.	1	whale
03/15-2245	MFAS ship	Surface ship sights 1 "lg whale" traveling at 1500 yards. **MFAS IN USE. Reduce dB. *Ship alters course.***	1	lg whale
03/16-0724	MFAS ship	Surface ship sights 1 "**deceased seal**" at unknown range. MFAS NOT in use. No action taken.	x	dead pinniped

Date-Time (local)	Ship Type	Description of Actions Taken	# of animals	Animal Type
03/16-1736	MFAS ship	Surface ship sights 1 "**deceased seal or sea lion**" at 10 yards. MFAS NOT in use. No action taken.	x	dead pinniped
03/17-0700	MFAS ship	Surface ship sights 2 "lg whales" traveling at 500 yards. MFAS NOT in use. No action taken.	2	lg whale
03/17-0801	*non- MFAS ship*	Surface ship sights 12 "dolphins" closing to bow-ride at 1000 yards. Non-MFAS equipped ship. No action taken.	12	dolphin
03/17-0910	MFAS ship	Surface ship sights 4 "dolphins" at 10 yards. MFAS NOT is use. No action taken.	4	dolphin
03/17-1304	MFAS ship	Surface ship sights 3 "dolphins" at 200 yards. MFAS NOT is use. No action taken.	3	dolphin
03/18-0050	*non- MFAS ship*	Surface ship sights 1 "whale" milling at 300 yards. Non-MFAS equipped ship. Ship alters course.	1	whale
03/18-0111	MFAS ship	Surface ship sights 1 "sm humpback whale" traveling at 4000 yards. MFAS NOT in use. No action taken.	1	lg whale
03/18-0153	*non- MFAS ship*	Surface ship sights 1 "**deceased sea lion**" at unknown range. Non-MFAS equipped ship. No action taken.	x	dead pinniped
03/18-0832	MFAS ship	Surface ship sights 100+ "dolphins" traveling/feeding at 1000 yards. MFAS NOT in use. No action taken.	100	dolphin
03/18-0919	MFAS ship	Surface ship sights 6 "dolphins" traveling at 2000 yards. MFAS NOT in use. No action taken.	6	dolphin
03/18-1231	MFAS ship	Surface ship sights 20 "dolphins" traveling at 75 yards. **MFAS IN USE. Sonar secured.**	20	dolphin
03/18-1301	MFAS ship	Surface ship sights 1 "humpback whale" traveling at 4000 yards. MFAS NOT in use. No action taken.	1	lg whale
03/18-1603	MFAS ship	Surface ship sights 1 "whale" traveling at 2000 yards. **MFAS IN USE. Sonar secured.**	1	whale
03/18-1614	MFAS ship	Surface ship sights 10 "blue whales" traveling at 800 yards. **MFAS IN USE. Sonar secured.**	10	lg whale
03/18-1733	MFAS ship	Surface ship sights 2 "whales" traveling at 6000 yards. MFAS NOT in use. No action taken.	2	whale
03/18-1802	MFAS ship	Surface ship sights 100 "dolphins" traveling at 500 yards. ***MFAS IN USE. Sonar reduce -16 dB.***	100	dolphin
03/18-1843	MFAS ship	Surface ship sights 10 "whales" traveling unknown range. ***MFAS IN USE. Sonar dB reduced.***	10	whale
03/18-1949	MFAS ship	Surface ship sights 10 "whales" traveling unknown range. ***MFAS IN USE. Sonar dB reduced.***	10	whale
03/19-0610	MFAS ship	Surface ship sights 2 "whales" traveling at 2000 yards. MFAS NOT in use. No action taken.	2	whale
03/19-0613	MFAS ship	Surface ship sights 6 "dolphins" traveling at 500 yards. MFAS NOT in use. No action taken.	6	dolphin
03/19-0650	MFAS ship	Surface ship sights 1 "lg whale" traveling at 2000 yards. **MFAS IN USE. Sonar secured. Ship alters course.**	1	lg whale
03/19-0745	*non- MFAS ship*	Surface ship sights 5 "bottlenose dolphins" traveling at 500 yards. Non-MFAS equipped ship. No action taken.	5	dolphin
03/19-0752	MFAS ship	Surface ship sights 2 "seals" traveling at 500 yards. ***MFAS IN USE. Sonar reduce -10 dB.***	2	pinniped
03/19-0753	MFAS ship	Surface ship sights 1 "whale" traveling at 15000 yards. MFAS NOT in use. No action taken.	1	whale

Date-Time (local)	Ship Type	Description of Actions Taken	# of animals	Animal Type
03/19-0755	MFAS ship	Surface ship sights 4 "pilot whales" traveling at 2000 yards. MFAS NOT in use. No action taken.	4	sm whale
03/19-0819	*non- MFAS ship*	Surface ship sights 7 "dolphins" closing to bow-ride at 500 yards. Non-MFAS equipped ship. No action taken.	7	dolphin
03/19-0928	MFAS ship	Surface ship sights 10 "seals" traveling at 1700 yards. MFAS NOT in use. No action taken.	10	pinniped
03/19-1019	*non- MFAS ship*	Surface ship sights 100 "dolphins" traveling at 1500 yards. Non-MFAS equipped ship. No action taken.	100	dolphin
03/19-1056	*non- MFAS ship*	Surface ship sights 2 "dolphins" traveling at 100 yards. Non-MFAS equipped ship. No action taken.	2	dolphin
03/19-1056	*non- MFAS ship*	Surface ship sights 2 "dolphins" traveling at 2000 yards. Non-MFAS equipped ship. No action taken.	2	dolphin
03/19-1106	MFAS ship	Surface ship sights 1 "whale" traveling at 1500 yards. MFAS NOT in use. No action taken.	1	whale
03/19-1111	MFAS ship	Surface ship sights 20 "whales" traveling at 12000 yards. MFAS NOT in use. No action taken.	20	whale
03/19-1127	MFAS ship	Surface ship sights 10 "dolphins" traveling at 1300 yards. MFAS NOT in use. No action taken.	13	dolphin
03/19-1332	*non- MFAS ship*	Surface ship sights 1 "**deceased sea lion**" at 800 yards. Non-MFAS equipped ship. No action taken.		dead pinniped
03/19-1337	MFAS ship	Surface ship sights 8 "dolphins" traveling at 500 yards. ***MFAS IN USE. Sonar reduce -10 dB.***	8	dolphin
03/19-1546	*non- MFAS ship*	Surface ship sights 1 "humpback whale" traveling at 400 yards. Non-MFAS equipped ship. No action taken.	1	lg whale
03/20-0920	MFAS ship	Surface ship sights 1 "lg whale" traveling at 1000 yards. MFAS NOT in use. No action taken.	1	lg whale
03/20-1156	MFAS ship	Surface ship sights 2 "fin whales" feeding at 4000 yards. MFAS NOT in use. **Ship alters course.**	2	lg whale
03/22-1149	*non- MFAS ship*	Surface ship sights 12 "bottlenose dolphins" at 350 yards. Non-MFAS equipped ship. **Ship alters course.**	12	dolphin
03/23-0701	*non- MFAS ship*	Surface ship sights 20 "bottlenose dolphins" traveling at 2350 yards. Non-MFAS equipped ship. **Ship alters course.**	20	dolphin
03/23-1016	*non- MFAS ship*	Surface ship sights 1 "whale" traveling at 50 yards. Non-MFAS equipped ship. **Ship alters course.**	1	whale
03/23-1312	*non- MFAS ship*	Surface ship sights 10 "dolphins" traveling at 50 yards. Non-MFAS equipped ship. **Ship alters course.**	10	dolphin
03/24-1123	*non- MFAS ship*	Surface ship sights 1 "**deceased dolphin**" at 500 yards. Non-MFAS equipped ship. No action taken.	x	dead dolphin
	66 (61 + 5 dead)	= total sighting events total number of animals =	**729**	

Date-Time (local)	Ship Type	Description of Actions Taken	# of animals	Animal Type

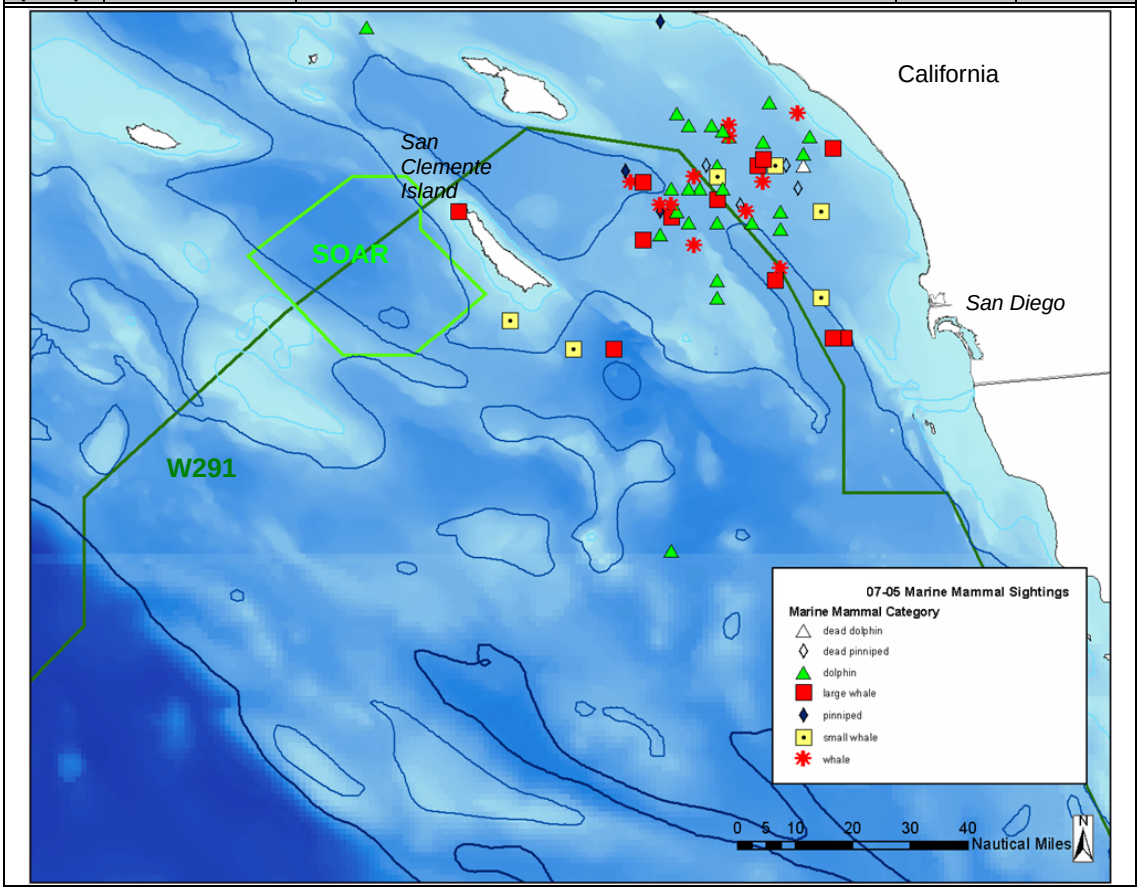

Table A-7. Sightings during COMPTUEX 07-02 where MFAS mitigation occurred.

(**Bold**= potential ESA species).

Assessment by Date				
Date	**Range (yards)**	**Animal Type**	**MFAS Action**	**Potential Exposure per NDE and BO**
2/20	4000	**1 whale**	Secured	Not probable, sonar secured >NDE requirement
2/20	4000	20 dolphins	Secured	Not probable, sonar secured >NDE requirement
2/20	300	4 pilot whales	Reduce power	Not probable, sonar reduced -10dB per NDE requirement
2/21	1000	**20 whales**	Reduce power	Not probable, sonar reduced >NDE requirement
2/28	50	30 dolphins	Secured	Possible

Assessment by Range			
Range	**ESA species (potential)**	**MMPA species**	**Comments**
200 yards- Sonar secured (turned off)	0	30 dolphins	Secured when animals initially observed at 50-yards
500 yards- Sonar reduced -10 dB	0	4 pilot whales	Reduced power when observed at 300-yards
1000 yards- Sonar reduced -6 dB	20 whales		Reduced power when observed at 1000-yards

Table A-8. Sightings during JTFEX 07-05 where MFAS mitigation occurred.

(**Bold**= potential ESA species).

Assessment by Date				
Date	**Range (yards)**	**Animal Type**	**MFAS Action**	**Potential Exposure per NDE**
3/15	unk	**1-4 lg whale**	Secured	Possible
3/15	1500	**1 lg whale**	Reduce power	Not probable, sonar power reduced >NDE requirement
3/18	75	20 dolphins	Secured	Possible
3/18	800	**10 blue whales**	Secured	Possible
3/18	2000	**1 lg whale**	Secured	Not probable, sonar secured >NDE requirement
3/18	unk	**10 whales**	Reduce power	Possible
3/18	unk	**10 whales**	Reduce power	Possible
3/18	500	100 dolphins	Reduce power	Not probable, sonar power reduced -16dB >NDE requirement
3/19	2000	**1 lg whale**	Secured	Not probable, sonar secured per NDE requirement
3/19	500	2 seals	Reduce power	Not probable, sonar power reduced -10dB per NDE requirement
3/19	500	8 dolphins	Reduce power	Not probable, sonar power reduced -10dB per NDE requirement

Assessment by Range			
Range	**ESA species (potential)**	**MMPA species**	**Comments**
200 yards- Sonar secured (turned off)	1-4 lg whale 10 whales 10 whales	 20 dolphins	Secured at unknown range to observation Reduced at unknown range to observation Reduced at unknown range to observation Secured when initially observed at 75-yrds
500 yards- Sonar reduced -10 dB		100 dolphins 2 seals 8 dolphins	Reduced when initially observed at 500-yrds Reduced when initially observed at 500-yrds Reduced when initially observed at 500-yrds
1000 yards- Sonar reduced -6 dB	10 blue whales		Secured when initially observed at 800-yrds

Table A-9. Total annual exposures for sonar and underwater detonations (*left*) from DoN 2007 based on 7 exercise per year (COMPTUEX/JTFEX EA/OES Table 4.3-38), and estimated exposures per exercise (*right*).

Species	DoN 2007 annual exposures			Estimated singe exercise exposures		
	Level B Sub TTS	Level B	Level A	Level B Sub TTS	Level B	Level A
ESA-listed						
Blue whale	325	14	0	46.4	2.0	0
Fin whale	263	10	0	37.6	1.4	0
Humpback whale	33	0	0	4.7	0	0
Sei whale	2	0	0	0.3	0	0
Sperm whale	59	4	0	8.4	0.6	0
Non-ESA listed						
Gray whale	64	0	0	9.1	0	0
Bryde's whale	2	0	0	0.3	0	0
Minke whale	24	2	0	3.4	0.3	0
Baird's beaked whale	4	0	(4)*	0.6	0	0.6
Cuvier's beaked whale	208	10	(218)*	29.7	1.4	31.1
Mesoplodon spp.	0	0	0	0	0	0
Ziphiid beaked whale	49	3	(52)*	7.0	0.4	7.4
Dwarf sperm whale	0	0	0	0.0	0	0
False killer whale	16	0	0	2.3	0	0
Killer whale	12	1	0	1.7	0.1	0
Pygmy sperm whale	859	56	0	122.7	8.0	0
Short-finned pilot whale	0	0	0	0	0	0
Bottlenose dolphin	516	30	0	73.7	4.3	0
Common dolphin	69,258	3,491	35	9,894.0	498.7	5.0
Dall's porpoise	142	3	0	20.3	0.4	0
Northern right whale dolphin	3,003	227	0	429.0	32.4	0
Pacific white-sided dolphin	1,949	101	0	278.4	14.4	0
Pantropical spotted dolphin	547	6	0	78.1	0.9	0
Risso's dolphin	2,050	96	0	292.9	13.7	0
Rough-toothed dolphin	0	0	0	0	0	0
Striped dolphin	1,554	78	0	222.0	11.1	0
California sea lion	0	0	0	0	0	0
Northern elephant seal	0	0	0	0	0	0
Pacific harbor seal	6	0	0	0.9	0	0

* ALL predicted beaked whale Level B exposures counted as Level A exposures.

Figure A-1. General Southern California Operating Area (draft figure from SOCAL EIS).

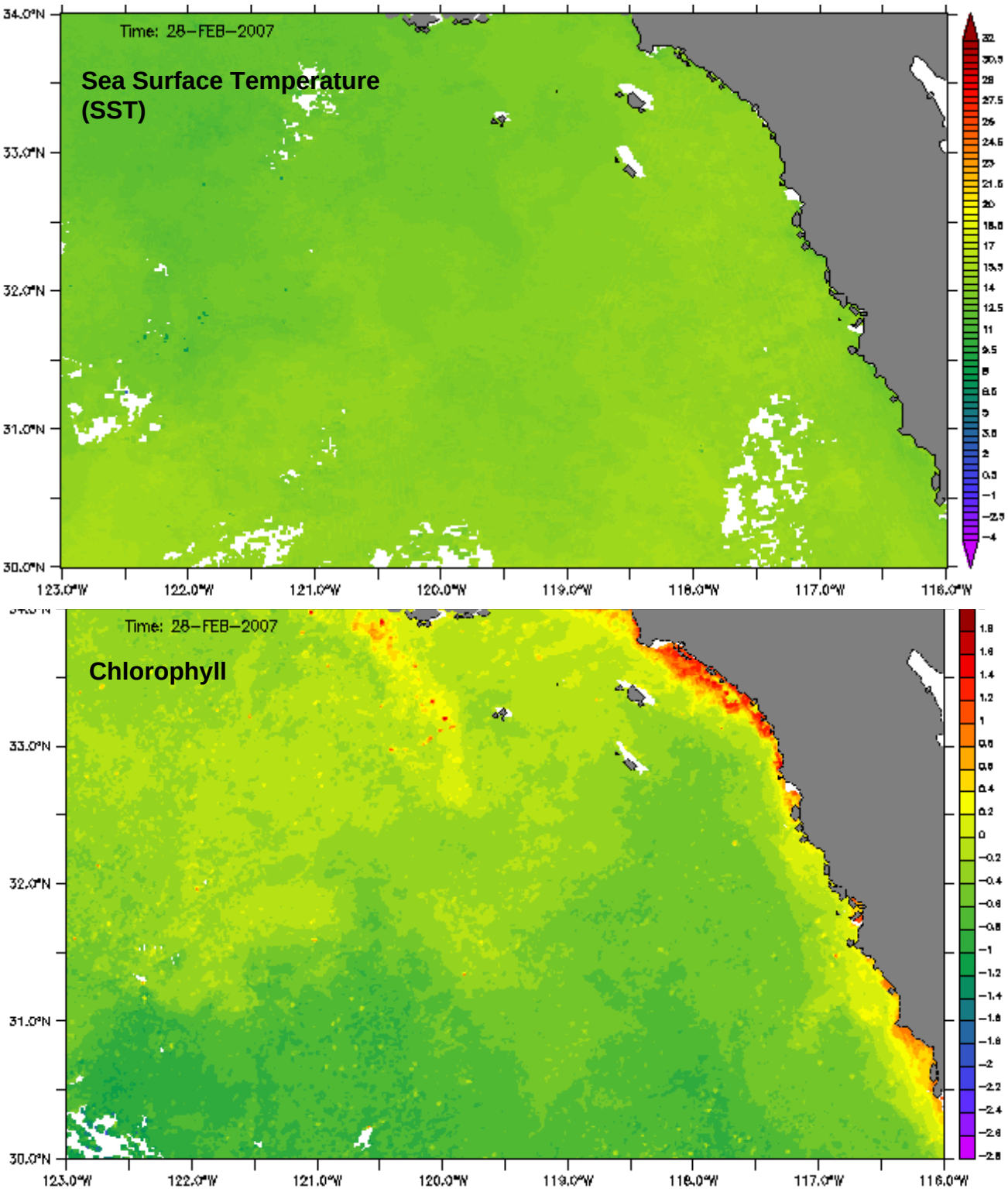

Figure A-2. SST (top) and Chlorophyll (bottom) conditions for Southern California, 14-day composite ending 28 Feb 2007.
Data from: CoastWatch and Southwest Fisheries Science Center, NMFS.
http://las.pfeg.noaa.gov/oceanWatch/oceanwatch.php

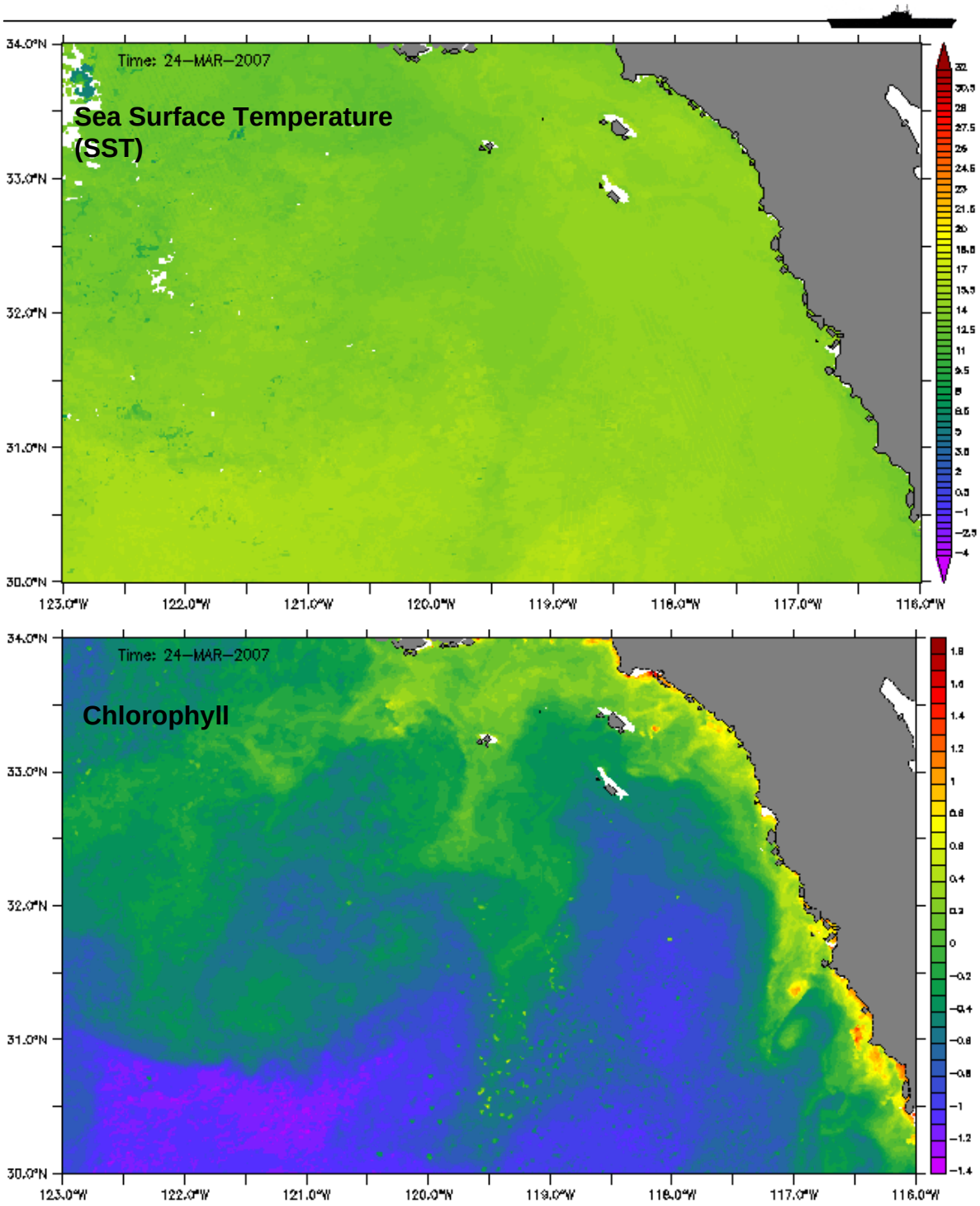

Figure A-3. SST (top) and Chlorophyll (bottom) for Southern California, 14-day composite ending 24 March 2007.
Data from: CoastWatch and Southwest Fisheries Science Center, NMFS.
http://las.pfeg.noaa.gov/oceanWatch/oceanwatch.php

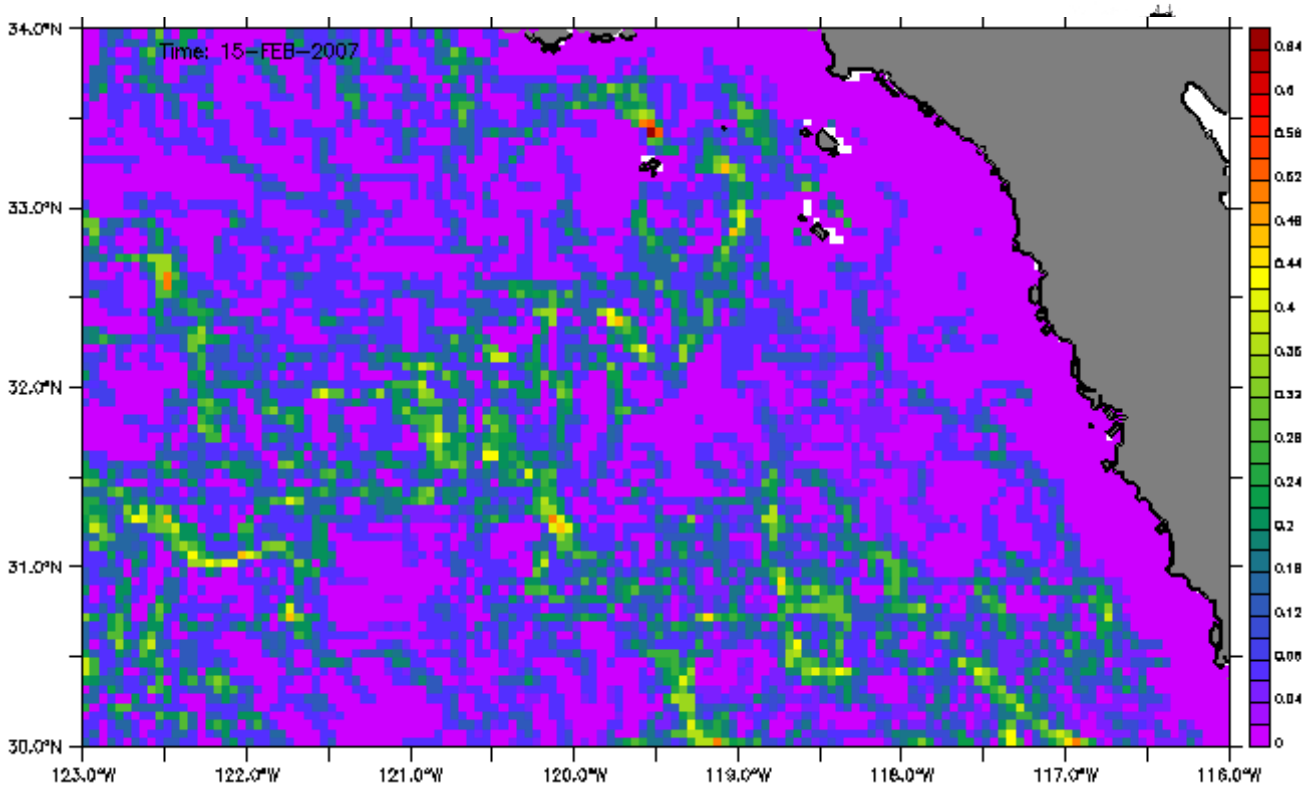

Figure A-4. Frontal Probability Index for Southern California, 14 day composite ending 15 February 2007 (only data available as of document preparation date).
Data from: CoastWatch and Southwest Fisheries Science Center, NMFS.
http://las.pfeg.noaa.gov/oceanWatch/oceanwatch.php

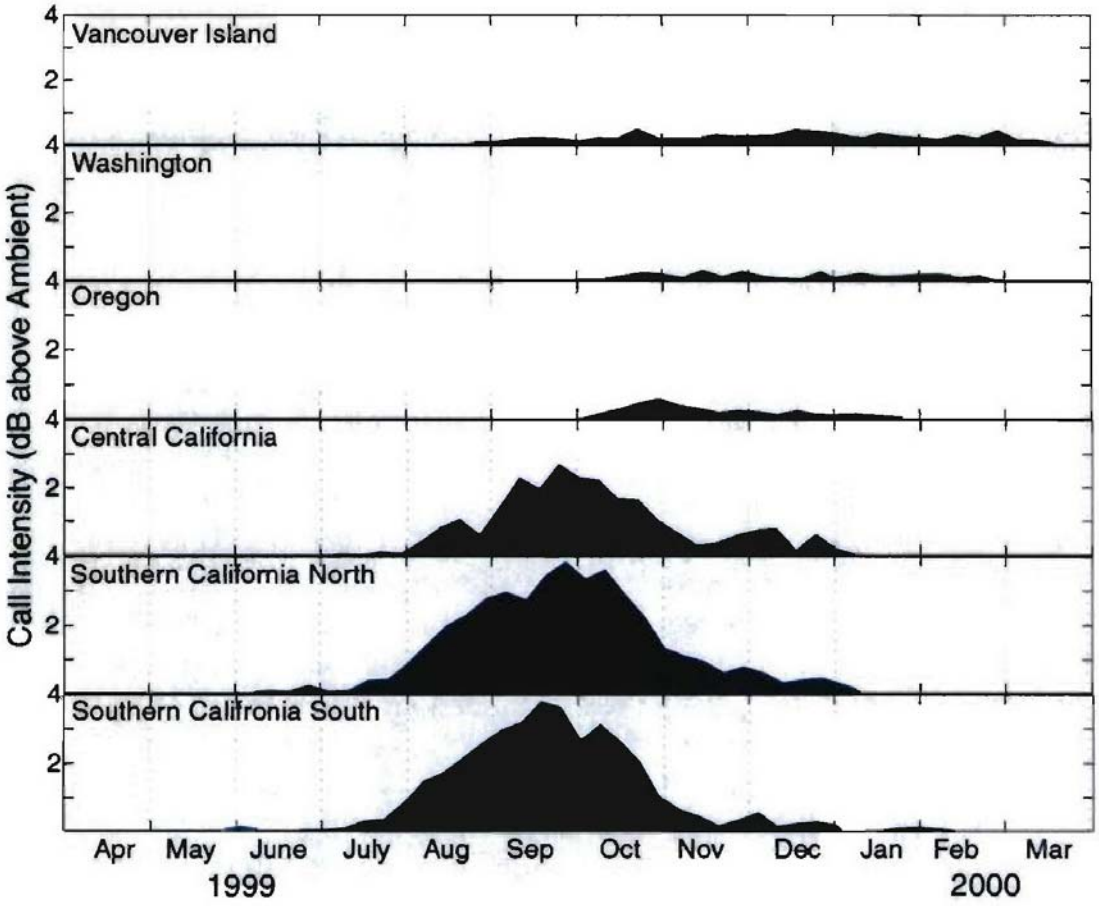

Figure A-5. Seven year average (1994-2000) of blue whale acoustic intensity for each of six sites along the continental shelf of the western North America (From: Hildebrand 2005).

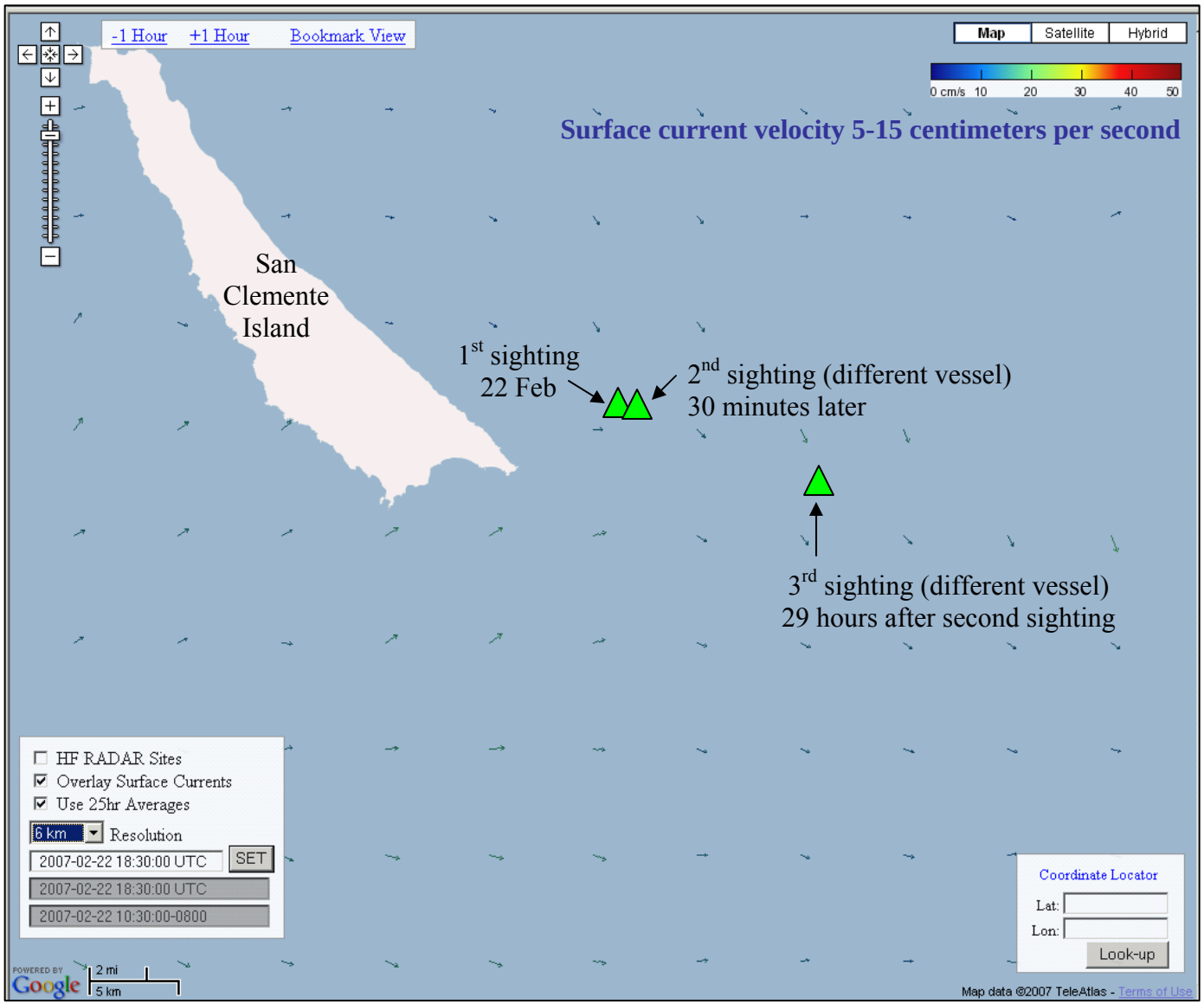

Figure A-6. Surface currents measured from on radar-based current mapping (25-hour averaging) at 10:30 am Pacific Standard time on 22 February 2007 relative to multiple sightings of the same decomposed whale carcass by several ships from 22-23 February.
(Data and image online from: from Coastal Ocean Currents Monitoring Program)

APPENDIX B- LETTER OF INSTRUCTION

SUBJ/MARINE MAMMAL AND ENDANGERED SPECIES LETTER OF INSTRUCTION (LOI) /IN SUPPORT OF xxxxx07-xx//

REF/A/DOC/16USC1361-1372/-/1972//

REF/B/DOC/16USC1531-1544/-/1973//

REF/C/INST/OPNAVINST 5090.1B CH-3/01NOV1994//
REF/D/MSG/SECNAV/181634ZNOV2005//

REF/E/LTR/DOD/23JAN2007//

NARR/REF A IS THE MARINE MAMMAL PROTECTION ACT. REF B IS THE ENDANGERED SPECIES ACT. REF C IS THE ENVIRONMENTAL AND NATURAL RESOURCES PROGRAM MANUAL. REF D IS ALNAV REQUIRING RETENTION OF ALL MID-FREQUENCY ACTIVE SONAR USE LOGS AND MATERIALS RELATED TO MID-FREQUENCY ACTIVE SONAR DUE TO ONGOING LITIGATION IN US FEDERAL COURT. REF E IS NATIONAL DEFENSE EXEMPTION FROM REQUIREMENTS OF THE MARINE MAMMAL PROTECTION ACT FOR CERTAIN DOD MID-FREQUENCY ACTIVE SONAR ACTIVITIES.//

GENTEXT/REMARKS/1. (U) DUE TO POSSIBLE PRESENCE OF PROTECTED MARINE SPECIES WITHIN xxxxx 07-xx OPERATING AREA AND POTENTIAL EFFECTS ON THESE SPECIES FROM USE OF MID-FREQUENCY ACTIVE SONAR, THE FOLLOWING GUIDANCE IS PROVIDED FOR EXERCISE CONDUCT AND REPORTING. THE MAJORITY OF THE GUIDANCE AND INFORMATION IN THIS MESSAGE IS COMPILED FROM EXISTING LAWS AND REGULATIONS FOUND IN REFS A-E.

1.A. (U) MARINE MAMMALS. REF A PROHIBITS HARASSING, CAPTURING, INJURING OR KILLING ANY MARINE MAMMAL (INCLUDING WHALES, DOLPHINS, SEALS AND PORPOISES) IN U.S. WATERS OR ON THE HIGH SEAS. THE TERM HARASS IS INTERPRETED BROADLY AND INCLUDES ACTS OF PURSUIT, TORMENT OR ANNOYANCE WHICH HAVE THE SIGNIFICANT POTENTIAL TO INJURE A MARINE MAMMAL IN THE WILD OR WHICH DISTURBS OR IS LIKELY TO DISTURB A MARINE MAMMAL 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.

1.B. (U) ENDANGERED SPECIES. REF B PROHIBITS THE TAKING (HARASSING, HARMING, PURSUING, HUNTING, SHOOTING, WOUNDING, KILLING, TRAPPING, CAPTURING OR COLLECTING OR TO ATTEMPT TO DO SO) OF ANY FEDERALLY PROTECTED ENDANGERED OR THREATENED SPECIES UPON THE HIGH SEAS, WITHIN THE UNITED STATES OR IN THE TERRITORIAL SEA OF THE UNITED STATES.

2. (U) REF E SPECIFIES NEW REQUIREMENTS EFFECTIVE THROUGH 23 JANUARY 2009 WHEN USING MID FREQUENCY ACTIVE (1 KHZ-10 KHZ) SONAR (MFAS) (E.G. SHIP AND SUB HULL MOUNTED SONAR, HELO DIPPING SONAR AND DICASS SONOBUOYS) DURING MAJOR EXERCISES OR WHEN TRAINING OR CONDUCTING MAINTENANCE WITHIN ESTABLISHED OPERATING AREAS.

2.A. (U) THESE REQUIREMENTS APPLY:

2.A.1. (U) DURING XXXXX 07-0X TRAINING EXERCISES.

2.A.2. (U) TO THE USE OF MFAS SYSTEMS FOR THE PURPOSE OF SEARCHING FOR AND TRACKING OF SUBMARINES AND MINES.

2.B. (U) THESE REQUIREMENTS DO NOT APPLY TO:

2.B.1. (U) OPERATIONAL USE, INCLUDING FORCE PROTECTION AND SAFETY OF NAVIGATION.

2.B.2. (U) UNDERWATER COMMUNICATION SYSTEMS AND FATHOMETERS.

3. (U) A COORDINATED CUSFFC/CPF GUIDANCE MESSAGE WILL BE RELEASED IN THE NEAR FUTURE TO ENSURE COMPLIANCE WITH REF E REQUIREMENTS. IN THE INTERIM, FOR THE PURPOSES OF xxxxxx 07-xx, THE FOLLOWING ACTIONS ARE DIRECTED.

3.A. (U) PERSONNEL TRAINING.

3.A.1 (U) ALL SURFACE SHIP LOOKOUTS AND TOPSIDE WATCHSTANDERS (I.E., OODS, JOODS) AS WELL AS MPA AIRCREWS AND ASW/MIW HELICOPTER AIRCREWS MUST COMPLETE MARINE SPECIES AWARENESS TRAINING (MSAT) BY VIEWING THE U.S. NAVY MSAT DVD. MSAT TRAINING MUST BE REVIEWED PRIOR TO USE OF MFA SONAR. THESE PERSONNEL ARE NOT SOLELY MARINE MAMMAL OBSERVERS AND CAN PERFORM OTHER DUTIES (E.G., LOOKOUT, JOOD).

UNITS SHOULD ALREADY HAVE A COPY OF THE MSAT DVD, WHICH WAS DISTRIBUTED IN AUGUST 2006. IF NOT RECEIVED, CONTACT xxxxxx, TEL: xxx-xxx-xxxx, NIPRNET EMAIL: xxxxxxxxx TO OBTAIN A COPY. THE MSAT TRAINING CAN BE FOUND ON HTTPS:/MMRC.TECQUEST.NET/. IN ADDITION, MARINE MAMMAL TRAINING SLIDES ARE AVAILABLE ON THE xxxxxxx WEBSITE AT xxxxxxx.

3.B. (U) AVIATION UNITS.

3.B.1 (U) MPA AND OTHER AIRCRAFT PARTICIPATING IN ASW EVENTS AND FLYING LOW ENOUGH TO REASONABLY SPOT MARINE MAMMALS SHALL MONITOR FOR MARINE MAMMALS PRIOR TO AND DURING THE EVENT AND REPORT SIGHTINGS TO xxxxxx. IF SONAR IS SECURED (I.E. DICASS SONOBUOY) DUE TO PRESENCE OF MARINE MAMMALS WITHIN 200 YARDS, THEN REPORTING REQUIREMENT DESCRIBED IN PARA 4.A.2 APPLY.

3.C. (U) SONAR OPERATORS.

3.C.1 (U) SUB OPERATORS WILL CHECK FOR PASSIVE INDICATION OF MARINE MAMMALS CLOSE ABOARD PRIOR TO USE OF MFAS. CLOSE ABOARD IS DEFINED AS VISIBLE BEARING RATE ON DIMUS DISPLAY. SHIP OPERATORS WILL CHECK FOR PASSIVE INDICATION OF MARINE MAMMALS ON THE UNDERWATER TELEPHONE IOT ALERT LOOKOUTS PRIOR TO USE OF MFAS. IF MFAS SONAR IS SECURED DUE TO PRESENCE OF MARINE MAMMALS, THEN REPORTING REQUIREMENTS DESCRIBED IN PARA 4.A.2 APPLY AS APPLICABLE AND CAN BE DETERMINED.

3.D. (U) MFAS OPERATIONS.

3.D.1. (U) OPERATE MFAS AT LOWEST PRACTICABLE LEVEL, NOT TO EXCEED 235 DB, EXCEPT FOR OCCASIONAL SHORT PERIODS OF TIME TO MEET TACTICAL TRAINING OBJECTIVES. USE OF MFAS AT SOURCE LEVELS ABOVE 235 DB SHALL BE LOGGED AND REPORTED IAW PARA 4.

3.D.2. (U) PRIOR TO START-UP OR RESTART OF ACTIVE SONAR, OPERATORS WILL CHECK THAT THE BUFFER ZONE DESCRIBED BELOW IN PARA. 3.E IS CLEAR OF MARINE MAMMALS.

3.D.3. (U) HELICOPTERS SHALL OBSERVE/SURVEY THE VICINITY OF EACH ASW EVENT LOCATION FOR 10 MINS PRIOR TO COMMENCEMENT OF THE PROSECUTION (BEFORE DEPLOYING ACTIVE (DIPPING) SONAR). HELICOPTERS SHALL NOT DEPLOY THEIR SONAR WITHIN 200 YARDS OF A MARINE MAMMAL AND WILL SECURE ACTIVE TRANSMISSIONS IF A MARINE MAMMAL CLOSES WITHIN 200 YARDS. IF SONAR IS SECURED DUE TO PRESENCE OF MARINE MAMMALS WITHIN 200 YARDS, THEN REPORTING REQUIREMENT DESCRIBED IN PARA 4.A.2 APPLY.

3.E. (U) HULL MOUNTED MFAS BUFFER ZONES.

3.E.1. PRIOR TO START-UP OR RESTART OF MFAS, OPERATORS WILL CHECK THAT SAFETY ZONES IN PARA 3.E.2-4 ARE CLEAR OF MARINE MAMMALS.

3.E.2. (U) 1000 YARDS. WHEN MARINE MAMMALS ARE DETECTED BY ANY MEANS (AIRCRAFT, LOOKOUT, OR AURALLY) WITHIN 1000 YARDS OF THE SONAR DOME, THE SHIP OR SUBMARINE WILL LIMIT ACTIVE TRANSMISSION LEVELS TO AT LEAST 6 DB BELOW THE EQUIPMENT NORMAL OPERATING LEVEL FOR SECTOR SEARCH MODES. SHIPS AND SUBMARINES WILL CONTINUE TO LIMIT MAXIMUM PING LEVELS BY THIS 6 DB FACTOR UNTIL THE ANIMAL HAS BEEN SEEN TO LEAVE THE AREA, HAS NOT BEEN SEEN FOR 30 MINUTES, OR THE VESSEL HAS TRANSITED MORE THAN 2000 YARDS BEYOND THE LOCATION OF THE LAST SIGHTING.

3.E.3. (U) 500 YARDS. SHOULD THE MARINE MAMMAL BE DETECTED WITHIN OR CLOSING TO INSIDE 500 YARDS OF THE SONAR DOME, ACTIVE SONAR TRANSMISSIONS WILL BE LIMITED TO AT LEAST 10 DB BELOW THE EQUIPMENT'S NORMAL OPERATING LEVEL FOR SECTOR SEARCH MODES. SHIPS AND SUBMARINES WILL CONTINUE TO LIMIT MAXIMUM PING LEVELS BY THIS 10 DB FACTOR UNTIL THE ANIMAL HAS BEEN SEEN TO LEAVE THE AREA, HAS NOT BEEN SEEN FOR 30 MINUTES, OR THE VESSEL HAS TRANSITED MORE THAN 2000 YARDS BEYOND THE LOCATION OF THE LAST SIGHTING.

3.E.4. (U) 200 YARDS. SHOULD THE MARINE MAMMAL BE DETECTED WITHIN OR CLOSING TO INSIDE 200 YARDS OF THE SONAR DOME, ACTIVE SONAR TRANSMISSIONS WILL CEASE. WHEN A MARINE MAMMAL IS DETECTED CLOSING TO INSIDE APPROXIMATELY 200 YARDS OF THE SONAR DOME, THE PRINCIPAL RISK BECOMES POTENTIAL PHYSICAL INJURY FROM COLLISION. ACCORDINGLY, IF THE MARINE SPECIES CLOSES WITHIN 200 YARDS, SHIPS AND SUBMARINES SHALL MANEUVER TO AVOID COLLISION TO THE GREATEST EXTENT POSSIBLE, WITH SAFETY OF THE VESSEL BEING PARAMOUNT. ACTIVE SONAR WILL NOT RESUME UNTIL THE ANIMAL HAS BEEN SEEN TO LEAVE THE AREA, HAS NOT BEEN SEEN FOR 30 MINUTES, OR THE VESSEL

HAS TRANSITED MORE THAN 2000 YARDS BEYOND THE LOCATION OF THE LAST SIGHTING.

3.E.5. (U) SPECIAL CONDITIONS APPLICABLE TO DOLPHINS AND PORPOISES

ONLY: IF, AFTER CONDUCTING AN INITIAL MANEUVER TO AVOID CLOSE QUARTERS WITH DOLPHINS OR PORPOISES, THE OFFICER OF THE DECK CONCLUDES THAT DOLPHINS OR PORPOISES ARE DELIBERATELY CLOSING TO RIDE THE VESSEL BOW WAVE, NO FURTHER MITIGATION ACTIONS ARE NECESSARY WHILE THE DOLPHINS OR PORPOISES CONTINUE TO EXHIBIT BOW WAVE RIDING BEHAVIOR.

3.F. (U) LOOKOUTS

3.F.1. (U) ON THE BRIDGE OF SURFACE SHIPS, THERE WILL BE AT LEAST THREE PEOPLE ON WATCH WHOSE DUTIES INCLUDE OBSERVING THE WATER SURFACE AROUND THE VESSEL. IN ADDITION TO THE THREE PERSONNEL ON WATCH, ALL SURFACE SHIPS PARTICIPATING IN ASW EXERCISES WILL HAVE AT ALL TIMES DURING THE EXERCISE AT LEAST TWO ADDITIONAL PERSONNEL ON WATCH AS LOOKOUTS. EACH PERSON ON WATCH WILL HAVE A SET OF BINOCULARS TO AID IN DETECTION OF MARINE MAMMALS. ON SURFACE VESSELS EQUIPPED WITH MFAS, PEDESTAL-MOUNTED BIG EYE (20 X 110) BINOCULARS WILL BE USED TO ASSIST IN DETECTION OF MARINE MAMMALS IN THE VICINITY OF THE VESSEL.

3.F.2. (U) DURING MFAS OPERATIONS, PERSONNEL WILL UTILIZE ALL AVAILABLE SENSOR AND OPTICAL SYSTEMS (SUCH AS NIGHT VISION GOGGLES) TO AID IN DETECTION OF MARINE MAMMALS.

3.F.3. (U) PERSONNEL ON LOOKOUT WILL EMPLOY VISUAL SEARCH PROCEDURES EMPLOYING A SCANNING METHODOLOGY IAW LOOKOUT TRAINING HANDBOOK (NAVEDTRA 12968-B).

3.F.4 (U) AFTER SUNSET AND PRIOR TO SUNRISE, LOOKOUTS WILL EMPLOY NIGHT LOOKOUT TECHNIQUES IN ACCORDANCE WITH LOOKOUT TRAINING HANDBOOK.

4. (U) REPORTS AND DATA COLLECTION.

4.A. (U) ALL UNITS WILL CONTINUE TO SEND SPORTS MESSAGES.

4.A.1. (U) ALL UNITS EMPLOYING MFAS ARE REQUIRED TO SUBMIT AN AFTER ACTION REPORT (AAR), CLASSIFIED AS CONFIDENTIAL. XXXX STRIKE GROUP COMMANDER SHALL CONSOLIDATE ALL REPORTS INTO A FINAL REPORT AND FORWARD TO xxxxxxx, INFO CHAIN OF COMMAND, WITHIN 10 DAYS OF COMPLETION OF THE EXERCISE. THIS TIMELINE IS REQUIRED DUE TO REGULATORY REQUIREMENTS THAT NAVY VERBALLY REPORT MARINE MAMMAL SIGHTING INFORMATION AND IMPACTS TO MFAS OPS TO NATIONAL MARINE FISHERIES SERVICES WITHIN 15 BUSINESS DAYS FROM EXERCISE COMPLETION.

4.A.2. (U) THE FINAL REPORT (SUBJ: MFA MARINE MAMMAL REPORT FOR EXERCISE xxxxx 07-xx) WILL BE COMPRISED OF TWO PARTS. PART ONE WILL REPORT ALL MARINE MAMMALS SIGHTED DURING THE EXERCISE, AND WILL INCLUDE THE DATA LISTED BELOW:

A.DTG OF INITIAL SIGHTING.

B. UNIT AND POSIT (UNIT NAME AND LAT/LONG). NOTE, IF REPORT IS FOR ASW HELO ASSIGNED TO VESSEL, THIS MUST BE REPORTED SEPARATELY FROM SURFACE SHIP REPORTS.

C. DESCRIPTION OF ANIMAL BY SPECIES IF KNOWN, OTHERWISE SPECIFY: DOLPHIN, SM WHALE (SMALL WHALE), LG WHALE (LARGE WHALE), SEAL/SEALION.

D. ESTIMATED NUMBER OF ANIMALS.

E. TRUE BEARING AND RANGE FROM UNIT.

F. ANIMALS BEHAVIOR AT TIME OF SIGHTING: RESTING, TRAVELING (NOTE DIRECTION IN RELATION TO SHIP COURSE), BOW-RIDING, FEEDING/ERRATIC, MILLING (I.E., STAYING IN SAME AREA), JUMPING CLEAR OUT OF WATER, FLIPPER/TAIL SLAPPING, OTHER, OR UNKNOWN).

G. ACTION TAKEN: NONE, ALTER COURSE TO AVOID, MFAS POWER DOWN, MFAS SECURED (I.E. CEASE ACTIVE SONAR TRANSMISSION).

ONLY IN CASES WHERE MFAS IS POWERED DOWN OR SECURED, THE FOLLOWING ADDITIONAL INFORMATION IS REQUIRED IN ORDER TO FORWARD POST-EXERCISE IMPACT ASSESSMENT TO CPF AND NATIONAL MARINE FISHERIES SERVICE:

H. UNIT COURSE AND SPD.

I. ANIMAL COURSE AND EST SPD.

J. ACTION TIMELINE: LENGTH OF TIME MFAS POWERED DOWN, OR SECURED.

K. ACTION IMPACT (I.E. TACTICAL DEGRADATION ASSESSMENT): NONE, SLIGHT, MODERATE, SEVERE.

- REPEAT PARAS. A-L AS NECESSARY TO REPORT ADDITIONAL SIGHTINGS.

SIGHTING SHALL BE IN FORMAT:

A. DTG/ B. UNIT-POSIT/C. DESCRIPT/ D. # ANIMAL/ E. BRNG-RNG/ F. BEHAV/ G. ACTION TAKEN/H. UNIT CRS-SPD/ I. ANIMAL CRS/ J. ACTION TIME/

PART TWO OF THE REPORT WILL PROVIDE A COMMANDER'S ASSESSMENT OF EFFECTIVENESS OF THE MITIGATION MEASURES IMPLEMENTED IN REF E, MAKE RECOMMENDATIONS TO IMPROVE THESE MEASURES, AND REPORT ANY IMPACT TO TRAINING FIDELITY CAUSED BY THESE MEASURES (E.G., SONAR POWER REDUCTION CAUSED BY MARINE MAMMAL ENTERING BUFFER ZONE). IT IS PARTICULARLY IMPORTANT TO CAPTURE THE IMPACT THAT THESE MEASURES MAY HAVE ON OPERATIONS AND TRAINING.

5. (U) ENSURE WATCHSTANDERS ARE BRIEFED ON THE POSSIBLE PRESENCE OF MARINE MAMMALS AND THAT ALL SIGHTINGS ARE REPORTED TO THE BRIDGE. NOTE, WHALES OFTEN TRAVEL IN GROUPS AND A SIGHTING INDICATES THE POSSIBILITY OF OTHER WHALES IN THE VICINITY.

5.A. (U) UPON SIGHTING A WHALE, ADJUST COURSE AND SPEED AS NECESSARY TO MAINTAIN A SAFE DISTANCE CONSISTENT WITH PRUDENT SEAMANSHIP.

5.B. (U) SIGHTINGS OF ALL WHALES SHALL BE PASSED VIA CHAIN OF COMMAND TO THE CFMCC BATTLE WATCH CAPTAIN IOT ALERT OTHER SHIPS IN THE AREA TO THE POSSIBILITY OF THE WHALES' PRESENCE.

5.C. (U) IN THE EVENT OF A WHALE COLLISION. IF POSSIBLE, TAKE VIDEO AND/OR PHOTOGRAPHS OF THE STRICKEN WHALE.

5.C.1. (U) ATTEMPT TO IDENTIFY DISTINGUISHING CHARACTERISTICS OF THE WHALE INVOLVED. THE "WHALE WHEEL," A DEVICE THAT LISTS VARIOUS SPECIES OF WHALES AND THEIR IDENTIFYING FEATURES, CAN ASSIST IN THIS REGARD.

5.D. (U) REPORTING REQUIREMENTS FOR A WHALE COLLISION. CHAPTER

19-11.3.2 OF REF C PROVIDES GUIDANCE CONCERNING WHALE STRIKES.

5.D.1. (U) IN THE EVENT OF A COLLISION WITH A WHALE OR ON SIGHTING A MARINE MAMMAL FLOATING CARCASS DURING xxxxxx 07-0X, AN APPROPRIATE UNIT SITREP/OPREP MESSAGE MUST CONTAIN THE FOLLOWING ADDRESSEES AND INFORMATION:

A. DATE, TIME AND LOCATION.

B. VESSEL'S COURSE AND SPEED.

C. OPERATIONS BEING CONDUCTED BY THE VESSEL.

D. WEATHER CONDITIONS, VISIBILITY AND SEA STATE.

E. DESCRIBE THE ANIMAL IN AS MUCH DETAIL AS POSSIBLE; E.G., LENGTH, COLOR, CONDITION OF BODY, OTHER DISTINGUISHING FEATURES. DO NOT SPECULATE.

F. NARRATIVE OF INCIDENT, INCLUDING RELATIVE POSITION AND MOVEMENTS OF SHIP AND WHALE.

G. INDICATE IF PICTURES/VIDEOS WERE TAKEN FROM FLIGHT DECK CAMERAS OR OTHER INSTALLED OR PORTABLE CAMERAS.

5.D.2. (U) A VOICE REPORT (VIA ISIC) TO xxxxxx IS ALSO REQUIRED. IF VOICE COMMUNICATIONS ARE NOT AVAILABLE, MAKE REPORT VIA CHAT.

6. (U) ALL UNITS THAT EMPLOY MFAS SHALL ENSURE THEY FULLY UNDERSTAND AND IMPLEMENT THE MITIGATION AND REPORTING REQUIREMENTS PROMULGATED IN THIS MESSAGE.

6.A. (U) COMMANDING OFFICERS SHALL THOROUGHLY REVIEW THIS GUIDANCE WITH KEY PERSONNEL AND WATCHSTANDERS TO ENSURE FULL SITUATIONAL AWARENESS AND COMPLIANCE.

7. (U) REMINDER, NOTHING IN THIS MESSAGE RESTRICTS THE AUTHORITY OF A COMMANDING OFFICER FROM TAKING SUCH MEASURES DEEMED NECESSARY FOR OPERATIONAL FORCE PROTECTION AND SAFETY OF NAVIGATION PURPOSES.// BT